

# **A Primer on Linking Disaster Risk Reduction with Development Efforts**

**ACEDRR Workshop Report Series 1**

*A report based on the themes presented  
at the disaster risk reduction workshop  
conducted at the 2007 Madurai Symposium*

**Advanced Centre for Enabling  
Disaster Risk Reduction  
Tata-Dhan Academy  
Madurai**



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**Advanced Centre for  
Enabling Disaster Risk  
Reduction**

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Tata-Dhan Academy, Madurai

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We hope that this primer will sensitize practitioners to the intricate relationship between disasters and development, thereby strengthening actions to promote disaster risk reduction as a developmental effort.

***R. Sangeetha***

Coordinator

*Advanced Centre for Enabling Disaster Risk Reduction*



## PREFACE

When one surveys news reports today, mention of disasters—whether natural or man-made—seem to be commonplace. And, quite often, there is a lot of response to disasters. Aid agencies channel money or other forms of relief directly to communities who need it or to organizations who are better prepared to implement response work. Governments create plans to offer rehabilitation support, or find some other way to compensate those who are affected by disasters. Academicians write reports comparing one disaster to similar disasters, and theorize about what could have been done to minimize the impact of the disaster.

But where is the community in this post-disaster scenario? And what about the communities who have not suffered catastrophes? Are they safe? Is that enough? Is it appropriate to merely *respond* to disasters, or is there a better way to approach disaster risk reduction? And what does this mean for a development organization?

ACEDRR believes that there is simultaneously a positive and negative relationship between development and disasters. However, development efforts have incredible potential to contribute to disaster risk reduction and to help create a “culture of preparedness”. Development practitioners have a responsibility to be aware of this continuum and use it to

guide their work and to build knowledge about disaster preparedness and prevention.

ACEDRR also believes that for disaster preparedness to truly become a “culture”, efforts should not be merely on the part of an organization, institution, or government. Instead, there needs to be a platform where knowledge can be increased and shared to different stakeholders including partner organizations, academicians, government agencies, and the community. Furthermore, this is not envisioned as a uni-directional flow of knowledge; on the contrary, ACEDRR values the wisdom that comes only from years of tradition and experience that can be learned directly from the community and promotes strong multi-dimensional knowledge sharing.

To help create this culture, and to help increase the body of knowledge about the continuum between development and disasters, ACEDRR conducts a range of activities including pilot projects and research projects, developing a disaster database, strengthening multi-stakeholder networks, and conducting trainings and workshops.

One such workshop was the *Knowledge Building Workshop on Disaster Risk Reduction* conducted at the 2007 Madurai Symposium. Workshop participants included practitioners from NGOs, government organizations, and academic and research institutions. During the one-day workshop, one background paper and seven lead papers were presented on topics ranging from early warning systems, to the role of ecological preservation in disaster risk reduction, to disseminating knowledge about disaster risk reduction through virtual learning environments. (See the appendix for a list of the papers presented.)

As one objective of the experience was to share knowledge, all papers have been made available on the ACEDRR website. However, ACEDRR felt that more could be done to synthesize the experience. The result is this primer, which was designed around some of the main themes of the one-day workshop. The primer is divided into four main parts, as in the following outline:

- ✧ ***Development and Disaster Risk Reduction: Creating a Development Culture which Integrates Disaster Risk Reduction*** focuses on the relationship between development and disasters, both in a general sense, and in the context of population growth and urbanization.
- ✧ ***Education and Training for Disaster Risk Reduction: Creating a Culture of Preparedness for Practitioners and Communities*** considers the differences between concepts like “information”, “knowledge”, and “wisdom” and shares how capacity building and education can be used as tools for disaster preparedness both at the organizational and the community level.
- ✧ ***Making Knowledge and Wisdom Work for Disaster Risk Reduction: Learning from the Experiences of Others to Enhance Disaster Risk Reduction from the Community Level*** concentrates on the community-based disaster management approach and also shares some views on how information and communication technologies can help at times of disasters.
- ✧ ***DHAN Vayalagam (Tank) Foundation’s Experience in Flood Mitigation: Relief Work Evolves into a Community-Integrated Early Warning System for Flooding Risk*** presents one example of how a relief effort evolved into a community-managed early warning system for floods, and also how a pilot study was developed to help enhance and share the lessons from the experience with different stakeholders.

This primer is by no means a complete account of the relationship between disasters and development. However, it is hoped that this primer can serve as an introduction for practitioners to become more sensitized to the sensitive relationship, and that they use this new awareness to change from working in what is mostly a reactive manner, to working in a proactive one. It is also hoped that this primer can lay a foundation for further discussions and research—not discussions and research designed *around* communities, but ones which are passionate about including the

community as an integral partner and as a stakeholder whose traditional wisdom might be able to help us with some of the more complicated issues we face in our rapidly modernizing world.

# 1



## DEVELOPMENT AND DISASTER RISK REDUCTION

### *Creating a Development Culture which Integrates Disaster Risk Reduction*

**D**evelopment and disaster risk reduction are not always thought of together. Instead, there is often more of a concept of “post-disaster” responses by aid organizations to strengthen disaster risk reduction in redevelopment efforts. Indeed, very often, even the organizations which are working under the themes of “disaster risk reduction” and “development” are different, working with different priorities. But would it not be best if disaster risk reduction were integrated with any development intervention? Most would now agree that re-examining the intricate relationship between these two themes is important in today’s changing world. In the Government of India’s Ministry of Home Affairs’ *Disaster Management: The Development Perspective*, part of their Tenth Five Year Plan document, they propose:

*Five Year Plan documents have, historically, not included consideration of issues relating to the management and mitigation of natural disasters. The traditional perception has been limited to the idea of “calamity relief”.... However, the impact of major disasters cannot be mitigated by the provision of immediate relief alone.... Disasters can have devastating effects on the economy; they cause huge human and economic losses, and can significantly set back development efforts of a region or a State.... With the kind of economic losses and developmental setbacks that the country has been suffering year after year, the development process needs to be sensitive towards disaster prevention and mitigation aspects. There is thus need to look at disasters from a development perspective as well. (n.d., p 1, Section 7.1)*

The question remains, of course, how can this be done?

This chapter will look at this relationship more closely. The first section will explain how development and disasters are interrelated, in a general sense. In the second section, the relationship will be further explored in the context of population growth and increasing urbanization. Finally, this chapter will share some opportunities for making development sustainable—and at the same time, influential—in reducing disaster risk.

## **THE RELATIONSHIP BETWEEN DEVELOPMENT AND DISASTERS**

**M**ost dictionary definitions of “development” will indicate that development is not simply growth, but growth which results in something being stronger or more advanced. So, for example, a slum development effort might ensure stronger buildings or better drainage facilities. Going deeper, however, the general idea is that development should not only be about infrastructure development; it should also ensure advances in people’s quality of life. This includes advances in their livelihoods, access to services, and emotional stability (Kumar, 2007). Thus, improving access to education and healthcare, promoting gender equity, and taking efforts to protect the environment or restore an ecosystem can all be seen as development activities.

The idea of “disaster” brings various things to mind. Disasters include natural calamities which affect significant populations in various aspects (including life, livelihoods, or assets) and man-made calamities. Disasters can also include disease outbreak, whether for humans, plants, or livestock. While we generally think of disasters on a large scale, it is also important to note that disasters are also contextual and relative. That is, a community’s perception of a disaster might vary depending on that community’s ability to cope with a particular incident; this may be both in terms of the actual extent of the disaster as well as the cost of recovering from a disaster. In other words, “disaster impacts and losses are not distributed evenly across populations. Its distribution depends upon underlying vulnerabilities which arise from factors such as location of hu-

man settlements and economic enterprises, conditions of housing, and access to resources and information” (Vatsa, 2004, pp 1 – 2).

With that in mind, what is the current relationship between development and disasters? There are at least five broad areas. First, some development efforts intentionally or unintentionally displace people<sup>1</sup>. The displacement can leave them more vulnerable, thus more susceptible to disasters. This displacement does not have to be physical—that is, from their residence. It can also be in terms of employment. For example, educational improvements can make employment difficult for some groups who become displaced from their jobs by fewer people who are better trained or are using more efficient equipment. Second, unregulated development—development which focuses only on growth and not growth plus, say, advancement or strengthening of some sort, can lead to new disasters or insecurities in themselves. Using the example of a slum again, a slum can grow—in other words, expand—without a process in place to reduce vulnerabilities; this unregulated growth can lead to various hazards including higher exposure to diseases or even structures collapsing on themselves due to improper construction. Third, disasters can negate development efforts, at least partially, by causing high levels of destruction that not only affect infrastructure, but also destabilizes people by

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1 In *Everybody Loves a Good Drought*, for example, P. Sainath writes the following description:

Imagine the entire population of the continent of Australia turned out of their homes—eighteen million people losing their lands, evicted from their houses. Deprived of livelihood and income, they face penury. As their families split up and spread out, their community bonds crumble. . . . Oddly, it all happens in the name of development. And the victims are described as beneficiaries.

Sounds too far fetched even as fiction?

It’s happened in India, where in the period 1951 – 90, over 21.6 million people suffered precisely that fate—displaced by just dams and canals alone. (p. 71)



causing emotional trauma and by interrupting their livelihoods. Fourth, disasters can pave the way for further development—or at least redevelopment—efforts. In the early stages, these efforts are often targeted at restoring livelihoods and restoring access to basic services; however, depending on the extent of the disaster, development organizations may find themselves with an opportunity to completely rebuild something. Fifth, development can help reduce vulnerability for different communities. For example, education can help communities learn how to respond in case of an emergency, or an infrastructure development project can help reduce exposure to, say, water-borne diseases.

Of course, the above is an oversimplified view of the intricate relationship between disasters and development. Development can be further divided, for example, as economic development and social development, as was done by the UNDP in a 2004 report, *Reducing Disaster Risk: A Challenge for Development*. In their comparison between the two, they looked at impacts along the lines that disasters can limit development, development can increase disaster risks, and development can reduce disaster risk, and considered these along the lines of both social and economic development. Thus, if we were to consider economic development causing disaster risk, we would include a development effort that introduced new risks or that was unsustainable, thus leading to instability and uncertainty, as indicated in the earlier slum development example.

The above discussion relates to the potential relationships between disasters and development; however, as indicated earlier, many development efforts related to disasters have been focused on responding to disasters. Fortunately, trends are changing. In the American Red Cross's *International Disasters Report* (July 1, 2006 – June 30, 2007), for example, they point out that they recognize “a direct relationship between better-prepared communities and lives and assets saved” (p. 3) and encourage promoting preparedness activities continuously. Furthermore, preparedness activities can range from simple community assessments, to preparing evacuation plans, to simply raising public awareness about disaster preparedness.

Why are such efforts important? Reinforcing the American Red Cross's assertion, Hewitt (2005) describes the challenges faced in developing countries which, due to increased vulnerability, migration, population growth, urbanization, and other similar pressures, can suffer incredible development setbacks as a result of disasters. In developed countries, by contrast, Hewitt describes the situation as:

*Even when disaster does strike, most developed world countries remain at the ready, thanks to detailed disaster management programs that include mechanisms for warning populations of impending disasters, providing emergency medical and social services, and facilitating coordinated clean-up and reconstruction. (45)*

This difference can be attributed to better planning processes, stricter building codes, better enforcement of laws and other mechanisms designed to protect people and their property, and heightened awareness of safety and precautionary measures by the general public.

Since many development efforts specifically target poor populations, it is even more important that organizations focus on integrating disaster management or disaster risk reduction in their work. One simple reason is the impact of disasters on the poor or on developing countries. While it is accurate to say that "Natural disasters are not bound by political boundaries and have no social or economic considerations. They are borderless as they affect both developing and developed countries" (Government of India, n.d., Section 7.6), this is only half the story. A country's or an individual's ability to absorb a shock also depends on their economic strength and stability (Kumar, 2007; UNDP, 2004). Therefore, disasters—while they may be borderless—do cause more disruptions for poorer, more vulnerable sections of society. This can lead to a cyclical relationship between poverty and vulnerability in which the poor spend much more of their time and resources preparing for disaster shocks or recovering from disaster shocks. Wealthier countries and individuals, on

the other hand, can generally recover from disasters more quickly and more thoroughly<sup>2</sup>.

However, for both developing and developed countries, urbanization and population growth pose new challenges. Humans have always been known to alter their environment to their benefit, but without proper designs, these plans can be very short sighted. In the following section, we will look at how population growth and urbanization are related to disasters.

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2 This is not to be misinterpreted that developed countries do not suffer the consequences of disasters. In the US, for example, Hurricane Katrina, in 2005, was an extremely devastating and expensive disaster. Wildfires can be expensive and destructive during the dry summer months. The difference, however, is in the ability for an economically stronger country to “absorb” these events. An analogy would be that of two households in a given area, one wealthier (with sufficient savings, a variety of assets, insurance, and similar methods of reducing risk) and one poorer (for example, subsisting on a “wage-to-wage” lifestyle, without insurance, and so on). The wealthier household might lose more in absolute amounts, but the poorer household would lose a larger percentage of its assets; additionally, because of the lack of insurance and other security measures, the recovery time for the poorer household would most likely be longer (Krishna, 2004).

## IMPLICATIONS OF URBANIZATION AND POPULATION GROWTH ON DISASTER RISK REDUCTION

One simple reason for integration of disaster risk reduction in development efforts—one which is important whether looking at a developed area or a developing area—is that overpopulation and urbanization are both common challenges in today’s development process, and these challenges bring with them both historical disaster risks and new disaster situations. To demonstrate the scope of urbanization, it is estimated that “by the year 2025, half the world’s population will reside in urban areas and 90% of this will be in developing nations” (Gadhok, 2007, slide 2). This growth can result in what can be called “megacities”—cities in which the population is greater than 10 million.

Urbanization is significant in the discussion of the relationship between development and disasters in that it presents a scenario in which cities are both a cause of risk, and they face many risks of their own (Gadhok, 2007). One way in which cities directly cause risk is in the effect of urbanization on environmental change. First, urbanization often results in major deforestation or alteration to an area’s ecosystem. It has not been until recently that environmental impact assessments have become more commonplace in development planning. Deforestation alone can lead to problems such as landslides (the root-systems of forest plants can help soil retention) or climate change (see Text Box 1), and can lead to the loss of natural defence systems (such as the protection that forests can provide against excessive wind, or protection from floods by the absorption of water by root systems during heavy rainfall). Note that these

problems introduce new problems of their own. A landslide, for example, can obviously threaten a person's life and assets; but it can also lead to the loss of fertile land through unnaturally rapid erosion. Deforestation can also lead to desertification<sup>3</sup>; in China, for example, the Chinese Forestry Administration attributes over 1.7 million square kilometres of desertification to "poor agricultural practices and deforestation" (Hill, 2004, p. 134).

Forests are not the only natural systems in place which provide protection from natural disasters. As noted by Deshmukh, while natural disasters "cannot be controlled, natural disas-

***CLIMATE CHANGE,  
GLOBAL WARMING, AND THE  
GREENHOUSE EFFECT***

Climate change is a term one is likely to encounter quite frequently in today's literature. The term is often used alongside terms like "global warming", and the "greenhouse effect"; but these terms, while interrelated, are quite different. The "greenhouse effect" refers to how Earth's temperature is controlled by different gases in Earth's atmosphere. "Global warming" is the increase in the earth's surface temperature that has been observed recently because of changes in the composition of gases in the earth's atmosphere (particularly gasses referred to as "greenhouse gasses"). As "climate" refers to long-term average measurements of weather-related data, "climate

*Continued on page 10*

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3 The impact of desertification is beyond the scope of this chapter; however, it is important to note the host of problems which can result from this and other forms of land degradation. As indicated by Parks, Tierney, Hicks, and Roberts "Land degradation has led to sharp declines in agricultural productivity, more frequent flooding and drought, malnutrition and food insecurity, mass migration and armed conflict, as well as ecosystem breakdowns" (2008, p. 38). As such, land degradation is a huge issue from a development perspective. Fortunately, there are many lessons from the growth of the currently developed countries in terms of why development should not come at the expense of the environment. Unfortunately, convincing developing countries to build environmental protection into their development plans can be seen as hypocritical since, in many cases, the developing countries did not create the environmental problems which plague them today; often, these are the results of earlier rapid growth of developed countries (Parks et al., 2008).

*Continued from page 9*

change” refers to significant long-term weather changes in a particular region.

Climate change, thus, is an important consideration when looking at the development opportunities for a region since changes in climate can result in things such as changing cropping patterns (benefiting some regions and harming others), altering water availability, altering the frequency and strength of natural disasters such as floods and hurricanes, imposing pressure on governments and humanitarian organisations to provide disaster relief, changing types and destinations for tourism, and increasing death rates (for example, deaths due to heatstrokes or similar conditions) (Common & Stagl, 2005).

Climate change is a controversial issue for several reasons, one of the most significant of which is the question of placing blame, that is, who should we blame for contributing to global warming? As described by Maslin:

*Non-industrialized countries are striving to increase their population’s standard of living, thereby also increasing their emissions of greenhouse gases, since economic development is closely associated with energy production.... China has*

*Continued on page 11*

ters do not need to trigger a disaster. Their impact can be much reduced by leaving nature’s protective infrastructure firmly in place—such as dunes, mangroves, coral reefs, forests on steep slopes” (2007, ¶ 2). Deshmukh goes on to add that this free and natural insurance insures not only against various natural disasters; it also insures the livelihoods of the existing inhabitants of these areas. In India, for example, large portions of tribal populations rely on forests for non-timber forest products for their livelihoods. Other communities depend on mangroves for supporting their fishing livelihoods. As these areas become encroached as urban areas expand (or, for example, for developing roads or other transportation facilities to connect urban areas) these populations and the environment both become exposed to greater risk, and are thus also more vulnerable to disaster impacts. Other forms of environmental change can be seen in the name of development. Hill (2004) highlights desertification, dried-up water bodies, and dust storms in a portion of her book *Understanding*

*Environmental Pollution*, citing examples such as the drying up of Owens Lake in California to provide water for Los Angeles.

But is the growth of cities itself something to be concerned about? Considering that many of the world's largest cities are no longer in the world's most developed countries, and considering that most of the urban growth to come will occur in developing countries, the growth of cities is a significant development issue<sup>4</sup>. Not only do larger cities demand more in terms of governance, infrastructure development, waste disposal, transportation, water, energy, and food supply, they also, as indicated earlier, contribute to a new host of development problems.

To better understand this, it may be of use to try to visualize the creation of megacities. In many developing countries—particularly those in which we can expect the growth of megacities—the growth of cities is often so rapid that infrastructure development cannot match the

*Continued from page 10*

*the second biggest emissions of carbon dioxide in the world. However, per capita the Chinese emissions are ten times lower than the USA, who are top of the list. (2004, p. 13)*

Concessions have been made for the developing world in all agreements regarding emissions reduction, since this is unfair (morally and economically) for developing countries who require increased energy production to support its development. However, due to the sheer population of some of developing countries (India and China, for example, combine for a population of over 2.3 billion people, and both are becoming rapidly industrialized) one can expect that their growth would be accompanied by a huge amount of pollution (Maslin, 2004). Thus, if development efforts in these countries voluntarily adopt more environmentally cautious or sensitive approaches, the climate change process can be slowed.

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4 As stated earlier, one does not need to restrict these discussions to developing countries. In the United States, for example, in the last 60 years, there has been considerable and rapid population growth (in part due to internal migration) in cities near the Pacific, Atlantic, and Gulf coasts. The Pacific coast is earthquake-prone; the Atlantic and Gulf coasts are hurricane-prone (Board on Natural Disasters, 1999).

pace of, for example, population growth. One can easily imagine cities growing “up”—that is, with multi-storied buildings—as well as growing “out”. For cities that grow “up”, we can expect problems such as higher concentration of pollution, less physical safety, or higher risk of theft. Additionally, if the growing city is in a country or region noted for corruption or inefficient bureaucracy, there are problems related to adherence to building codes or environmental regulations which impact the physical stability of the buildings. For cities that grow “out”, on the other hand, we can visualize housing being constructed closer to factories and other industries which may have been originally constructed remotely to address concerns like chemical pollution or other health hazards. We can also visualize the outward growth further altering the natural environment, contributing to the environmental issues briefly mentioned earlier.

Try to imagine, also, the response times in emergencies, or the increasing demands of sanitation or waste management, and you can see a new host of hazards emerging. Combine poor sanitation with overcrowding, and introduce an element of a highly contagious disease, and your urban area may be facing a medical emergency beyond its management capacity. In fact, we can even remove the element of imagination, and the element of poor sanitation facilities, and instead, introduce an unexpected event such as a flood, and you quickly find yourself dealing with a similar situation. For example, writing about the relief efforts following Hurricane Katrina, Winslow wrote:

*The major potential infectious disease threat resulted from the flooding of sewers. Early assessments by the EPA [Environmental Protection Agency] revealed coliform bacteria counts of >2400 cfu/mL in floodwater in Orleans Parish. (To be considered safe for recreational use, water should have a coliform count of <200 cfu/mL.) (2005, p. 1761)*

The possibility of infection was not the only risk. Due to inadequate media coverage, which overplayed the extent of the risks (the Center



for Disease Control said that, although these levels were unsafe, decontamination efforts did not require anything special; required cleaning with soap and clean water would be sufficient), many people panicked, creating additional work pressures for those involved in the relief efforts. Panic, combined with a lack of clarity of proper procedures (for example, escape routes) can quickly create disaster-prone situations. In urban settings, for example, fires, bombs, or even festivals or sports events which have become overly raucous or emotional, can all lead to stampedes an other similar dangerous settings.

Perhaps one of the biggest challenges with urbanization and population growth, however, is availability of clean drinking water. According to McGuire, “Even today, 1.7 billion people—a third of the world’s population—live in countries where supplies of potable water are inadequate, and this figure will top 5 billion in just 25 years” (2002, p. 37). When one considers that a disaster can also be defined in terms of a community’s ability to cope with a given situation, it becomes much easier to see how a shortage of drinking water—or a community being forced to rely on contaminated water which can spread diseases such as cholera or which can cause a diarrhoea epidemic—can lead to conflicts and levels of migration powerful enough to destabilize many regions.

The description in the previous pages may present a somewhat bleak picture; however, the intent is to offer hope in the sense that many people are acutely aware of both the challenges and of the possible solutions. It is also to remind us of the idea that disasters and development are interrelated, as expressed by Gadhok:

*While development is closely linked to vulnerability and vice versa, it is important to integrate preparedness for disasters as a part of development plans. For example, most of the deaths caused during the aftermath of disasters are not due to hazard itself but due to the built environment, which is not adequate to resist the impact of such calamities, or due to weak emergency prepared-*

*ness systems that are not equipped to offer response to such calamities to save casualties and losses. (p. 4)*

In the following section, we will look at some of the ways in which the development process itself can be strengthened in such a way that it assists in disaster risk reduction, or ways in which services offered by development agencies can be expanded to meet the needs of disaster risk reduction.

## **ENHANCING THE CONTINUUM BETWEEN DEVELOPMENT AND DISASTER RISK REDUCTION**

In the previous sections, we presented why it is important to create stronger links between development and disaster risk reduction, in particular considering the long-run changes we are now experiencing as a result of population growth and rapid urban growth. This section will look at areas for strengthening or “institutionalizing” disaster risk reduction.

In the Government of India’s (GOI) 2004 *Disaster Management in India: A Status Report*, the National Disaster Management Division outlines ten changes in approaches which would help with institutionalizing disaster risk reduction: designing institutional changes, adopting new policy, enhancing the legal framework, mainstreaming mitigation into development planning, providing funding, creating specific disaster mitigation schemes, enhancing preparedness measures, capacity building, developing human resources, and ensuring community participation (Government of India, 2004). As part of their efforts, it was recommended that state governments should establish “Disaster Management Authorities” to be responsible for activities like maintaining warning systems and coordinating disaster management work. Additionally, various responsibilities at different levels of governance, down to village-level youth organization “Disaster Management Teams”, were outlined in the report. But, perhaps more interesting are some of the features mentioned from the draft national policy on disaster management which include elements such as the following (pp. 11 – 12):

- ✧ *Item iii:* “Mitigation measures shall be built into the on-going schemes/programmes”.
- ✧ *Item iv:* “Each project in a hazard prone area will have mitigation as an essential term of reference. The project report will include a statement as to how the project addresses vulnerability reduction”.
- ✧ *Item v:* “Community involvement and awareness generation... are necessary for sustainable disaster risk reduction. This is a critical component of the policy since communities are the first responders to disasters and, therefore, unless they are empowered and made capable of managing disasters, any amount of external support cannot lead to optimal results”.
- ✧ *Item xii:* “The existing relief codes in the States will be revised to develop them into disaster management codes/manuals...”.

From the governmental level, these are definitely important features of a strengthened approach to disaster risk reduction, especially if they are implemented diligently and carefully.

There are other approaches which can be used. For example, in the same Government of India status report, vulnerability mapping and the creation of a geographic information system (GIS) database were mentioned several times; having such a database would assist in identifying high-risk hazard or risk zones, and help with emergency response (GOI, 2004). Because of the possibility of linking spatial databases with other forms of data—for example, photographs, population data, building records, historical disaster statistics, and land cover—GIS has the potential to be incredibly useful for predicting disasters in a particular area. This information can be displayed in the form of a map—a visual display that is easily understood, even for illiterate populations.

Beyond being used for predicting vulnerabilities and hazards, however, what this sort of data can provide is a way to plan more wisely. By using

existing geographic and non-geographic data for a particular area—for example, an area soon to be developed, or an area where an infrastructure development programme is to be implemented—a GIS database can help create models to simulate the impacts of these interventions. In the case of a disaster, providing that appropriate data is available, a well-implemented GIS database can also help in relief efforts by identifying how many evacuees are expected, and consequently, what quantity of relief supplies should be provided (Wattegama, 2007). Thus, GIS can be seen as a tool to help mitigate disaster risks as well as a tool to help with contingency planning.

Another area in which development efforts can help with disaster risk reduction is by diversifying assets (or capital) for a given population since this diversification will improve a community's ability to absorb shocks. Assets can be classified in different ways. For example, assets can be classified as human (knowledge, health, education), social (networks, relationships), political (influence, democratic institutions), financial (livestock, cash), physical (infrastructure, communications systems, transport), and natural (trees, water, game animals). As is pointed out by the International Institute for Sustainable Development (IISD), this combined capital can form “the basis for understanding how people will respond to climate induced vulnerabilities” and should thus be the basis for development activities (2003, p. 13). As a result of trying to increase capital overall for more vulnerable communities, their ability to recover from shocks will improve.

One important thing for any development organization to consider is the difference between slow-onset disasters (such as droughts or desertification) and rapid-onset disasters (such as floods and hurricanes). The development interventions for each is quite different. Slow-onset disasters require long-term planning and long-term commitment and may involve different coping strategies, in particular, to ensure access to food and water and to ensure livelihood stability. For areas likely to suffer from droughts, for example, different drought-resistant crops may be introduced, the public can be trained in different water conservation measures, natural water storage facilities can be identified or man-made

catchments can be constructed, and the community can store grains and similar food items for future consumption. Areas which are likely to suffer from rapid-onset disasters should implement measures appropriate to the disasters they can expect. For example, residents in earthquake-prone zones should ensure that their housing is structurally sound and that they have certain minimum first-aid supplies available. Regional planners in the same area should ensure that all new buildings adhere to minimum safety standards and are constructed in suitable sites, and the local government should ensure that existing buildings are retrofitted to the same standards as new ones.

Different stakeholders can also offer support for people living in disaster-prone areas. For example, an NGO can help create a disaster-reduction fund, or microfinance or micro-insurance products can be introduced as risk-transfer mechanisms. A microfinance institution (MFI), for example, can support a community in times of disasters by educating their clients about preventive measures or by providing loans for improving housing conditions<sup>5</sup>. Similarly, they might establish linkages with disaster experts to help develop better internal communication methods to help at the time of a disaster (Kumar & Newport, 2007). Groups working with both the community and with governmental agencies can act as liaisons and help with policy advocacy and policy implementation.

Development agencies can also help promote early warning systems (EWS). It is important to note, however, that while early warning systems are beneficial, they do not offer the same degree of security that prevention and other mitigation measures might offer; an EWS is likely to help protect lives, but will unlikely protect the livelihoods or assets of a given community. Another concern with an EWS is that the “controller” of the system must be trusted by the community, and must be respon-

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5 As stated earlier, one does not need to restrict these discussions to developing countries. In the United States, for example, in the last 60 years, there has been considerable and rapid population growth (in part due to internal migration) in cities near the Pacific, Atlantic, and Gulf coasts. The Pacific coast is earthquake-prone; the Atlantic and Gulf coasts are hurricane-prone (Board on Natural Disasters, 1999).

sible enough to not issue unnecessary or false warnings. As such, some feel that the best early warning systems are those which are community managed, an idea which was expressed in a 2005 note from the Parliamentary Office of Science and Technology:

*Community-based early warning systems, which involve the local community in creating hazard maps, scientific monitoring and contingency planning, are often more effective than high tech systems. This involvement increases awareness and understanding of the impacts of natural hazards, but these systems offer shorter warning times than high tech systems. (p. 3)*

Over the course of this chapter, the relationship between disasters and development were discussed, and several methods for creating continuity between development planning and disaster risk reduction were presented. This is not to say, of course, that this is easy to achieve; on the contrary, there are a number of challenges to be addressed if any intervention is to be successful. There must, for example, be increased capacity for all stakeholders. Development organizations should conduct “risk auditing” exercises to determine whether any of the projects need modification, and they should open communication with other organizations to ensure inter and intra-linkages of efforts. This would help create continuity of efforts, but it also requires considerable investments. Continuity of efforts also depends on the community’s capacity to implement a given project, their attitudes towards a project, and their understanding of the importance of mitigation.

In the following chapters, we will look at how education and training can help create a culture of preparedness, and at how the strengths inherent in a given community can be harnessed for disaster risk reduction.







## **EDUCATION AND TRAINING FOR DISASTER RISK REDUCTION**

*Creating a Culture of Preparedness for  
Practitioners and Communities*

**D**isasters are not entirely avoidable, but education, training, and research can help minimize their impacts. Education can come in the form of training and capacity building for organizations; organizations, in turn, can transfer this knowledge to the community in a way that makes disaster preparedness and disaster management a way of life. Education can also come in the form of information and training directly aimed at the community at large or at specific portions of the community, for example at primary or secondary school students. To make the education more relevant, research is needed to help accurately assess the needs of the community, the potential risk, the types of preventative measures which should be in place, and the types of curative measures which might be needed following a disaster. Fortunately, today, informa-

tion dissemination can be far more rapid due to advances in information technology, but the question remains, how can we transfer what we transmit as “education” from being merely “information” to being something people can act upon and make decisions from?

“Information” is, ultimately, a vague term. If we are to transfer “information” into something usable, we need to first look at the subtleties of the concept of information and how information is often used. One useful categorization of “information”—the categorization which will be used in this chapter—comes from Ben Wisner, who suggests that what we call “information” goes through a four-level refining process from data to information to knowledge and to wisdom. Information most often starts with data, which is most often statistical knowledge, such as information gathered from a census or from weather stations. Once we have organized the data in some form, we have begun to transform the data into information. When information has been raised to the level where it can be used to make predictions or raise awareness—in other words, when we can ensure that information is understood and accepted—information becomes knowledge. Finally, wisdom is achieved when, by using knowledge, people have the “capacity to make value judgements based on experience, understanding and principle” (Wisner adapted by Vaux in Walter, 2005, p. 13). Wisdom, however, does not have to come from personal experience; it can just as effectively come from observations of the experiences of others.

This chapter will first look at the transformation of information into knowledge and wisdom and the role this transformation can play in minimizing the impacts of disasters. This chapter will also consider the role of capacity building as a tool for disaster preparedness. Finally, this chapter will present some of the educational measures which can occur within professional organizations and directly at the community level to help improve the community’s understanding of disaster management.

## DISASTER MANAGEMENT AS A CULTURAL ASSET

In order to develop education and training programs for disaster management, it is important to understand the kinds of information that is necessary and the roles established institutions can play in promoting this education. At the top level, there is *disaster management*—an overarching theme in which pre- and post-disaster elements must be considered (WHO adapted by Singh, 2007, Annexure 1). Below this, information on *disaster mitigation* and *disaster risk reduction* need to also be addressed.

Disaster mitigation and disaster risk reduction are best viewed as pre-disaster initiatives. Disaster mitigation is essentially enacting measures to reduce the impact of potential disasters, and typically relates to infrastructural measures to manage potential disasters (Krishna, 2007a). It is a preventative measure which does not entirely solve the problem but can significantly reduce the cost of recovering from disasters. Disaster risk reduction extends the idea of mitigation to include what several (for example, Krishna, 2007a; Shaw et al., 2004) refer to as a culture of preparedness. What this refers to is a societal responsibility for managing disaster, that is, making disaster preparedness a part of one's lifestyle.

Post-disaster elements of disaster management include relief, rehabilitation, and reconstruction efforts (Singh, 2007). While we typically think in terms of physical infrastructural assets when considering relief, rehabilitation, and reconstruction, it is important to not neglect people's emotional needs following a disaster. Post-disaster efforts have considerably different time-frames associated with them. Relief, for example, is

typically seen as efforts which occur immediately following a disaster, and will typically include the provision of necessities such as food, water, first-aid, and temporary shelter to those who have been impacted by the disaster. The goal of rehabilitation is to restore some of the infrastructural and societal features to a community which has suffered a disaster; rehabilitation is the first step of reconstruction efforts, but serves more immediate needs. Reconstruction is a longer-term post-disaster effort which should seek to restore the community to a level of disaster preparedness above what it was pre-disaster.

What is important, especially in the context of developing a culture of preparedness, is the ability to realize that, what is on the one hand a disaster can be conversely seen as a development opportunity; the reconstruction efforts can include education, training, and infrastructure development which can prevent or reduce the likelihood of a similar disaster having such an impact in the future. This concept is highlighted in a recently published document by the US Department of Education [DOE] (2007):

*Recovery may seem like an end, but it is also the beginning. You must close the loop on the circle. A critical step in crisis planning is to evaluate each incident. What worked? What didn't? How could you improve operations? Take what you have learned and start at the beginning. (p. 5-5)*

In this process of regeneration, a community is able to identify any further training, equipment, or other inputs necessary to face future similar disasters more effectively. Relief goes through a trend whereby it becomes disaster management. Similar trends can be observed in India; for example, the Government of India's Ministry of Home Affairs, in an attempt to institutionalize the concept of disaster preparedness, wrote that:

*the State Governments have also been advised to convert their Relief Codes into Disaster Management Codes*

*by building into it the process necessary for drawing up disaster management and mitigation plans as well as elements of preparedness apart from response and relief (2004, p. 12)*

and later reinforced that:

*This is a major task being undertaken by the Government to put in place mitigation measures for vulnerability reduction. This is just a beginning. The ultimate goal is to make prevention and mitigation a part of normal day-to-day life (2004, p. 40).*

But beyond the government, who should be involved in pre-disaster and post-disaster efforts? Ultimately—considering that the goal is that of a culture of preparedness—everyone should be involved in pre- and post-disaster management efforts; however, there are different ways in which established organizations have certain advantages to make a bigger impact.

When considering pre-disaster management efforts, established organizations, for example, grassroots organizations, are in a great position to transform data and information into knowledge and wisdom which can help develop a culture of preparedness. Such organizations have the capacity to regularly collect firsthand data which is specific to the communities they are working with. Access to such data allows these organizations to make more accurate needs and resources assessments through participatory appraisals. Furthermore, these organizations have better capacity to provide training within their organization to their volunteers and employees; it is possible that this could have a “trickle-down” effect to friends and family members of the employees and volunteers.

Established organizations are also more likely to have a wider network than individuals, thus making it possible to more effectively create and disseminate documentation to a variety of stakeholders. This could include government departments, private institutions, funding agencies,

relief organizations, and specialized training organizations. For example, an established NGO will probably have better success at implementing community-based early warning systems than concerned individuals within a community because they will probably have better access to modern technology as well as better access to information about a variety of valuable—but typically undocumented—traditional methods for early identification of natural disasters.

Following a disaster, established organizations can also help promote the cycle of recovery, rehabilitation, and reconstruction. At the most basic level, by utilizing the relationship which many organizations can develop with communities, these organizations can mobilize the community to move forward despite the challenges which they face in a post-disaster setting and help promote resilience within the community by projecting hope rather than desperation. If the organization itself has institutionalized a culture of preparedness, it is better positioned to provide immediate support in terms of things like coordinating food distribution, or by providing shelter, health care, and clothing in the early stages of a disaster. For relief and rehabilitation efforts, an established organization is in a better position to effectively organize support from international relief organizations, and can also assist international relief organizations in the more effective distribution of relief aid by providing accurate local information.

What is clear here is that integral to any attempt to manage disasters is the development of a culture in which knowledge sharing is promoted. Knowledge sharing is important because, as mentioned earlier, “wisdom” does not have to come from personal experience. As was pointed out by John David at a 2007 workshop on disaster risk reduction, “Smart people learn from *experience*. Wise people learn from the experience of *others*” (slide 16). Educationalists generally agree that people are able to learn in many ways, including learning from observing the experiences of others, by participating in simulations, and even passively through community interactions or through self-learning. Additionally, at the very least, sharing of data, statistics, and other “information” helps bring information

one step closer to being knowledge, and makes it easier for people to make the best value judgments.

But while knowledge sharing as a disaster risk *reduction* perspective is mostly concerned with pre-disaster settings, it is important that knowledge sharing continues during a disaster and in the time following a disaster. If we *do not* share knowledge in a post-disaster setting, there is a lot of duplicated or uncoordinated efforts—a sort of “relief competition.” Duplicated efforts amount to a wastage of critical funds and resources, while uncoordinated efforts can often result in the wrong kind of relief. For example, in the International Federation of Red Cross and Red Crescent Societies’ 2005 *World Disaster Report*, several incidents are cited where things like shipments of clothing from well-wishers actually impeded disaster relief efforts by “blocking roads, wasting workers’ time and taking up storage space” (107) which could have otherwise been put to more productive use. If, instead, there was a coordinated sharing of information about the kind of support that would be (or would not be) helpful, outcomes could be much different. In the same *World Disaster Report*, reports were also shared about successful knowledge sharing efforts between the government and NGOs in the Maldives to quickly offer relief in the weeks following the 2004 Indian Ocean tsunami.

There are other reasons to share knowledge. As already indicated, if knowledge is shared among different agents responding to a disaster, community needs assessments are more likely to be accurate and support can be more effectively tailored to the actual problems the communities are facing. But at another level, knowledge sharing, especially providing accurate information to the community itself, is important for ensuring that the community will cooperate with relief efforts, even if results are slow to be observed. In the time following a disaster, it is important to provide the community with up-to-date, accurate, reliable information about the kind of relief, rehabilitation, and reconstruction efforts they can expect to receive. This can provide people—even in the worst of situations—some peace of mind, by helping them to see that there is some order behind what might otherwise seem overwhelming, disorienting, chaotic, and confusing.

## CAPACITY BUILDING AS A TOOL FOR PREPAREDNESS

Capacity building can be broadly defined as developing the skills, knowledge, or tools which help individuals and organizations reach their potential. When considering capacity building from the perspective from disaster management, the areas in which most individuals and organizations need to reassess their capabilities are in areas such as health, education, standard emergency procedures, personal preparedness, and humanitarian practice.

When speaking of disaster preparedness and capacity building, it is hard to avoid mentioning the Cuban experience in protecting its civilians from the devastation caused by hurricanes. Wisner, Ruiz, Lavell, and Meyreles (in Walter, 2005) looked at elements which contributed to Cuba's success at hurricane disaster management and point out that the Cuban approach includes several elements which may be replicable, at least at certain levels of governance, and help minimize the effects of reoccurring natural disasters. These include access to accurate current and historical data to help facilitate people's ability to make reasonable predictions; a systematic formal "system of governance and civil protection from national to local level, which is coherent, well-coordinated, proactive, responsive and accountable" (p. 55); established systems for risk awareness and practice drills to familiarize people with how to proceed in a disaster; clearly defined roles for media, public transport vehicles, and neighborhood and professional organizations; and established shelters equipped with emergency provisions.



Of course, when comparing Cuba to, for example, India, Cuba has several things working to its advantage. For starters, its population is relatively small and the nation has also managed to achieve high levels of literacy. This makes it much easier to develop the culture of preparedness. Schools can deliver effective disaster preparedness education which will reach *everyone*—not “everyone who is able or can afford to attend school.” Additionally, in Cuba, beyond just teaching students about the threats hurricanes can pose, there are publicly held drills and reminders, helping reduce the element of surprise and chaos in case a hurricane strikes.

But formal education is not the only answer. In fact, Shaw et al. point out that while education is important in building a culture of disaster preparedness—in particular, with earthquake awareness in the case of their study—other factors may be more important.

*School education is important in enhancing knowledge and perception of earthquake disaster. Family education is the most vital element for action in preparedness, where community education is essential for actions in dissemination and preparedness, contributing significantly in the gradual path from knowing to action. (p. 48)*

In essence, this finding is representative of the idea that, while schools do impart cultural ideals on students, learning is multi-faceted; targeting the creation of a culture of disaster preparedness at the community level would add significant value to a community’s ability to effectively manage disasters.

How, then, can one help promote the creation of this culture? As already noted, it might be difficult for larger countries, for example, India, to adopt some of the elements which contributes to Cuba’s success at disaster management; however, several of the ideas can be, instead, undertaken by grassroots-level organizations and promoted at the local governance level. Singh (2007) proposes that disaster risk reduction should be a superordinate goal for all organizations in the development

sector, and that the development sector already has many of the skills which can help them become better disaster managers. He points out that many of the things which need to be focused on post-disaster—for example, health, education, livelihoods, mental health, food, water, and shelter—are things which should be integrated into a disaster management system anyway. Kumar & Newport (2007) suggest that organizations such as microfinance institutions—which will generally face financial challenges in the case of disasters because of the increased vulnerabilities of their clients—can promote this culture by encouraging preparedness both internally and externally. As a prevention measure, for example, they recommend that “typical requirements of MFI staff include: informing households on where to access emergency services such as medical supplies, clean water, and shelter” (22). Furthermore, they point out that external preparedness—networking with others who may have more expertise in disaster management—is perhaps more cost effective and may reduce some of the risks mentioned earlier when efforts are not coordinated or knowledge is not shared.

This network can serve other purposes too. For example, an institution attempting to develop its capacity in disaster risk reduction will be wise to prepare an emergency action plan and train its stakeholders using periodic drills; schools, for example, are expected to routinely conduct emergency response drills. After a series of unfortunate events at a few Indian schools—such as fires or building collapses resulting in multiple student and teacher deaths—the Government of India’s Ministry of Home Affairs’ “National Disasters Management Division” prepared a school safety handbook (Arya et al., 2004) which recommends institutionalizing disaster management efforts such as providing formal education, establishing a “school safety team” at each school, holding special activities during a “preparedness month,” and implementing district-level and school-level school safety plans.

Such emergency plans would certainly be wise; however, what would be even wiser would be if, in the process of developing this action plan, the organization involved public authorities—particularly emergency responders—in reviewing the plan and for help in developing contin-

gency plans (Arya et al., 2004; Bacon, 2007; US DOE, 2003). By including emergency planners in the process, the organization will help emergency planners better coordinate emergency shelters, evacuation routes, and emergency provisions; at the same time, responsible parties within the organization will have created a human contact with an emergency provider who could be of support in times of need (US DOE, 2003). It is much more useful and productive to create these relationships before a crisis occurs.

Whatever level planning is being undertaken, one feature which should be carefully defined is the roles different people are expected to play in times of an emergency. Within a school or an organization, for example, it might be advisable to establish a team (as mentioned earlier by Arya et al., 2004) or teams which are responsible for different features of disaster management. For example, one team might be responsible for developing awareness (via, for example, educational materials or simulations). Another team might be in charge of delivering messages or warnings in times of emergency—both within the institution as well as to the media and concerned family members. Other teams might be established to handle first aid or to handle evacuations. By assigning roles, individuals are given a chance to become proficient in their tasks. Additionally, if these roles are clearly communicated to other stakeholders, some of the chaos which is likely to accompany a disaster is likely to be reduced.

## INCREASING THE REACH AND IMPACT OF EDUCATION

As tempting as it may be to say that education holds the answers, education is not a simple, straightforward solution, and there is nothing to guarantee that approaches to educate people will result in the knowledge or wisdom desired for large-scale behavioural change—the kind of change which would make disaster preparedness a cultural feature. For example, a study conducted in Sri Lanka following the 2004 Indian Ocean tsunami cited that while residents felt that schools were the best places for improving knowledge about disaster preparedness, students demonstrated a surprisingly low level of information about tsunamis (even after the event and the subsequent influx of tsunami-information), and teachers felt that the existing lessons and evacuation drills were not adequate (Kurita, Nakamura, Kodama, & Colombage, 2006).

This problem is not restricted to the community; many of the same deficiencies can be observed in the professional community also. In a presentation demonstrating the capacity of multimedia technology to provide training Shelly Kulshrestha (2007) points out that:

*Between 1993 and 2002, NCDM [National Committee on Disaster Management] has conducted over 50 training programs for more than 1000 people. Over 4000 people have been trained at the State level through 24 disaster management centers. Considering the demand for DM [disaster management] training in India, these numbers are relatively small. (Slide 4)*

How can education be redesigned to help ensure that it has a more effective impact and that following a disaster, people are not left feeling, “we should have tried harder”? In the following two sections we will look first at ways in which organizations can be better trained for disaster risk reduction, and second at ways in which community resources can be strengthened and utilized more effectively.

### ***Education Opportunities for Practitioners***

The first step would be to promote education opportunities for practitioners. The workshop on disaster risk reduction held at the 2007 Madurai Symposium is just one example of an educational opportunity for experts to gather, share their experiences, and learn from each other. Such events make knowledge available not only to the participants, but also to the extended reach of the organizations represented; for example, a represented organization may have their representative offer a similar workshop to other colleagues upon returning from the workshop. Additionally, by using different forms of information dissemination (for example, publishing handbooks, making the papers and presentations publicly available, or extending the workshop’s themes to online discussion forums), the lessons learned at these events can be almost unlimited.

One noteworthy benefit we have with today’s technological capacity is the ability to offer interactive distance learning opportunities. These opportunities can range from modifications to traditional correspondence courses, to fully online synchronous or asynchronous learning experiences. Many of the tools for developing e-learning activities are free or inexpensive; if an organization already has a website, for example, interactive e-learning courses can be offered at virtually no additional costs<sup>6</sup>.

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6 One such platform is the open-source “Moodle” classroom-management system (<http://moodle.org>). There is even free Moodle hosting available at sites like <http://ninehub.com> and <http://e-socrates.org> if your webserver does not meet the requirements for installing Moodle. Many of the classroom-management systems also include the option to customize the

The advantages of implementing virtual courses is that the costs can also be reduced for participants. There is low (or no) transportation cost involved, and physical location is not a constraint. The participants and the course facilitators can, indeed, be participating anywhere in the world that there is internet access. Printing costs and textbook fees can be reduced by using materials readily available online; the International Federation of Red Cross and Red Crescent Societies—and many other organizations involved in disaster management—include many of their publications online as free PDF downloads. Finally, virtual learning reduces time constraints since the learning is asynchronous. In other words, participants do not need to all be online at the same time, but instead, can participate at their convenience, meeting a pre-set minimum required participation level each week or each module.

Beyond in-person trainings (for example, workshops and seminars) and virtual learning, there is also good, ready-to-use information available to help practitioners develop their internal capacity for understanding what needs to be done in response to different types of disasters. The Sphere Project’s comprehensive handbook *Humanitarian Charter and Minimum Standards in Disaster Response* attempts “to improve the quality of assistance provided to people affected by disasters, and to enhance the accountability of the humanitarian system in disaster response” (Sphere Project, n.d., para 1). At the same time, the creators of the handbook mention that the book is not a “how to” guide, but a book that can help humanitarian organizations guarantee that they are well-prepared for each stage of disaster response humanitarian action for factors from water or sanitation to shelter or health services<sup>7</sup>.

Another publication which will be invaluable to most organizations offering support in disaster risk reduction activities is the American Red

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languages used, thus extending the applicability of the courses to different audiences.

7 The full handbook is freely available in several languages from the Sphere Project’s website: <http://www.sphereproject.org>.

Cross's *Talking About Disaster: Guide for Standard Messages*.<sup>8</sup> This guide is particularly useful for developing communication materials for explaining what to do in situations ranging from residential fires to terrorist acts to landslides. Additionally, it includes a section on "Preparedness Action Messages" and post-disaster messages. While the guide was prepared specifically with a US audience in mind, many of the tips can easily be adapted to different geographic locations.

The above are just a few of the opportunities and resources available for practitioners working in the disaster risk reduction field. Ultimately, an organization which is well-informed about managing a range of disasters will be better positioned to appropriately assist a community in times of disasters. There are, however, ways in which communities themselves can be strengthened to better cope with disasters. The following section discusses areas in which communities can be strengthened to help facilitate disaster risk reduction activities.

### ***Education Opportunities for Communities***

Development activities are best when done with the support of the targeted communities. Similar generalizations can be made when considering disaster risk reduction. Along with trying to create a "culture of preparedness" in a community, organizations should also work toward educating communities directly and enabling communities to directly undertake some DRR-related activities.

One entry-point could be thematic participatory rural appraisals to gather data on things like flood-prone areas, reliable storage areas for emergency food provisions, sturdy and accessible emergency shelters for different types of disasters, evacuation routes, and action plans for the elderly, infants, or disabled members of the community. When appraising evacuation routes, the appraising organization can also check for the availability of different types of transportation (for example, trucks

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<sup>8</sup> The entire book is available online at <http://www.redcross.org/disaster/disasterguide/>.

or tractors normally used for transportation of goods) and can sensitize the owners of these vehicles so that, in times of a disaster, the owners are encouraged to act in a humanitarian or altruistic way rather than a profiteering or exploitative way. The simple act of making the appraisal a “participatory” appraisal helps raise community awareness and helps to determine the current level of local knowledge on disasters in terms of preparedness and management. Similar activities should be conducted at schools; ensuring that children are also well-informed will help manage fear or panic if a disaster strikes.

Ensuring that we involve communities in disaster risk reduction work is also important because it also helps expand an organization’s knowledge of the types of disasters a community might face. For example, many people, when thinking of disasters, might think of “quick onset” disasters (such as floods, cyclones, or earthquakes) but may not plan appropriately for “slow onset” disasters (such as droughts) which communities, with their extensive historical knowledge, will be able to provide.

There are other ways in which communities can take action. One way which is gaining momentum worldwide is community radio initiatives. Community radio programmes can be developed to help raise awareness of disaster preparedness and management. Best practices for safety—tailored to the specific needs of a community within a limited geographic area—can be shared to a sizeable audience cost effectively. The facilities used for broadcasting (or narrow-casting) programmes can also be used to communicate with the communities during the time of a disaster, alerting listeners to emergency shelters, areas of mandatory evacuations, and similar time-sensitive news.

Promoting community radio can also help raise the community’s awareness of the media in general. As communities become more “media-conscious” they will be in a better position to develop relationships with media so that during a disaster, media outlets are more likely to help the communities rather than “exploit” them for sensational news stories. In other words, there may be the chance that, instead of focusing on demotivating coverage of a tragedy, the media—knowing the needs of the



community—can convey this message to agents who can provide relief support.

There are other ways in which a community can be better prepared. Mobile phones, for example, have made a noticeable entry even into rural areas. A “phone-tree”—a system where each individual is responsible for conveying a message to a predetermined set of individuals—can be established to help disseminate a message quickly. Public notices can be developed to help promote community sensitivity to different disaster-related issues, and in the process, help develop the culture of preparedness that is necessary for resilience in times of disaster.

Education and training are essential to effective disaster risk reduction approaches, and initiatives are necessary both at the professional level and the community level. Communities will, very likely, already have a considerable wealth of indigenous knowledge related to the types of disasters most relevant to them, and it is important that professional organizations utilize this knowledge when developing disaster risk reduction approaches. In large, diverse countries like India, NGOs and similar organizations can significantly reduce the impact of disasters provided that they, themselves, are well-educated and well-prepared for the types of disasters one can expect in a given area. Fortunately, there are many training opportunities available for practitioners, and many opportunities for sharing lessons learned with different intervention strategies. Through continued collaborations and knowledge sharing, current and future generations can be better prepared for the variety of natural and man-made disasters they may face.



# 3



## **MAKING KNOWLEDGE AND WISDOM WORK FOR DISASTER RISK REDUCTION**

*Learning from the Experiences of Others to Enhance  
Disaster Risk Reduction from the Community Level*

**I**n the previous chapters, we have discussed the continuum between development and disaster risk reduction and opportunities for increasing overall education about disaster risk reduction approaches. However, if we consider that the end-result of any disaster risk reduction intervention should be to provide safer lives and livelihoods of communities, most of what has been presented so far has been advisory in nature. There is, of course, a lot of value in the advice presented, but equally important are the lessons which can be learned from the experiences of others.

Often, we are tempted to ask about who should be responsible for disaster management. Equally often, we are tempted to answer with

simple solutions, such as “the government” or “mostly the government, but NGOs can also help.” However, these solutions sometimes neglect the power of the community to help provide solutions to this large and growing problem. The problem with this is, just as a development intervention designed without inputs from the community (for example, through a needs assessment or through similar mechanisms) is likely to encounter resistance in acceptance by the community, so too will a disaster risk reduction solution or a disaster management solution which was developed in isolation from the community suffer in terms of implementation and acceptance.

To increase the impact of interventions, it is useful to utilize direct community involvement. This can be done in different ways. For example, a community might establish an internal committee responsible for disaster planning. Similarly, a community might establish a community radio programme or similar awareness campaign to ensure that the entire population in a given area is aware of what to do when a crisis occurs.

There are many different approaches to disaster risk reduction. Different agencies, for example, Oxfam, the UNDP, and UNICEF, all have different designs and different focus areas (see Krishna, 2007a, for an overview of some of these approaches). However, it is increasingly common to observe the increasing acceptance of the strength inherent in a community to cope with and respond to disaster situations. This is in contrast to the traditionally “top-down” approaches in which governments and humanitarian agencies offer support immediately following a disaster.

In this chapter, we will present the change from the “top-down” approach to to the “bottom-up” approach towards disaster management, also known as the community-based disaster management (CBDM) approach. This will be followed by a brief section on the role that information and communication technologies can be used—even at the community level—at times of disasters.

## **BRINGING SUSTAINABILITY THROUGH COMMUNITY OWNERSHIP**

One concern for anyone designing a development programme is the sustainability of the intervention. A common scenario is that an organization, for example, an NGO, gets involved in implementing a programme, but only has a set amount of funding to be used within a set amount of time. During that time, the success of the programme may be quite high. What happens, however, once the funding is over or the NGO withdraws from the area? One unfortunate observation is that often, after some time—perhaps a couple of years—conditions revert to their pre-intervention state. This is largely because of the reliance on the top-down approach mentioned earlier. The general belief, from both sides, might be that the local community cannot undertake these programmes on their own, or that these activities should be spearheaded only with the support of some professionals. There is some truth to this perception; often, the most vulnerable community is the poor, and the poor have fewer resources available to them.

On the other hand, as mentioned earlier, attitudes have been changing. Not only are communities being encouraged to become actively involved in their development, but many agencies are taking an active interest in documenting and learning more about indigenous practices ranging from weather detection practices to herbal medicines. This reciprocal model—the community-based disaster management (CBDM) approach—promotes a bottom-up design ensures community participation by getting communities to analyse their conditions, hazards, vulner-

abilities, resources, and capabilities. Through active dialogue of community members, awareness increases, vulnerable communities become better enabled to manage disasters or respond to emergencies on their own, communities become more responsible in making decisions and implementing plans.

As can be inferred from the previous paragraph, the community-based disaster approach does not imply the absence of stakeholders such as the government or NGOs. Instead, it gives larger bodies a chance to benefit from local knowledge while also imparting skills and training to the local community. This is particularly useful in larger countries like India, where different regions suffer from different calamities; learning directly from the community can help expedite or strengthen projects since a considerable amount of data can be collected directly from the community. This data might also capture information which may inadvertently be overlooked by intervening organizations, including, for example, special practices to ensure the safety of children, elders, or individuals with disabilities. This symbiotic relationship can be seen in the International Strategy for Disaster Reduction's report, *Gender Perspective: Working Together for Disaster Risk Reduction*:

*In some cases, special training was given to women on disaster issues. For instance, in a recent flood in Andhra Pradesh State, communities played a major role in the rescue programme, paying special attention to children, pregnant women, old people and the disabled. In some villages in this state, communities have created village emergency funds based on household "handful-of-rice" and "kitchen-utensil" contributions. (2007, p. 14)*

In other words, community involvement is not simply about getting community input on a given project; it is about a more holistic level of participation at various levels which will, hopefully, make an intervention sustainable beyond the lifetime of an outside stakeholder's involvement.

But what are some of the specific steps which are involved in getting better community participation and for empowering communities? Victoria (2003) identified a seven-step process to create “disaster resilient” communities. These steps include (1) developing a relationship with the community, (2) understanding the disaster profile for the area, (3) conducting participatory appraisals related to hazards and vulnerabilities, (4) developing a disaster risk reduction plan, (5) organizing the community around disaster response, (6) implementing short-, medium-, and long-term programmes, and (7) continuously improving the disaster risk reduction plan. In many ways, this is not very different from any effort to involve communities in their own development; the difference is the focus on disaster-related themes instead of other development themes such as health or education—although these themes themselves may be integral to the overall success of the programme.

Each of these steps are important, and each requires different levels of commitment from the facilitating organization. For example, the first two steps are largely focused on organization-based efforts. The organization is responsible for taking efforts to develop trust within the community while simultaneously collecting useful information from the community, including things like land characteristics, the economic condition of the community members, the existence of groups (such as self-help groups or cooperatives), the existence of other organizations, and the political structure of the area. The second step, again spearheaded by the facilitating organization, would both be a preliminary study of the hazards faced by the community and be an entry point for raising awareness in the community of the community-based disaster risk reduction model (Victoria, 2003).

The third, fourth, and fifth steps require high levels of community participation. For example, in the third step, there are several participatory rural appraisal (PRA) techniques which can be modified to suit the information needs of disaster mitigation or prevention planning. Time-lines can be used to determine how “disaster-prone” a certain region might be based on historical information provided by the community. While it is true that this information might also be available from secondary

sources, by involving the community, a facilitating organization can help raise awareness in the community. Similarly, a problem-tree analysis can not only help raise awareness, but can also be the foundation for a discussion on solutions. Thus, if a community identified problems such as severe structural damage to their buildings in the case of an earthquake, a discussion can be facilitated to help identify more structurally sound ways of construction or more appropriate places for constructing homes, as well as offer training on best-practices for safety during an earthquake. Venn diagrams can be used to help plan evacuation routes, identify areas of support, and identify features within a community that need to be strengthened. Social or well-being rankings can help create tailored evacuation or support plans for disadvantaged community members, as well as provide information on what sort of support can be expected from different households for establishing emergency provisions and so on (Victoria, 2003; Bollin, 2003).

The fifth step, organizing the community around disaster response, involves organizing and training the community for different aspects of disaster response. For example, Krishna (2007b) suggests the formation of different groups responsible for things such as early warning and communication, shelter management, evacuation, counselling, medical treatment, and relief distribution. As the skills required for each of these different types of tasks is specialized to different degrees, this is another opportunity for the facilitating organization to offer capacity-building trainings to the community members. These trainings can include leadership development, “exposure visits” to other sites where community-based disaster risk reduction efforts have been successful, and skills and contacts necessary for effective communication with government officials and government agencies (Victoria, 2007). Thus, although these are voluntary organizations, there is also a direct and immediate benefit to the community volunteers. To make the group formation process easier, the facilitating organization can also utilize any existing strengths identified, such as well-established self-help groups or other community level groups.



The sixth and seventh steps return to being slightly more focused on the facilitating organization's efforts; however, again, the organization should try to ensure that these activities have strong capacity-building opportunities for the communities involved. It would, for example, be extremely important for the community to be able to self-monitor their disaster plans, but the facilitating organization must also be proactive in ensuring that the community has the most up-to-date information regarding appropriate approaches for a given disaster situation (Victoria, 2003). This is an important consideration; community participation does not mean the absence of scientific or research-based approaches, but rather that these findings and practices can be communicated to communities in a way that they will both understand the rationale and be more willing to follow the suggestions (Pandey & Okazaki, n.d.).

This seventh step, monitoring and evaluation, is also important because, as noted earlier, our behaviour changes the environment and can introduce new disaster risks in itself. As such, communities need to be empowered through a continuous flow of information to help them make the best choices for their development. Unfortunately, it is not always financially or physically possible for a development organization to have a permanent presence in a community—nor is it necessarily desirable. However, there are other approaches to information dissemination which may be useful for keeping communities informed. One such approach is to utilize the strengths of information and communication technologies (ICT) for conveying timely information to communities; this is explored in more detail in the following section.

## SHARING A VOICE BETWEEN THE COMMUNITY AND DEVELOPMENT PROFESSIONALS

Earlier in this document, geographic information systems (GIS) was provided as an example of a tool which could help development planning efforts and disaster relief efforts. GIS is just one example of information and communication technology (ICT). E-learning was another form of technology, presented as a way to offer inexpensive educational opportunities to professionals. These technologies are examples of how technology can be used to help create a continuum in the discourse between communities and facilitating development organizations. Furthermore, ICT skills can be shared with communities, thus building the overall community knowledge and even bridging the technological or digital divide that is also observable in poorer communities. There are many technologies which can be classified under the ICT title including widely available mass media such as radio and television, voice and mobile communication services such as land-line phones and mobile phones, and more modern communication tools such as internet and email.

ICT has already been identified as a useful set of tools for the poor in several different ways. For example, fishermen can use GIS to help determine appropriate fishing areas, or they may be notified via short message services (also known as SMS or text messages) of different data regarding tides or weather conditions. This change is, in large part, due to the dropping costs of access to technology—both in terms of fixed costs (such as purchasing a mobile phone) and recurring costs (such as purchasing usage credits) (World Bank, Global Information and Commu-

nication Technologies Department, 2008; Wellenius & Neto, 2008). This has resulted in dynamic changes. For example, according to Wellenius and Neto, “Communication and information services in the developing world have experienced explosive growth. Between 1980 and 2005 the number of phones (fixed and mobile) multiplied 30-fold” (2008, p. 3). These changes enhance connectivity with communities and can help improve the development and flow of knowledge between different development stakeholders.

Information and communication technologies can play different roles at different stages in a disaster. For example, since land-line telephone infrastructure can easily be damaged (or overloaded) during a disaster, it may not be wise to fully rely on them during a disaster (Mohanty, Karrelia, & Issar, n.d.). The same technology, however, might be used to form branching telephone networks—systems in which everyone in a particular area is responsible for contacting a predetermined set of people—and can be used as an early warning system; as long as everyone in the “network” is able to contact the people they are responsible for, this can be a low-cost and efficient way to convey information.

New technologies are also being developed which can further improve warning systems. As mentioned earlier, penetration of mobile phones has increased considerably—especially in developing countries. One such technology is cell broadcasting—a feature on certain wireless networks in which “a public warning message in text can be sent to the screens of all mobile devices with such capability in a group of cells of any size” (Wattegama, 2007, p. 11). Similarly, text messages can be easily sent to multiple recipients, even from an internet enabled computer. This form of alerting a community, however, would only be successful in areas where literacy in at least one language is high since it would require that the recipient can read the message being broadcast.

As can be observed, some of these techniques can easily be community maintained. For example, a community-maintained “village information centre” can help gather a database of land-line and mobile phone numbers for a particular village, help establish telephone networks, and have

a system in place for broadcasting text messages to a targeted population. Although a facilitating development organization would be necessary for creating such a centre, ultimately, the sustainability of these centres is best if they become increasingly community-managed over time. The role of the development organization can change over time to one in which it offers additional training to different community members or one in which it helps to keep the technological skills up-to-date with current technological developments.

Radio and television broadcasting also offer great potential to improving a community's access to information. With trends in making obtaining narrowcasting licenses and broadcasting licences more easily obtainable, it is also now possible to consider community radio or community television networks helping raise awareness in a community about things like safety practices (before a disaster), emergency procedures (during a disaster) and relief efforts (following a disaster). Radio broadcasting has a particular advantage in that there are many devices which are able to receive radio signals (including, for example, mobile phones); additionally, since many of these devices are battery operated, they can even be used to receive information during disasters which disrupt power supply.

A properly planned radio or television programme can receive strong community support, both in terms of having a committed audience as well as having regular contributors. Community members can be trained in interviewing techniques, and can record elders and experts in the community describing things like historical community events, different coping strategies, and ways in which the community can be more involved and better prepared. Serialized video programmes can be developed in which emergency or rescue techniques are demonstrated—techniques such as building rafts or flotation devices from readily available materials. As with a participatory rural appraisal technique, involving communities in these processes not only gives them new skills, but it also helps raise their self-awareness, and thus contributes to the common knowledge that can be used during challenging times.

Internet and other computer-based technologies should also be considered in community-level ICT efforts. Computers can be used to maintain community-level databases that can be shared with disaster response organizations. These databases can include things like appropriate shelters and rescue vehicles, or even inventories of emergency supplies and their expiration dates. In times of emergencies, websites can be used to coordinate the collection of information about missing persons, update emergency-response teams about road closures, keep track of people being housed at temporary shelters, and similar post-disaster or during-disaster information.

These are just a few ways in which information and communication technologies can be used to help communities be better prepared for a disaster and be more resilient in times of a disaster. By directly imparting ICT skills to community members, facilitating organizations are also helping in bridging one of the emerging challenges in the developing world: the technological divide. Additionally, by imparting these skills directly, the potential for sustainability becomes increased since the ownership of the initiatives are gradually transferred to the affected communities themselves. This shared knowledge and wisdom from both professionals and the community helps create a stronger foundation for creating a culture of disaster preparedness. In the following chapter, the experience of DHAN Vayalagam (Tank) Foundation's experience in flood mitigation—a development programme which involved community participation for disaster risk reduction—will be presented in detail.



# 4



## **DHAN VAYALAGAM (TANK) FOUNDATION'S EXPERIENCE IN FLOOD MITIGATION**

*Relief Work Evolves into a Community-Integrated  
Early Warning System for Flooding Risk*

**T**amil Nadu receives annual rains through the north-east monsoons from October to December; these rains fulfil 60% of the state's average annual rainfall of 979 mm. Because this amount of rainfall is far below that of many water rich regions, people used to harvest water in traditional village water infrastructures like tanks, ponds, and ooranies. Between 2001 and 2004, Tamil Nadu, along with other south-Indian states, suffered from three years of consecutive droughts which severely affected the agrarian community.

In 2005, the meteorological projections predicted a normal pre-drought north-east monsoon season, leaving people hopeful and happy with the promise of good grain production. However, contrary to weather projec-

tions, 15 districts out of 30 situated along the coastal districts and the districts adjoining them received unprecedented rainfall consecutively for three days from November 22 to 25, 2005. This unexpected rain resulted in torrential floods causing general devastation, shattering the agricultural economy, affecting livelihoods of approximately 20 million people, and damaging over 40,000 hectares of cultivated land.

Several tanks—which form the backbone of Tamil Nadu’s agricultural production—were breached in many places, leading to water going to waste. The overflow also wiped out the standing crops; large areas of paddy fields were washed away in many areas of the Thanjavur delta, including the tsunami-hit districts of Cuddalore and Nagapattinam which bore the brunt and fury of the floods for over a week. Official estimates quote that over 250 people died; in reality, it would be more than 500. Over 20,000 landless households were left without proper shelter as their mud-walled houses collapsed.

Though the government swiftly evacuated people to safer places and provided food packets, appropriate follow-up interventions were missing. The Indian government released Rs. 5 billion for immediate relief; the State government’s assessment and demand was Rs. 130 billion. The state capital and many other Tamil Nadu cities were isolated since roads and railway tracks were blocked in many places; this also hampered the relief activities.

At this point, DHAN Vayalagam (Tank) Foundation (DVTF) stepped in to help with the relief efforts. What evolved was an integrated community-oriented programme for an early warning and information system that combined DVTF’s technical expertise with traditional community knowledge. This chapter shares this evolution as one example of how development and disaster management are closely integrated.



## **FROM FLOOD RELIEF AND REHABILITATION, TO RESILIENCE AND MITIGATION**

**T**he unprecedented rains in November 2005 led to severe flooding that affected many farmers and villagers. While there were government efforts in progress to help those affected by the floods, DHAN Vayalagam (Tank) Foundation (DVTF) felt that more could be done. After the flood, DVTF's professional team, farmer leaders, and Kalanjiam women and movement workers from non-flood-hit districts were put into relief operations. They helped organize shelters in community halls, schools, marriage halls, and temples. The state government's relief provision of 5 kg rice, kerosene, and Rs. 1,000 was made available to the affected members and non-members living in the project locations by coordinating with district revenue officials and village administrative officers. DVTF advanced Rs. 50,000 worth of gunny bags (for use as sandbags) to tank associations of flood affected districts. The associations employed their own labour in temporarily closing the breaches in the tank bunds with sandbags. The association members, movement workers, volunteers, farmer leaders and project executives of DVTF provided voluntary labour to fill sandbags, move them to the breached area, and place them in position so that the water required for the standing crops could be stored in the affected tanks. About Rs. 300,000 worth of physical work was completed in about 35 villages by the collective action of Vayalagam members. This prompt action by the Vayalagam farmers helped to save the standing crop in most areas (except for the areas where the land was too severely eroded by the floods) and get near normal yields.

In the Kalanjiam Programme, a few urban locations (Sellur, Pudur, Virudhunagar, and Salem) were severely affected; in these locations, houses of members were either washed away or severely damaged. School children's notebooks and uniforms, along with different household vessels, were washed away in the floods. The Kalanjiam federations from adjoining blocks which were not affected offered Rs. 250,000 from their common fund, thus helping the affected communities to purchase groceries, school bags, books and uniforms, vessels, and other items lost in the floods.

In this project, the immediate relief phase was managed by the community with assistance from their counterparts and project executives before the sanction of the proposal for long term relief. In the rehabilitation phase, DVTF responded with the programme components by bridging the gap of governments' flood-relief measures in the flood-hit locations in Tamil Nadu and Andhra Pradesh.

The flood rehabilitation project's relief activities focused on rebuilding poor people's assets (mostly shelters), and closing the breaches in minor irrigation tanks, supply channels, and sluices that affected community assets. An open appeal was made to donor institutions, corporations, and financial and philanthropic institutions to respond to the disaster. Oxfam Novib and M/s. ITC responded positively. M/s. ITC permitted DHAN to utilize Rs. 300,000 from the ongoing project at Singampuneri location in Sivagangai district for giving grants to the farmers to replant damaged paddy crops or to remove the sand deposited on the fields adjacent to the tanks.

### ***Project Design and Implementation***

The Vayalagam Tankfed Agriculture Programme coordinated the implementation of this project by setting up a secretariat with a programme leader supported by a team leader, a technical advisor, and an accountant. This secretariat met with regional coordinators of the flood-affected regions of Tamil Nadu and Andhra Pradesh and shared the project

components, code of conduct, and principles of disaster mitigation projects supported by Oxfam Novib. They visited the flood-affected blocks and convened a meeting with both Kalanjiam and Vayalagam teams. The Kalanjiam leaders and associates from flood-affected project locations identified the population which should receive priority support for constructing or repairing their homes.

The Vayalagam project executives carried out rapid tank-breach-assessments along with representatives of the Vayalagam movement and local farmers. This helped the project executives generate proposals which were forwarded to the flood rehabilitation project secretariat in Madurai. After receiving the proposal, the secretariat scrutinized the proposal to ensure it qualified for support under the flood relief project, after which the proposals and the recommendations were sent to the Financial Responsibility Centre. The funds were subsequently released to concerned Kalanjiams and Vayalagams along with the terms and conditions for utilization.

A civil engineer was assigned to monitor the quality of house construction and to appraise the members' satisfaction of the relief measures that they were receiving. Similarly the Vayalagam and Kalanjiam programmes appointed regional coordinators to review the progress at different locations and to ensure that funds were being properly utilized.

### ***Rehabilitation Activities***

The flood rehabilitation works addressed two main activities: closing breaches and conducting minor repairs in tanks and supply channels, and constructing or repairing dwellings.

From November 2005, DVTF project executives helped organize farmer members and volunteers to temporarily close the breaches in bunds and save the standing crops in order to prevent the poor farmers and the landless from losing their livelihoods. Simultaneously, they approached revenue officials, Panchayat Union officials, and the district administra-

tion to allocate flood relief works to the association to close the breaches permanently.

The executives visited the flood affected tanks and assessed the extent of damage. After discussions with the community, it was clear that the community would be willing to repair breaches without involving private contractors; instead, they would contribute physical labour and free supervision to match with 25% of the costs identified in the technical estimate. Based on this interest, the executives submitted the technical estimates to the secretariat in the DHAN Foundation head office. The technical experts scrutinized the proposals and released funds for 92 tanks and their chain supply channels to permanently close 370 breaches (approximately 3 to 4 breaches per tank). About 43 major breaches that occurred near the surplus weirs and repairs to surplus outlets were closed permanently.

Project executives and federation leaders from Madurai, Sivagangai, and Virudhunagar districts visited their respective district collectors several times during the project period. This was done to garner the district collectors' support in convincing block and revenue officials to cooperate by permitting the relief works in the tanks since the tanks are the property of the state government. By seeing our farmers' initiatives, Panchayat presidents and others with political support carried out breach closing in the villages where DHAN Foundation was not present. The rehabilitation works undertaken through Vayalagam associations were captured in newspapers, creating interest in a few neighbouring villages.

Due to the the timely and important rehabilitation measures, 2,911 farmer families benefited by saving crops in 2,779.52 acres. The landless and women members were provided with employment opportunities for 3,773 man-days.

The Vayalagam Movement leaders contacted the Madurai Press Club and shared the need for the local association's presence in flood mitigation works in tanks—without private contractors—and stressed that the quality would be reduced if the work was carried out by private contrac-

tors. Many dailies, including the Hindu and the Indian Express, carried the press conference's messages the following day.

### ***Scope of Damage***

Different structural components in tank system got breached or damaged. Out of 90 flood-affected study tanks, 80 of them had breaches in their bunds. In addition to this, some tanks also experienced damages to their sluices (27 tanks) and surplus weirs (25 tanks); the supply channels of 36 tanks were breached; and the surplus courses of 17 tanks and supply channels of 44 tanks had heavy silt deposits. Rough estimates pointed at a required Rs. 20,000,000 for restoring tanks just back to a functional level (not to the original designed level).

The strong rush of stored water through these breaches resulted in damages to standing crops, farmland, and houses. But not all these breaches were naturally formed; in some cases, farmers intentionally breached the bund at appropriate places to minimize damages, and in some areas, farmers who were encroaching on land near the tanks breached the bund to save their standing crops without considering the interest of the legitimate tank users.

From the data furnished, it could be seen that 62 out of 80 breaches occurred in the tank bund close to masonry structures such as sluices and surplus weirs because of the weak bond between the masonry structure and the earth used for tank bund formation. Any breach near the sluice naturally causes damage to more cropped areas and makes the land eroded or sand cast. Because of this, the inner slope of the bund around structures like sluices and surplus weirs are protected with stone revetment and with stop walls along the upstream two thirds of the sluice barrel length.

### ***A Pilot Project in Flood Preparedness***

Building upon the relief work of DVTF, and utilizing the existing strength of DVTF's efforts, the Advanced Centre for Enabling Disaster Risk Reduction (ACEDRR) designed a pilot project in establishing an early warning system for flood risks and vulnerabilities in the area in which DVTF was working. The ACEDRR field team conducted focus group discussions with tank farmers and other stakeholders to capture their views on preparedness, local communication systems, and responses at the time of floods and other disasters. It was observed that these systems have been eroding only in recent times; this is attributed to the ownership of these water bodies being transferred to the state. However, the field observations did also show that there were local systems, resources, and expertise which had been practised for generations which helped mitigate the effects of floods.

#### ***Watch and ward systems: Evolved, practised, and maintained by the community***

In one focus group discussion, it was found that the community had knowledge on meteorological information such as rainfall patterns, thunder at the time of rainfall, cloud movement which was based on years of observation and experience; accordingly they had a "rule of thumb" on what could be expected, what preparations were required for their agricultural work, and so on. For example, participants in one community shared that if thunder with five hours of rainfall is observed on the western side of the village, they could expect heavy water flow the nearby river, thus mandating precautionary measures to protect their land, agriculture, and other assets. Additionally, since the bus route for this village is adjacent to the river, bus drivers would keep the villagers apprised of the status of the river's water flow.

Another community shared their system of tank maintenance; this system improved the water-holding capacity of the tank and helped ensure that the tanks were better able to withstand the flood risks at the time of

variations in rainfall pattern and abnormal climatic conditions. For that, there was a system of collective action—in forms such as family labour contributions, or financial contributions for families which could not volunteer labour—with norms and social sanctions for non-cooperation. In some areas, stone packing was done to help strengthen the bunds, and diversion channels were created to help safely divert water in the times of heavy water flow.

### ***Proposed early warning systems and preparedness measures***

It is planned that block-level Vayalagam federations will integrate an early warning system (EWS) as a component of flood mitigation. For this, each federation would have a committee exclusively for flood matters. The respective managing directors would act as the executives for implementing flood control and mitigation activities in their blocks. The two senior associates who took part in the field team as part of the study would offer general support and help monitor issues and activities. The purposes for the two block-level flood-mitigation committees are:

1. Monitoring the cascades which are identified with the flood-prone tanks and introducing a package of precautionary measures such as regular maintenance of the tank system, voluntary community upkeep, and other systems.
2. Creating awareness about flood mitigation measures in advance of the monsoon season to ensure that appropriate measures are adopted.
3. Collaborating with the different stakeholders to share information and jointly address flood mitigation.
4. Creating flood-mitigation funds at the federation level.

5. Improving communication by evolving a mechanism of communication using mobile phones during flood periods to coordinate response efforts.
6. Evolving a model for the cascades identified, and using that model to mainstream flood mitigation in other places.

In the case of the villages in the project area, different preparedness measures needed to be in place for the early warning system. Some of these prerequisites that DVTF established include:

- ✧ The Vayalagam nested institution for tanks and cascades must be present.
- ✧ The network of channels in the cascade must be carefully studied to identify any weak areas which may lead to floods. Any weak areas must be further analysed to determine both the potential scope of damage and to identify what is required to fix the problem.
- ✧ The earlier collective efforts must be revived; these efforts include regular maintenance, the Neerkattis system of monitoring tanks, collective Shramadhan, and the system of sharing responsibility for the maintenance of the cascade's channels among different villages.
- ✧ Meetings must be held with the community to ensure that the needs of each community are met and to ensure that everyone involved knows their responsibility and specific action plan.
- ✧ Flood response materials, such as sandbags and rope, must be stocked in a place where they will be available for immediate response in times of a flood.



- ✧ Mainstream agencies who work on flood relief measures should be provided with a list of tanks and channels which are susceptible to flood-related damage.
- ✧ Special meetings should be conducted before and during the monsoon period to help with overall preparedness.
- ✧ Tank encroachment should be eliminated; encroachment in the tank system reduces the channel width and reduces the storage capacity of the tank, and thus, contributes significantly to flood damages.
- ✧ Close information exchange should be ensured between the federation offices and the IMD.

### ***Reaction or responses at the time of flood situations***

At the times of potential flooding, the following are some of the practices which should be in place to help with response activities:

- ✧ Vulnerable tanks should be critically monitored, and villagers near these tanks should be kept informed about any predicted threats.
- ✧ Sandbags should be readily available to close breaches.
- ✧ Each cascade system should already have an emergency plan.
- ✧ All stakeholders would be approached for sharing the information about the damages; an integrated approach would be practiced to help affected villagers.
- ✧ Effective collaboration and communication should be ensured between the affected communities and the block development

office, fire service office, public works department, and collector office.

- ✧ Established groups within the community, such as self-help groups, should be prepared to help with things such as evacuation, protection of assets, and provision of food, water, and other relief materials.

### ***Permanent measures to follow response activities***

After the flood, it is important to analyze the situation to assess the overall damages which have occurred. The results should be prepared as a report with specific information for each village and cascade. These reports can be shared with flood control rooms and other agencies working on disaster management.

It is also important to document what was learned during the floods, including detailed information about the sequence of events from the warning signs, to the flooding time, to the response efforts taken. Having this detailed account will help improve early warning systems and response systems.

The identified tank cascades in both the blocks are under the purview of the early warning system promoted in the sub basin. The associates who look after the cascades are responsible for monitoring and responding to flood related issues. They would be provided with mobile phones to facilitate communication with block level committees at any point in time. Cascade leaders and associates must be given a training and orientation programme to ensure that everyone involved understands the early warning systems and other operational procedures.

## ***Epilogue***

Subsequent to pilot project, the rains during the 2008 north-east monsoon resulted in floods in many parts of Tamil Nadu including Tirumanimuthar basin. The intensity was not as severe as that of the 2005 floods, yet the committees and movement workers carefully monitored the rainfall's intensity and the water level in the tanks, kept sandbags handy in case a breach occurred, and kept villagers informed throughout the rains. The villagers and the farmers responded very favourably to the early warning system, and no tanks were breached.



## APPENDIX

### *2007 Madurai Symposium Knowledge Building Workshop on Disaster Risk Reduction*

The Madurai Symposium is a biennial “celebration” designed by DHAN Foundation. The event celebrates development-related initiatives and innovations and serves as a platform to help improve future development interventions. The event is attended by all development stakeholders including community institutions, government organizations, NGOs, financial institutions, and researchers. During the week-long event, there are a host of workshops, people conventions, exhibitions, and cultural events.

One workshop was the *Knowledge Building Workshop on Disaster Risk Reduction*, conducted by the Tata-Dhan Academy’s *Advanced Centre for Enabling Disaster Risk Reduction*. The themes presented at this workshop created the platform for this primer. Below is (1) a list of the presenters and their topics and links to the papers and presentations which were delivered; (2) the contact details for the resource persons; and (3) an overview of some of the emerging areas in which a development organization can focus their attention<sup>9</sup>.

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9 These notes are a compilation of ideas brought forth at both the one-day workshop on disaster risk reduction and the people convention on disaster risk reduction, an event that was attended by over 300 participants.

## PRESENTERS AND TOPICS

<b>PRESENTER AND ORGANIZATION</b>	<b>TOPIC AND LINKS</b>
<b>Prof. Santosh Kumar</b> NIDM, New Delhi	Welcome address
<b>Mr. N. Hari Krishna</b> Oxfam America	Special Address
<b>Ms. R. Sangeetha</b> Tata-Dhan Academy, Madurai	<b><i>DHAN's Experiences in Disaster Risk Reduction</i></b> <ul style="list-style-type: none"> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/dhans-experience-on-drr">http://www.slideshare.net/tdapdm/dhans-experience-on-drr</a></li> </ul>
<b>Mr. N. Hari Krishna</b> Oxfam America	<b><i>Approaches in Disaster Risk Reduction: Experiences, present Status, and Future Requirements</i></b> <ul style="list-style-type: none"> <li>✧ Paper: <a href="http://dhan.org/acedrr/papers/[01]-Approaches-in-Disaster-Risk-reduction-[Mr.-Harikrishna].pdf">http://dhan.org/acedrr/papers/[01]-Approaches-in-Disaster-Risk-reduction-[Mr.-Harikrishna].pdf</a></li> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/drr-current-approaches-and-future-needs">http://www.slideshare.net/tdapdm/drr-current-approaches-and-future-needs</a></li> </ul>
<b>Prof. Santosh Kumar</b> NIDM, New Delhi	<b><i>Integrating Disaster Risk Reduction in Development Planning and Processes</i></b> <ul style="list-style-type: none"> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/development-and-drr">http://www.slideshare.net/tdapdm/development-and-drr</a></li> </ul>
<b>Mr. John David</b> UNTRS, UNDP, Chennai	<b><i>Early Warning System for Disaster Risk Reduction: Present Status and Future Challenges</i></b> <ul style="list-style-type: none"> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/early-warning-systems-for-disaster-risk-reduction">http://www.slideshare.net/tdapdm/early-warning-systems-for-disaster-risk-reduction</a></li> </ul>

<b>PRESENTER AND ORGANIZATION</b>	<b>TOPIC AND LINKS</b>
<p><b>Mr. Sarbjit Singh Sahota</b> RedR, Pune</p>	<p><b><i>Training and Research Needs in Disaster Risk Reduction</i></b></p> <ul style="list-style-type: none"> <li>✧ Paper: <a href="http://dhan.org/acedrr/papers/[02-b]--Structural-response-to-building-capacities-for-DRR-[Mr.-Sarbjit-Singh].pdf">http://dhan.org/acedrr/papers/[02-b]--Structural-response-to-building-capacities-for-DRR-[Mr.-Sarbjit-Singh].pdf</a></li> <li>✧ Annexures: <a href="http://dhan.org/acedrr/papers/[02]-Structural-response-to-building-capacities-for-DRR-[Mr.-Sarbjit-Singh].pdf">http://dhan.org/acedrr/papers/[02]-Structural-response-to-building-capacities-for-DRR-[Mr.-Sarbjit-Singh].pdf</a></li> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/structural-response-to-building-capacity-needs-for-drr">http://www.slideshare.net/tdapdm/structural-response-to-building-capacity-needs-for-drr</a></li> </ul>
<p><b>Ms. Taranjot K. Gadhok</b> HUDCO, New Delhi</p>	<p><b><i>Disaster Risk Reduction in Urban Context</i></b></p> <ul style="list-style-type: none"> <li>✧ Paper: <a href="http://dhan.org/acedrr/papers/[03]-Disaster-Mitigation---Lessons-learnt-&amp;-Future-Directions-[Ms.-Taranjot-K-Gadhok].pdf">http://dhan.org/acedrr/papers/[03]-Disaster-Mitigation---Lessons-learnt-&amp;-Future-Directions-[Ms.-Taranjot-K-Gadhok].pdf</a></li> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/urban-risks-and-drr">http://www.slideshare.net/tdapdm/urban-risks-and-drr</a></li> </ul>
<p><b>Ms. Shelly Kulshrestha</b> World Bank Institute, New Delhi</p>	<p><b><i>Virtual Learning on Disaster Risk Reduction</i></b></p> <ul style="list-style-type: none"> <li>✧ Presentation: <a href="http://www.slideshare.net/tdapdm/wbi-drm-capacity-building-program">http://www.slideshare.net/tdapdm/wbi-drm-capacity-building-program</a></li> </ul>
<p><b>Prof. Sanjay Deshmukh</b> University of Mumbai</p>	<p><b><i>Ecological Restoration and Disaster Risk Reduction</i></b></p> <ul style="list-style-type: none"> <li>✧ Paper: <a href="http://dhan.org/acedrr/papers/[04]-Mangroves-in-climate-change-based-DRR-[Mr.-Sanjay-Deshmukh].pdf">http://dhan.org/acedrr/papers/[04]-Mangroves-in-climate-change-based-DRR-[Mr.-Sanjay-Deshmukh].pdf</a></li> </ul>

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## **FOCUS AREAS FOR ACEDRR AND SIMILAR RESEARCH OR DEVELOPMENT ORGANISATIONS**

### ***From the Knowledge Building Workshop on Disaster Risk Reduction:***

- ✧ Risk auditing of development projects
- ✧ Pre-disaster planning and investment
- ✧ Governance of disasters
- ✧ Climate change and disasters
- ✧ Public health and environmental health
- ✧ Enhancing organisational capacity on DRR
- ✧ Creating and institutionalizing decision support system , tools, and techniques

### ***From the People Convention on Community Based Disaster Preparedness:***

- ✧ Community Disaster Management Committees (CDMC) should be established in all disaster-prone villages
- ✧ CDMCs should work in close contact with the Government and with NGOs

- ✧ The rich traditional knowledge on risk reduction should be documented, disseminated, and practiced as part of an early warning system
- ✧ A “risk management fund” should be established in all people institutions; similar funds should be available at the Panchayat level.
- ✧ Ecosystems should be restored and conserved; benefits should be shared and kept at village level institutions as part of the risk management fund
- ✧ Insurance should be made available for coastal communities covering health, life, and assets
- ✧ Mock exercises should be conducted more frequently, and awareness should be developed regarding CDMC and capacity building
- ✧ Disaster risk reduction and disaster management should be included in school and college curricula
- ✧ District Disaster Management Plans must be made available in all the Panchayats
- ✧ Research institutions should conduct research on disaster mitigation based on the community’s experience and traditional knowledge; the findings should be shared with the community
- ✧ Proper drainage systems should be established in coastal flood-prone areas; existing systems should be renovated
- ✧ The best performing CDMC can be recognized through suitable rewards.



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## About the Workshop

Today's development scenario poses challenges to governments, NGOs, research and academic institutions, corporations, individuals, and others concerned with development. The severity of recent disasters impede the process of development and increases poverty. One now finds a shift in disaster response from relief and rehabilitation to disaster risk reduction (DRR) through prevention, preparedness, and mitigation. This is because merely restoring a situation does not address the vulnerabilities which led to the disaster. As such, DRR should be a prime development issue. However, mainstreaming DRR in poverty reduction is a long-term process and requires diverse approaches. Fortunately, with the wide range of stakeholders working in DRR, there is a wealth of experience and knowledge available. Making use of this resource, however, requires strong collaborative action. Through such collaborations, new creative ideas can emerge as effective tools for disaster risk reduction.

The Tata-Dhan Academy's *Advanced Centre for Enabling Disaster Risk Reduction* organised the *Knowledge Building Workshop on Disaster Risk Reduction* to bring together practitioners from NGOs, government organisations, and academic and research institutions to share the best practices and lessons across different stakeholders and from different contexts.

## About the Advanced Centre for Enabling Disaster Risk Reduction

ACEDRR is a specialized centre established at the **Tata-Dhan Academy**, aiming to enhance the knowledge and practice on disaster risk reduction through research and pilot projects, training and education, networking, consultancy, and policy advocacy activities to ensure secured lives and livelihoods of vulnerable communities.

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