Let our children teach us!

Photo credit: SEEDS India, http://www.seedsindia.org

A Review of the Role of Education and Knowledge in Disaster Risk Reduction

Prepared by
Ben Wisner

ISDR System Thematic Cluster/Platform on Knowledge and Education
www.unisdr.org/knowledge-education

July 2006

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On behalf of the ISDR system
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Contents

CHAPTER 1

Executive Summary

1. This review covers the key activities relative to the Priority 3 of the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, broadly:
   - Knowledge management.
   - Education.
   - Risk awareness.

(see annex 2 for the full text of the Priority for Action 3).

2. Among the many topics ranging from university research and training to primary school curricula and the media's treatment of risk reduction, three subjects are most urgent and central:
   - Teaching about hazards and risk reduction in schools.
   - Schools as centres for community based disaster risk reduction.
   - Physical protection of schools from natural hazards.

3. At all levels, pupils and students, from primary school to post-graduate study, can actively study the safety of their own schools and work with teachers and community members to find ways to protect them. They can also spread the methods of participatory vulnerability and capacity assessment and hazard mapping to the broader communities surrounding schools and other institutions of education and research.

4. However, there are constraints on such a strategy for rapidly accelerating public consciousness of risk and school protection:
   - The Education Millennium Development Goal is not being met.
   - Teachers receive low pay and are poorly supported.
   - Schools themselves may be in dangerous locations, and unprotected from high wind, flash flooding, landslides, storm surges and earthquakes.

5. The Kashmir earthquake in 2005 killed 17,000 school children. There have also been many "near misses," when earthquakes have destroyed schools when children were not inside.

6. There are other constraints on school based vulnerability and capacity assessment:
   - Brain drain and brains down the drain [Unemployment/mal-employment, HIV/AIDS , violence, declining life expectancy and disability-adjusted life years (DALYs)].
   - Scientific dominance by most developed countries and transitional countries (heavily-indebted poor countries and Africa left behind).
   - Information and communications technology imbalances ("digital divide").
   - Persistent natural science/social science split (the "two cultures").
   - Gap between research and action ("the last mile").

7. School curricula today:
   - Many focus on earth science.
   - Many focus on preparedness and drills.
   - Few integrate the two.
   - Fewer develop their own local curriculum.
   - Far fewer go outside and study the school's hazards and the communities.

But this is where the potential lies!

8. There are also gaps and opportunities in research and higher education:
   - All levels of education and research can be better linked with each other.
   - Available science and local knowledge can be applied.
   - South-south networking can improve.
   - Bottom up (students, teachers and communities) and top down (government, United Nations, international organizations, non-governmental organizations) can be better connected.

9. The review finds a great deal of good practice around the world and much sharing of experience; however, gaps and unrealized opportunities are also documented.

10. The review ends with a section on strategy that should provide the basis for a concerted effort on the three priority areas identified in item number one above: promotion of more and better teaching about hazards and risk reduction, development of schools into models and centres of participatory risk reduction in their communities, and the protection of schools against multiple hazards.

CHAPTER 2

Introduction

2.1 Purpose of this review

This review examines good practices to reduce disaster risk through education, knowledge and innovation (including efforts to protect schools from extreme natural events).[2] It looks critically and strategically at current activities in order to identify gaps, opportunities in the form of synergisms and partnerships, and centres of innovation.

This review's purpose is to provide the background and basis for two innovative new initiatives on disaster risk reduction and schools:

1. The ActionAid schools project "Disaster Risk Reduction through Schools", underway in seven countries (Ghana, Kenya, Malawi, Haiti, Bangladesh, India and Nepal) to promote disaster risk reduction through innovative community action. More detail is provided on the project in the section below on primary education (section 3.2.10.1).
2. "Disaster Risk Reduction Begins at School", a two-year campaign launched by the UN Inter-Agency Secretariat of the International Strategy for Disaster Reduction (the "ISDR secretariat") in collaboration with the thematic cluster / platform on knowledge and education and other partners. This campaign, launched in June 2006, promotes teaching on hazards and risk reduction in schools, as well as improved school safety. Cluster group membership and a sketch of the campaign are provided as annex 8.

In order to achieve its purpose, the review touches on a great deal of other activity in education, public risk awareness, training and research. All of these subjects can be seen as connected in a web of human activity that informs, supports, connects and learns from diverse risk reduction activities in individual schools and in their surrounding communities – or at least should do.

The intention is to provide a critical and strategic review. Therefore, this review is neither a comprehensive account, nor a quantitative tabulation, of all educational and research activities dedicated to disaster risk reduction, or of all efforts in different localities and nations to protect schools.

2.2 The Hyogo Framework for Action

Work on this report began one year after adoption of the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (the "Hyogo Framework") as a review of good practices around education, knowledge and innovation for disaster reduction.

The Hyogo Framework, adopted at the World Conference on Disaster Reduction (WCDR) by 168 delegations in January 2005, is a groundbreaking international commitment to implement a global disaster reduction agenda. Building on numerous prior studies and reports, it articulates a worldwide consensus that disaster risk reduction is an integral part of sustainable human development, not a side issue of limited, technical interest or concern. It is organized around five main Priorities for Action:

1. Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.
2. Identify, assess and monitor disaster risks and enhance early warning.
3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.
4. Reduce the underlying risk factors.
5. Strengthen disaster preparedness for effective response at all levels.

This report deals with Priority for Action 3.

Education, knowledge and awareness are critical to building the ability to reduce losses from natural hazards, as well as the capacity to respond to and recover effectively from extreme natural events when they do, inevitably, occur.

2.3 The UN Decade of Education for Sustainable Development

The UN Decade for Education and Sustainable Development (2005-2014) (DESD), as well as continuing work by governments and other actors toward achievement of the Millennium Development Goals, provide this review's larger theoretical and political context.[3] The DESD, led by

UNESCO (the United Nations Educational Scientific and Cultural Organization), has as its overall goal:

To integrate the values inherent in sustainable development into all aspects of learning to encourage changes in behavior that allow for a more sustainable and just society for all … UNESCO's leadership role and, in fact, the task of Member States are also defined by the four major thrusts of education for sustainable development:

- Improving access to quality basic education.
- Reorienting existing education programmes.
- Developing public understanding and awareness.
- Providing training.

The concept behind the DESD was confirmed at the 2002 World Summit on Sustainable Development, where "education [was] recognized as a tool for addressing important questions such as rural development, health care, community involvement, HIV/AIDS, the environment, and wider ethical/legal issues such as human values and human rights".

The DESD seeks to make education support and promote sustainable human development more directly, while also expanding educational opportunities across the globe. DESD planners correctly understand that these ambitious goals require both a reorientation of education systems and a substantial investment in training.

The theory and conclusions of this review draw from the DESD theoretical framework. The DESD is designed to promote four fundamental values, two of which are linked to disaster risk reduction:

- Respect for the human rights of future generations and a commitment to intergenerational responsibility.
- Respect and care for the greater community of life in all its diversity, which involves the protection and restoration of the Earth's ecosystems.

This review is based on the premise, shaped by decades of research and practical experience, that disaster risk reduction is an essential part of sustainable development. Therefore, the broadly cross-cutting issue of disaster risk reduction must be one of the important issues that education addresses. Education for sustainable development should include risk reduction in the curriculum. Study of hazards and risk reduction should be promoted in schools, and schools should be protected as a national and local priority. However, to accomplish these goals, this review concludes that a re-orientation of school systems and more effort in teacher training and in-service support for teachers are required.

Finding ways to prevent and to mitigate the losses from future natural hazards demonstrates a commitment *par excellence* to the rights and well-being of future generations. In particular, making sure that schools are safe places in which to learn represents a commitment to future generations.

Additionally, this review found that many curricula presently dealing with hazards and risk reduction are, in fact, concerned with teaching about environmental stewardship. Links between natural resources and natural hazards already exist in many students' minds; for example, in response to a recent call by the ISDR secretariat and UNESCO, asking children to help to name the global

campaign on education and disaster reduction, many of the responses focused on water and water resources. [4]

2.4 The big picture

During the two years preceding the WCDR, many researchers and agencies were busy exploring the links between disaster risk reduction and sustainable human development. They concluded that their agendas overlapped nearly perfectly. However, the dominant perception in the development community was that to "add disaster" to their workload was a burden and would drain resources away from other work, such as the Millennium Development Goals.

In the year since the WCDR, this point of view has begun to change. Recent events have brought home the fact that development investments can be lost in the twinkling of an eye during an earthquake, tsunami or flood. It is also clear that many of the steps necessary to reduce disaster risk and protect schools and communities – actions such as reforesting slopes or protecting mangroves – also produce many other benefits. In education and public awareness, disaster risk reduction can be a window through which discussion of less dramatic but important development issues gain visibility – concerns such as urban sprawl, management of water resources, teacher and health provider pay and conditions of work, even very broad issues such as fair and free trade.

Additionally, the future of disaster risk reduction faces similar challenges as larger development programmes such as the Millennium Development Goals. The Millennium Project gives four reasons for failure so far to meet the Millennium Development Goals:

- Governance failures.
- Poverty traps.
- Existence of pockets of poverty.
- Specific areas of policy neglect.

Education for disaster risk reduction must avoid these pitfalls.

In its *State of the World's Children 2006: Excluded and Invisible*, UNICEF (the United Nations Children's Fund) highlights three areas where dramatic progress is needed if the Millennium Development Goals are to fully benefit children. UNICEF argues that:

- A massive push is needed to boost access to essential services for those children and their families currently missing out. This includes immediate interventions – dubbed 'quick impact initiatives' – that can provide a vital kick-start to human development and poverty reduction.

- Longer-term initiatives that are rooted in a human rights-based approach to development – many of which are already underway – must be stepped up or launched at the same time as the immediate interventions, helping to ensure that the latter are as effective as possible. Building up national capacities, through strategies led by national governments and local communities, is the best way to ensure the sustainability of these initiatives over the longer term.

- Deeper approaches must be taken that give special attention to the most vulnerable. This requires the participation of governments – through legislation, budgets, research and programmes – along with donors, international agencies, civil society, the media and the private sector to reach the children who are most at risk of missing out on the Millennium agenda (UNICEF 2006).

Overcoming current constraints requires a combination of leadership by key nations; lobbying by those concerned with education, children, youth and development; and support for civil society initiatives. The basic strategy is very simple: try to get things moving simultaneously from the "top down" and the "bottom up". At the national level, rational demonstration of unity on the Millennium Development Goals and the cost-effectiveness of protecting school infrastructure may have to be complemented with other incentives, such as debt-for-safety swapping. Pressure for the necessary legislation and resource flows must also come from civil society – from teachers' unions, parents,

community leaders and professional associations. Locally, however, steps can be taken right away even before national commitments are made. A regional and global framework for supporting such local action to increase education about risk reduction and to protect schools can accelerate these "bottom up" initiatives.

2.5 Definition of terms

2.5.1 Concerning "education"

The term "education" is used very broadly in this review. It encompasses formal and informal transmission of knowledge, and engagement of groups of people (children, youth, lay people and professionals) in identifying hazards and feasible actions to mitigate them and to prepare for the risk that cannot be reduced. This includes the formal public and private education systems (primary, secondary and tertiary), vocational and professional training courses, community-based self assessment, and public discourse involving the media, awareness campaigns, museums, memorials and special events.

2.5.2 Concerning "knowledge"

A similarly broad definition has been adopted for "knowledge", covering universal, codified and professional understandings as well as local, often oral, vernacular bodies of knowledge. Following the conceptual framework adopted by the International Federation of Red Cross and Red Crescent Societies (IFRC) in its *World Disaster Report 2005*, "data" are viewed as the building blocks that create "information". "Information" becomes "knowledge" when it is put into a context that gives it meaning and, usually, some relevance to action or inaction. "Wisdom" is what organizes knowledge, and though less tangible, is the result of accumulated experience of action and inaction (IFRC 2005).

Formal and Informal Knowledge are part of a System that Guides Understanding and Action:

- Data
- Information
- Knowledge
- Wisdom
- Action

2.5.3 Concerning "action"

This review surveys "action", or what actually is being done, rather than dwelling on commitments and plans. The WCDR that gave rise to the Hyogo Framework was action-oriented. It took place only weeks after the dreadful 2004 Indian Ocean tsunami that cost 220,000 lives in 12 countries. Many of the delegates, including those representing the IFRC and many non-governmental organizations (NGOs), were impatient with "business as usual" diplomacy (Wisner and Walker). Observers and experts looked back on the International Decade for Natural Disaster Reduction (IDNDR) and lamented that so little of the massive amount of accumulated scientific and engineering knowledge had so far actually been applied.

Words and plans, demonstration projects and pilots, must be differentiated from serious national efforts with money and political will behind them. It is one thing for a ministry of education to say it will introduce knowledge about natural hazards into school curricula. It is another for that to happen in a few pilot schools. It is yet another for that curriculum to be used widely, routinely and creatively.

Similarly, efforts vary widely in their commitment to integrating local knowledge related to disaster risk into plans and programmes. "Community participation" is a mantra and of clear value. However, it can be interpreted in a shallow manner, in which officials "consult" with locals to receive their blessing for pre-conceived plans, or it can take on a transformative character. In the latter case, local people are equal partners, or even lead efforts to increase safety.

2.5.4 Concerning a "critical" and "strategic" review

This report seeks to highlight practices that are reaching deeply into educational and social systems to help bring about the fundamental transformations needed to reduce disaster risk in today's world. A recent reflection on the rapid growth of green civil society in China notes that "[i]nitially, Chinese environmental NGOs tended to pursue 'safe' activities such as promoting environmental education for schools…" (Turner and Zhi 2006). However, these activities do not address one of the biggest problems facing students – safety. With at

least 17,000 school children dead in the collapse of their schools in the Pakistan earthquake and well-intentioned plans to put at least another 100 million excluded children into school by 2015, efforts in the broad field of education cannot be content with curriculum reform alone. It may be necessary, but it is not sufficient to bring about the urgent changes needed.

The late Brazilian adult education pioneer, Paulo Freire, thought of education as collective study of reality and problem solving, and made policy recommendations using a Portuguese term roughly translatable as "consciousness raising." In relation to disaster risk, "consciousness" is a useful term, going far deeper into root causes of vulnerability than does the common expression "risk awareness". For example, in Turkey between 1995 and 2003, a series of deadly earthquakes were met with a crescendo of public outcry and a slowly deepening public understanding of what had to be demanded of the construction industry (Mitchell and Page 2005). This, too, is education.

Reforms in education face very serious strategic obstacles. Teachers are generally poorly paid and poorly trained in much of the world. Education International – the apex organization representing most teachers' unions in the world – actually walked out of the UNESCO annual meeting in protest of perceived insufficient defence of teachers' needs and interests. In the US, 44 of the 50 states are projected to have education budget deficits by the year 2010 (Boyd 2005). In the UK, one in every four schools lacks a head teacher. This is the world in which under-trained and under-paid teachers are about to be asked to add natural hazards and disaster reduction to their teaching load. Obviously, more than innovative curricular material is required.

2.5.5 A strategic turning point?

Nevertheless, a tipping point may be imminent. Over the past 20 years, training courses by NGOs and other entities have penetrated deeply, beginning to have a significant impact on local efforts at risk reduction. University-based professionals are increasingly dissatisfied with the division between research and application. Some governments are beginning to see the efficiencies possible when education, health, disaster risk and poverty reduction are seen as an interconnected whole in comprehensive poverty-reduction strategy programmes.

These and other developments, such as the DESD discussed above (section 2.3), are bringing schools to the forefront as a focus for local disaster risk reduction. Using this focus, the ISDR secretariat and ActionAid campaigns supported by this report seek to build a critical mass of energy and activity.

CHAPTER 3

Formal Education

3.1 Curriculum and teaching practice: key elements of a complex system

There is much interest in curriculum and teaching practice as vehicles for transmitting disaster-related knowledge. This report will explore both in some detail.

But first, a caveat: curriculum does not exist in a vacuum. The primary and secondary systems of education in the world today are precisely that: systems. And systems depend on the strength and functionality of every component part. Therefore, the overall condition of education systems must be taken into account if recommendations to promote risk-reduction education are to be realistic and feasible.

In order to use curriculum, for instance, there must be teachers. And these teachers need to be trained, paid a decent salary, respected and supported. Additionally, teaching and learning materials must be available and affordable – which is not a given. One study found that key text-books in southern Africa cost up to four times what they do in the UK or the US. Physical infrastructure is also vital. Some of the most innovative curricula available worldwide are computer-based. Does the school have a computer? Is there an internet connection? Is there a reliable electricity supply? Are there enough desks for the students?

Above all, is the school itself a safe place to be?

For example, one expert interviewed for this review remarked:

> …in some Latin American countries the consequences of marginalization, poverty and inequity are reflected at the school level. In many cases, schools (a single classroom school) with a single teacher have to provide the training curriculum to students that are between first to six grades. All of them receiving education at the same time by one teacher ...[An]other common condition is overcrowding of the classrooms. In some cases, public schools host more than 50 students per classroom. In some other cases, mostly private sector, schools are functioning in houses that were transformed into schools.[5]

Additionally, the systems of administration, supervision, evaluation and promotion must be consistent with the goal of using education for risk reduction. In educational systems with standardized examinations, for instance, it may be difficult for teachers to innovate and take class time for valuable, hazard-related experiential learning exercises.

This review will not explore most of these prerequisites in depth, although later on, in section 3.4, the question of school safety will be examined. Here, the emphasis will be on curriculum and its use.

Pedagogy, the art of teaching, is crucial. Arguably, a well-trained or highly-motivated teacher can do a good deal with a mediocre curriculum, and a poorly-trained or unmotivated teacher will make little impact even with a good curriculum. Therefore, initial teacher training and in-service training are essential if education is to result in increased hazard knowledge and changed risk behavior that ripples from the classroom into the community.

As a rule, hands-on, experiential learning is the most effective way to educate. Therefore, ideally, a disaster-relevant curriculum would not only impart knowledge of the natural hazards themselves, but also would involve students in inspecting the school buildings, going outside to map the surroundings, and even interviewing elders about extreme natural events in the past. Such learning could be done in ways that reinforce basic skills in listening, writing, reporting and mapping. It could be integrated into the study of history, geography and natural science. Age-appropriate math, from simple arithmetic to statistics, geometry and trigonometry, could be used.

The real-life teaching and curricula reviewed here vary greatly. Few approximate this ideal. Some examples provide excellent training in earth and climate science, but do not focus on locally-experienced hazards. In other cases, like generals who tend to re-fight the last war, education planners have focused exclusively on one recent disaster. Turkey, for example, within its all hazards school curriculum, has an impressive programme of earthquake-risk awareness, that has reached

perhaps five million students. On the tsunami-affected coast of Thailand, there are new curricula that focus exclusively on tsunami – even though the most common hazards in the region are coastal storms, floods and forest fire.

3.2 In and around the primary and secondary classroom

Currently, children and youth in primary and secondary schools around the globe benefit from a wide variety of treatments of natural hazards, disaster preparedness and prevention. Curricula and teaching practices vary greatly in approach, intensity and quality. Taken as a whole, these diverse efforts raise the possibility of a rapid spread of good practice. To realize this possibility, however, relevant actors must devote focused attention and resources to sharing experience, translating and adapting curricula, and networking the most effective pedagogical practices.

One can get an impression of the range of existing activities by examining the numbers brought to light at the WCDR. Slightly more than half of the countries reporting on disaster reduction in advance of the WCDR confirmed that their education systems included some form of disaster-related teaching.

The type of effort varies. Overall, 113 countries sent information for the WCDR.[6] The table below is based on a study review prepared on the 82 national information reports received by the set deadline for the WCDR. Some 33 countries reporting (40 per cent) claimed to have national efforts to teach disaster-related subjects in primary and / or secondary school. The distribution of these countries breaks down as follows (table 1):

Other countries, such as Brazil and Venezuela, reported significant primary and secondary teaching at municipal or state level. Others, in advance of the WCDR, mentioned plans underway to begin teaching in schools (specifically Haiti, Nicaragua, Zimbabwe and Israel). Still other nations reported either teaching without support of a curriculum (Papua New Guinea, Canada and Austria); teaching integrated into other subjects (Cote d'Ivoire); or narrowly-focused teaching (e.g., fire safety in Germany, practical preparedness exercises in Ecuador).

In addition, Mexico, Romania and New Zealand mandate by law the teaching of disaster-related subjects in their schools. In the year and a half since these reports were collected by the ISDR secretariat, South Africa and Mexico have begun some pilot teaching programmes, and have put considerable energy into the development of teaching materials.

Table 1

Countries with hazards teaching in primary or secondary school

Asia and The Pacific	Latin America and the Caribbean	Africa	OECD	Central and Eastern Europe, and CIS	Other UN Members
Bangladesh	Bolivia	Algeria	France	Czech Rep.	Monaco
Iran	Br. Virgin Islands	Kenya	Greece	Hungary	
India	Colombia	Madagascar	Japan	Lithuania	
Mongolia	Costa Rica	Mauritius	New Zealand	Macedonia	
The Philippines	El Salvador	Senegal	Portugal	Romania	
Tonga	Montserrat	Uganda	Sweden	Russian Fed.	
Turkey			USA		

Abbreviations: Br. Virgin Isl., British Virgin Islands; CIS, Commonwealth of Independent States; Czech Rep., the Czech Republic; OECD, Organization for Economic Co-operation and Development; Russian Fed., the Russian Federation

Figure 1

Home page of *ABC Desastres* from Argentina

(Source: Revista EIRD Informe, No. 11, 2005)

One hundred and sixty eight nations were represented at the WCDR. Information from those whose reports were not summarized in the pre-conference study review shows primary and secondary school teaching on a large scale in Cuba, the UK and China, among others (see section 3.2.1 below and annex 10).

3.2.1 Examples of teaching practice

Much effective disaster-related teaching is taking place in many parts of the world. It is estimated that half the world's nations provide some form of teaching about natural hazards and safety in at least some of their schools.

A good deal of additional practice exists beyond what is revealed in table 1; this review explores some, but has uncovered only the tip of the iceberg. Additionally, a great deal of important activity happens below the national level. In many places, educational policy and the commission and supply of teaching materials is decentralized to the sub-national stage. In addition, NGOs, international organizations and agencies of the UN system provide teaching material that is accessible electronically, which may well be used in individual schools at the initiative of a keen teacher. In other cases, parents come into class to supplement and enrich teaching with their own experiences and material.

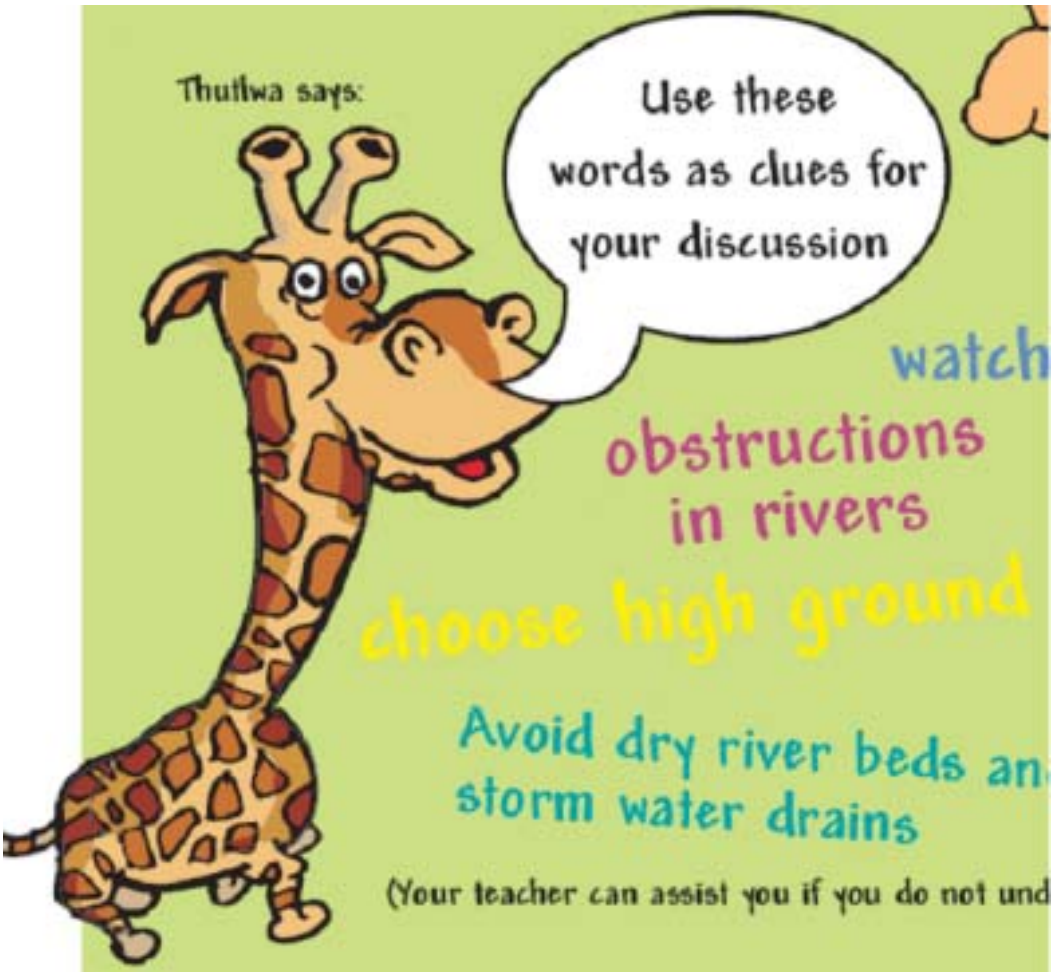
The challenge is to build on all these laudable practices, to promote them in neighboring schools, and to encourage such teaching in nations where it is rare or absent. The following case studies, describing good practices from around the globe, give an impression of the wealth of useful resources available. These practices provide a starting place from which to build.

3.2.1.1 Giraffes and thirsty weeds in South Africa

In South Africa, no national curriculum deals specifically with disasters or hazards; however, various individual states are pursuing relevant educational initiatives.[7] Western Cape schools offer "life and safety education", focusing on the avoidance of fires and other accidents in the townships. The curriculum is integrated with efforts to educate about violence prevention and with campaigns against gangsterism. The schools

Figure 2

Image from grade five text in South Africa



(Source: Dewald van Niekerk, North West University, South Africa)

also provide some environmental education, including teaching about drought and "thirsty" invasive species of plants.

In the Northern Transvaal, the ISDR/UNICEF board game "Riskland" has been adapted to South African conditions, and teaching materials for ages 10-12 have been produced. The materials feature a mascot for disaster risk reduction, the giraffe (see figure 2), who symbolizes foresight – with her great height, she can "see" hazards. Schools use songs to teach the basics of safety to younger children.

3.2.1.2 Student gardens and storm warnings in Cuba

In 2002-2003, Cuba supported 9,459 primary schools (906,293 pupils) and 1,909 secondary schools (431,878 pupils). These are difficult but dynamic times for them all.[8] Decades under the US economic embargo, compounded by an economic crisis stemming from the USSR's collapse, have put a great strain on the country's social infrastructure. This strain shows in education (Uriarte 2002). Some teachers have taken private-sector jobs. Student/teacher ratios have increased across the board. Boarding schools have suffered shortages of food and supplies. Drop-out rates have increased for pre-university and technical schools. Enrollments have decreased at all levels and particularly in higher education. School buildings are physically deteriorating.

Nevertheless, Cuba continues to be a hemispheric leader in teaching on hazards and safety (see photo 1). To compensate for food shortages, school gardening has increased. As a result, students spend more time in hands-on environmental stewardship together with teachers and visiting university experts. Urban gardening has exploded throughout Cuba, accompanied by a great deal of applied

Photo 1

Cuban students learning about disaster preparedness

Cubans start learning about disaster preparedness at a very early age. School children receive instructions on what to do in case of a disaster

(Source: Oxfam America)

research in universities and institutes on organic substitutes for the fertilizers and pesticides Cuba can no longer afford to import (Funes et al. 2001). Consequently, students are better able to appreciate the interdependency of humans and nature and bring this appreciation to their study of hazards.

Cuba is strongest in its teaching on hurricanes. While disaster preparedness, prevention, and response are part of all school curricula (Thomson and Gaviria 2004), the curricula emphasize hurricanes because of the island's exposure to them. The Cuban Red Cross provides some excellent teaching material, and the messages that children get in school are reinforced by training courses and disaster drills for parents in the workplace, and by radio and television broadcasts. This effective teaching accounts, in part, for Cuba's exceptional record in protecting human life in recent hurricanes (Wisner et al. 2005).

3.2.1.3 Nationwide training in civil defense for teens in Ecuador

In Ecuador, school instruction on disasters began in the 1980s and accelerated in the 1990s.[9] Teaching focuses on "civil defence", or preparation for and response to disasters, for ages 14-18. Students in their final year of high school (last year of the *bachillerato*) take a 200-hour course on the subject. There is close cooperation between the training department of the national office for civil defence and the Ministry of Education. Further support for teaching is provided by provincial-level civil defence offices and local fire departments.

Civil defence includes, for example, a programme to teach how teachers and students should act in case of emergency for both earthquakes and volcanic eruption. These programmes were actually tested during recent active periods of Pichincha and Reventador volcanoes.

3.2.1.4 A book on every desk in China

In 2004, the National Text-book Authorization Committee for Primary and Middle Schools of China approved a text-book for senior middle schools on natural hazards. The text-book was created by Beijing Normal University and published by the People's Education Press. It covers natural hazards and their mitigation. The contents are given in figure 3. By 2006, Professor Peijun Shi of Beijing Normal was able to tell me that there is a copy on every senior middle school student's desk.[10]

The book is a thorough introduction to natural hazards in the world, with a more detailed focus on China, and includes a final chapter on preparedness and disaster risk reduction. The book also features a list of Chinese web sites that students and teachers can consult, including an excellent site maintained by the Chinese Science Museum.[11] As of this writing, an English translation is being prepared.

Figure 3

A standard Chinese text-book for senior middle school

Geography
Elective No. 5
Natural Disaster, Mitigation and Reduction

Content

Part I Natural Disaster and Human Activity
Chapter 1 Natural Disaster and its Impacts
Chapter 2 Formation and Distribution of Major Natural Disaster
Chapter 3 Human Activity and its Impacts on Natural Disasters

Part II Natural Disasters in China
Chapter 1 Characteristics of Natural Disasters in China
Chapter 2 Geological Disasters in China
Chapter 3 Hydrological Disasters in China
Chapter 4 Meteorological Disasters in China
Chapter 5 Biological Disasters in China

Part III Disaster Mitigation and Reduction
Chapter 1 Natural Disaster Monitoring and Mitigation
Chapter 2 Natural Disaster Succor and Relief
Chapter 3 Self-Succor and Mutual Succor in Natural Disasters

(Source and Translation from Chinese by Prof. Peijun Shi, Beijing Normal University)

3.2.1.5 A total community priority in Japan

Neighborhood associations are universal in Japan.[12] Children grow up seeing adults modeling civil responsibility in a variety of ways. Notice boards are everywhere in residential areas, and urban homes have small red buckets of water outside the front door, a vestige of traditional community fire brigades, which have existed in many cities since the 1700s. (Although, unfortunately, few young people today want to join them.)

Japanese schools are a venue for a great deal of teaching about disaster preparedness. For example, Maiko High School in Hyogo Prefecture offers a course entitled "Environment and Disaster." It seeks "… to have the students think of how we live and exist in the symbiosis society [*sic*] by utilizing the lessons learned from the Great Hanshin-Awaji Disaster."[13] It looks at disaster mitigation in both social and natural environments, bringing in researchers, experts and parents as guest lecturers. The students visit the Nojima fault and the Memorial Center for the Great Hanshin-Awaji Earthquake of 1995. They attend conferences and even give lectures. They also correspond with foreign students and experts via email.

A wealth of material has been produced to aid teaching in Japan, some of it by municipalities, some by the prefectures (districts), and other by professional institutions like the Japan Society of Engineers, the Sapporo Observatory and the General Insurance Association of Japan. National government agencies also produce teaching material, such as *Let's Learn about Survival and Safety* (2001) by the Ministry of Education, Culture, Sport, Science and Technology for grades 1-3. Figure 4 gives the content of a 28-page guide produced by Shizuoka Prefecture.," electronic message, provided by Etsuko Tzunozaki, Asian Disaster Reduction Center, Kobe, Japan. National government agencies also produce teaching material, such as *Let's Learn about Survival and Safety* (2001) by the Ministry of Education, Culture, Sport, Science and Technology for grades 1-3. Figure 4 gives the content of a 28-page guide produced by Shizuoka Prefecture.

Figure 4

Japanese text-book contents

Guidebook for earthquake disaster prevention						
Shizuoka prefecture, disaster prevention bureau	Year of publication	2003	Format	PDF file	page	28
Children, elderly people, disabled people			Types of material	Instructional / Practical		

Table of contents

- **Earthquake damages in the past** (p.1-4) – lesson, knowledge
- **What is "Tokai Earthquake"?** (p.5-6) – knowledge
- **Damage estimation of Tokai Earthquake** (p.7-10) – knowledge
- **Tokai Earthquake and warning** (p.11-12) – knowledge
- **What should we do when warning is announced?** (p.13-14) – knowledge
- **What should we do when earthquake happens suddenly?** (p.15-16) – knowledge
- **Daily preparedness: evaluation of seismic capacity of our house** (p.17-18) – challenge
- **Daily preparedness: fixing furniture** (p.19-20) – knowledge
- **Daily preparedness: goods to be carried out, stockpile** (p.21-22) – knowledge
- **Daily preparedness: countermeasures for fire prevention** (p.23) – knowledge
- **Daily preparedness: check block wall** (p.23) – knowledge
- **Daily preparedness: let's participate in disaster prevention activity in the community** (p.24) – knowledge
- **Daily preparedness: let's make list of division of roles for activity and disaster prevention map** (p.25) – challenge

3.2.1.5 Training trainers of trainers in Turkey

Bogazici University, Kandilli Observatory and the Earthquake Research Institute's Disaster Preparedness Unit began training disaster awareness instructors in Istanbul, Turkey, in 2001.[14] By the end of 2002, they had trained over 3,000 teachers in 32 districts of the city. These instructors, in turn, taught 34,000 more teachers, as well as six thousand school personnel and more than 350,000 parents. In the end, 826,000 school children received disaster awareness education. Sponsors extended the training to three other Turkish provinces, reaching another 1.5 million students.

In 2004 / 05, a five-day master instructor trainer class was offered. Trainers from 50 provinces participated. The resulting 132 certified-master instructor trainers taught 16,000 school-based instructors, who in turn taught teachers, parents and others. In this way, according to a national web-based monitoring system hosted by the University, 2.4 million students were trained. Factoring in under-reporting to the monitoring system brings the estimate to 3.5 million students.

By 2006, the national Ministry of Education had committed to applying this cascading model to all the high-risk provinces in the country. This has the potential of increasing the seismic safety of 5 million children.

3.2.1.6 Progress on many fronts in India

India is making progress on disaster risk reduction teaching practice and curriculum on multiple fronts.[15] At the national level, the Central Board of Secondary Education (CBSE) of India has introduced disaster management into classes 8 and 9, and proposes to add it to the curriculum for class 10 in 2005 / 06. More than 1,000 teachers have already been trained in the use of this new curriculum throughout India. New texts supporting this initiative include:

- *Together, Towards a Safer India… An Introduction to Disaster Management for Class 8*, CBSE, Delhi.
- *Together, Towards a Safer India Part II: Making a Difference*, a text-book on disaster Management for Class 9, CBSE, Delhi.
- *Together, Towards a Safer India Part III: A Stride Ahead*, a text-book on disaster Management for class 10, CBSE, Delhi.[16]

In the state of Gujarat, the NGO SEEDS (the Sustainable Environment and Ecological Development Society) is running the "Gujarat School Safety Initiative," focused on developing disaster management plans in 150 schools in three cities – Ahmedabad, Vadodra and Jamnagar. The initiative engages with schools to build school-level disaster management plans, to organize drills and to hold exhibitions, plays and lectures to create

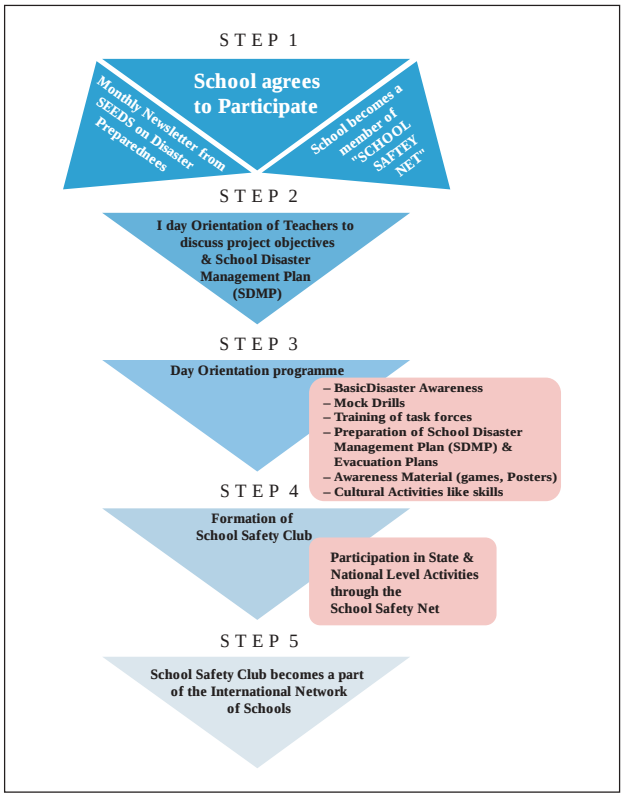
awareness on safety.[17] The initiative's scope, however, is even wider. Partnering with the Gujarat State Disaster Management Authority, SEEDS is planning by December 2006 for the initiative to directly benefit over 100,000 students and 9,000 teachers across the state. The initiative's methodology is schematized in figure 5 below.

Additionally, in the Indian state of Andhra Pradesh, a network of 20 local NGOs involved in disaster management is training children to recognize cyclone warnings and act on them, to build floating devices, to rescue and to treat the injured, and to help get people safely into cyclone shelters. This early training forms part of the larger community-based disaster preparedness programme run by this network, known as CADME (Coastal Area Disaster Mitigation Efforts), with support from Oxfam Great Britain (Sircar 2004).

Resources to promote and support training in schools in India are available from organizations such as the All India Disaster Mitigation Institute,[18] SEEDS and the UN Development Programme (UNDP).

Figure 5

Methodology of the Gujarat School Safety Initiative



3.2.1.7 From the global to the local in Germany

There are 16 different curricular arrangements in Germany that devolve responsibility for education to the sub-national states.[19] Nevertheless, beginning in North Rhine-Westphalia in 1993, natural hazards were a required subject in grades 7-8. The current text-book focuses on regions of the world at risk, the natural causes of risk, and the impact of hazards on the shaping of habitats (Brodengeier et al. 2004). Teachers attempt to sensitize students to the difference between a natural event and a disaster, and indicate the necessity of early warning systems, disaster management and prevention. They use the example of earthquake prevention school instruction. Then, students study the risk of earthquakes in their home region.

There are internet pages dedicated to teachers and pupils learning about natural hazards.[20] In addition, some schools host supplementary activities in the afternoon, voluntary workshops called *arbeitsgemeinschaft*. As part of an *arbeitsgemeinschaft* in Karlsruhe, for instance, a group of students are doing extra work researching earthquakes and floods in their own region.[21]

3.2.1.8 The use of living memory in Algeria

Algeria has made a good start at educating youth on disaster risk reduction using living memory.[22] During their six years of primary school, Algerian children are taught about natural disasters through stories at the rate of one lesson per year. During the 2005 school year, for example, Algeria's primary schools introduced stories about the 2003 Boumerdes earthquake to second-year students. During the three-year period of the secondary school, young people are taught about other natural phenomena – mainly earthquakes, floods, and volcanoes — but again, only through one lesson per school year. In the pre-university years, youth are taught about geology, plate tectonics and, again, earthquakes. This teaching is more systematic.

The national government is working to expand on this beginning. In December 2005, the Ministry of National Education organized a two-day meeting that brought together school teachers, university professors, scientists from the research institutes of seismology and earthquake engineering, and

members from the Algerian Red Crescent Society to discuss an official programme to introduce a new comprehensive teaching programme at all levels on disaster risk reduction. A commission appointed to make recommendations for this new curriculum has reported and the ministry is presently reviewing the report.

3.2.1.9 Schools cooking up a storm in Jamaica

Jamaica runs a multifaceted hazard awareness programme in schools. Elements include fire and earthquake drills, poster competitions and cultural competitions – contests involving song, dance, and skits by schools, as well as exhibitions and talks. Also, in collaboration with the Ministry of Education, Jamaica's disaster preparedness agency (the Office of Disaster Preparedness and Emergency Management, or ODPEM) promotes Disaster Awareness Day and Disaster Preparedness Day in schools. These events occur in January and June, respectively, the latter month also signaling the start of hurricane season. ODPEM also maintains an informational web site for children and produces children's books, videos and posters. Furthermore, disaster preparedness is infused in curriculum for various subjects at the primary, secondary and tertiary levels, including areas such as mass communications and resource management. ODPEM is encouraging the Ministry of Education to consider hazards and vulnerability reduction in location and design of schools.

In addition, schools participate in an innovative disaster-themed culinary competition during the annual Independence Festival. They prepare recipes and meals using only foods that would be available after a disaster – those with a long shelf life, and that do not require refrigeration. The competition has been well-supported and students have shown a great deal of creativity in their entries.

ODPEM is partnering with UNICEF on a project to prepare schools and their communities to ensure the safety of children from hazards. This project includes development of plans, drills, and efforts to shelter children in schools, as well as vulnerability analysis and involvement of community members.

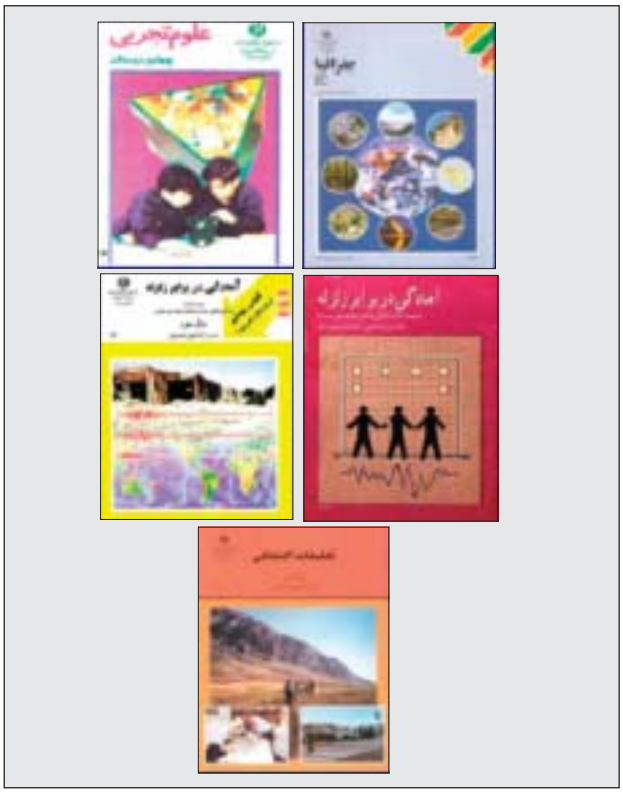
3.2.1.10 Full national mobilization in Iran

Iran has nationwide earthquake safety education in its schools, supported by a wide range of text-books, and reinforced by posters and public awareness campaigns for families and the general public. Between 1996 and 2003, the country developed a national system of annual school earthquake drills in stages, beginning with trials in Tehran and eventually reaching all 16 million primary and secondary students by 2003 (Ghafory-Ashtiany and Parsizadeh 2005).

Teaching earthquake safety to children in Iran

(Source: Ghafory-Ashtiany and Parsizadeh 2005)

Some of many Iranian text-books



(Source: Ghafory-Ashtiany and Parsizadeh 2005)

Educational efforts have increased since the Bam earthquake in 2003. Evidence suggests, however, that what children learned in school even before that tragedy helped save lives.
Doctoral candidate Yasmin Izadkhah has documented some of the ways that children used what they had learned at school to survive the 2003 Bam earthquake (Izadkhah 2004):

In an interview between the researcher and a secondary school pupil in Bam, the pupil … stated that he survived and helped his father to get out of the rubbles [sic] due to knowledge he had gained from his school text-books. He said that he had learnt that taking shelter under a desk could be useful.

In [photo 2], a girl who survived the Bam earthquake demonstrates the way she protected herself during the earthquake. It is believed that the casualty rate in the Bam earthquake could have been lower if the earthquake had occurred during the day time as there was more chance of people taking appropriate safety actions. In addition, when people are sleeping in a flat position, they are highly vulnerable to the impact of falling debris.

Photo 2

Iranian girl demonstrating how she protected herself during Bam earthquake

(Source: Parsizadeh)

3.2.1.11 Ambitious plans in Malawi

There is presently no central government promotion of risk reduction in Malawian schools. Nevertheless, preliminary plans for the ActionAid school project in Malawi's far southern Nsanje District have potential to catalyze national action (figure 6).[23] The Nsanje District is a good candidate for schools-based disaster risk reduction work, for several reasons. The area is prone to flooding, especially near the Shire River, which empties into the Zambezi close to the border with Mozambique. District schools are already a focus of community activity because they serve as shelters, food distribution centres during these past years of food crisis, and centres for community mobilization and meetings.

The communities surrounding schools in this part of Malawi are inhabited by the Chewa people. A belief persists among them that relocating to higher ground would involve abandoning ancestral spirits. Relocation is also opposed by traditional chiefs whose power is location-based. Drought is also a recurrent problem, with temperatures reaching 40+ Celsius and high rainfall variability. There is also chronic poverty, in part reinforced by the cycle of flood and drought, and a high school drop out rate during crisis periods – up to 50 per cent of students in the project area.

Figure 6

Malawi, showing Nsanje in extreme south

(Source: Improving Educational Quality Project)

With this background in view, the ActionAid project will:

- Use the schools for mobilization.
- Rehabilitate the schools affected by floods and make them safe for use as a refuge in cases of subsequent disasters.
- Teach children disaster risk reduction skills, which in the long run will ensure adequate knowledge of how to reduce risks for future generations.
- Involve school children in disaster risk reduction initiatives as school projects such as tree planting, water harvesting, drip irrigation and role playing in disaster response.
- Extend capacity building with participatory vulnerability assessment methods to the communities around the schools.
- Lobby at policy level for the inclusion of disaster risk reduction skills in the curriculum as a life skills subject.

3.2.1.12 Many other local experiences

Experimental programmes, pilots and demonstration projects, often at the municipal level, are even more common than established programmes. The question for these initiatives is, of course, whether and how they can be replicated and enhanced.

In the **Dominican Republic,** students have used computer mapping to study and understand local patterns of flooding. In **Quito, Ecuador**, the Healthy Schools programme focuses holistically on intra-family violence as well as seismic and volcanic risk. **Bogotá, Colombia** included education about disaster preparedness and prevention in its urban development plans for 1998-2000 and 2001-2003. The city's Education Committee supports teacher training for this purpose and has integrated disaster awareness into basic and intermediate educational objectives.

Some 500 schools in **New Delhi** have developed school disaster plans as the result of the work of school committees composed of the zone education officer, the principal, teachers, parents, the head boy and the head girl. They have prepared check-lists of "Do's" and "Don't's" in the case of a fire or other hazard event. Mock drills are held in the schools. The children also learn life-saving skills (UNDP 2005).[24]

prevenir es mi cuento
desastres... ¡ni de riesgos !

Box 1:

Overview of some Latin American experiences in teaching about hazards and safety

Natural hazards are part of national curricula in **Argentina, Cuba** Disaster preparedness (close relationship between Civil Defence and Ministry of Education) in **Ecuador, Cuba, Nicaragua, Peru, Venezuela, El Salvador, Panama**

> ***El Salvador*** *uses diverse active methods such as child-to-child teaching, work camps, simulations, risk mapping and the recruitment of youth into "Solidarity Brigades" that are, in effect, auxiliaries of the civil defence structure. School brigades also exist in* ***Peru*** *and* ***Nicaragua****.*
>
> ***Nicaragua*** *began in 2005 to implement a plan to make risk management part of the nationwide curriculum. It produced a curriculum, nine guidebooks for teachers and nine work books for students, and began using them in 10 pilot schools. 160 teachers were trained in 2005.*

Decentralized curriculum development and integration into environmental studies in **Bolivia** and **Costa Rica**.

Costa Rica *since 2003 has developed extensive hazards and safety teaching under the heading, "Environmental culture for sustainable development." The Ministry of Education's Office of Environmental Education has trained 120 cadres in the teaching about disasters in all the country's administrative areas. They have, in turn, trained 6,000 teachers. Teachers are encouraged to develop lessons based on the hazards and patterns of vulnerability in the specific locality, and students enjoy active, participatory learning through hazard-mapping and collection of information from the community. They also narrate experience, discuss moral dilemmas, conduct debates and brainstorm. Younger students have games, songs and audiovisual presentations. Much published material supports these teachers.*

(Summarized from Cardenas, 2004, pp. 12-36)

Numerous nations have primary school instruction in aspects of environmental management and earth care, such as **Kenya's** emphasis on the dangers of soil erosion (Kenya 2005). While this is a good basis upon which to build comprehensive disaster risk reduction curricula, it does not achieve that end by itself.

3.2.2 Curriculum: additional resources and key concerns

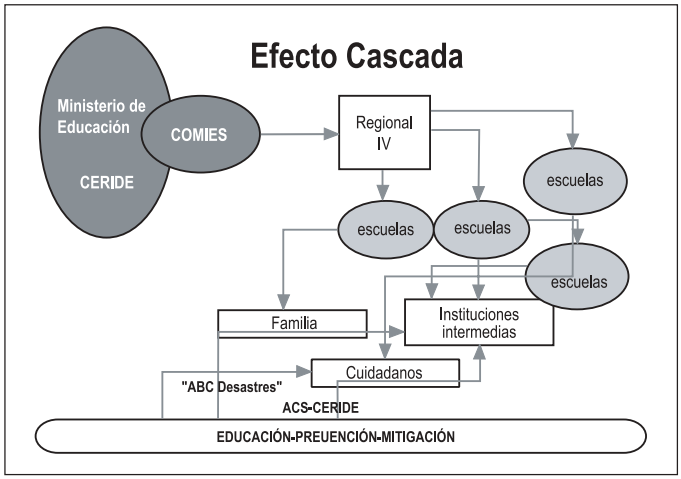
In addition to locally-produced or national disaster risk reduction curricula, there are some notable teaching programmes that have been widely disseminated internationally. One is the *Masters of Disaster* series, which helps teachers integrate disaster safety instruction into core subjects such as language arts, math, science and social studies.[25]

Another programme presently diffusing through francophone lands is the teaching materials and hands-on project ideas assembled on the SESAM web site financed by the French Ministry of Ecology / PPMS.[26] Argentina's *ABC Desastres* (figure 1, above in section 3.2), also well known, envisions a cascade model of diffusion and beneficial impacts that should ripple out from schools to families and communities (figure 7).[27]

Additionally, Education Project Asia has very good disaster web pages.[28] UNICEF's *Voices of Youth* includes such relevant resources as an interactive game that teaches about water resources.[29] The UN's organization for children has also sponsored two Children's World Water Forums, most recently in March 2006 in Mexico City.[30]

Figure 7

The cascading beneficial effects of *ABC Desastres* in Argentina



One of the most important issues when considering curriculum material is the appropriate language. Language, thought and action are very tightly coupled in very complex ways for human beings. Therefore, it is far better to use an indigenous language in many parts of the world, even though official language policy in schools may favor the lingua franca. In the case of translating teaching material into Mayan languages in Guatemala, for example, one expert put the reasoning this way:

[In] Guatemala, IFRC supported the cultural adaptation and translation to three Mayan languages of the well-known game board 'Riskland', as well as the training module for community-based first aid. Apart from many other reasons that motivated the Red Cross to support this initiative, let me highlight the following points:

- To be used at school level, for students, teacher and parents.
- The development of this material increased Mayan written vocabulary.
- The development of this material [helps] to increase reading capacities in local language.
- The development of this material respects beliefs and values and cultural differences.[31]

Thus, if the school really is going to be a focal point for diffusing risk reduction into the community, then material used in schools should also be accessible to parents and even grandparents. Also, to have vocabulary in an indigenous language for concepts of risk reduction is a very important step in increasing the community's ability to debate, study and plan.

Children playing "Riskland"

(Source: ISDR secretariat)

3.2.3 Exchange of teaching experience and materials

Not only do national, sub-national and municipal authorities adapt international teaching material and pedagogical ideas to local circumstances, but there are also effective bilateral exchanges. Examples include, in addition to Argentina's *ABC Desastres* and France's SESAM, mentioned earlier, the Teacher Resource Exchange in the UK.[32]

Bilateral exchanges are a very important way to speed up the diffusion of good practice, but there is a caveat: local adaptation is essential to success. For example, the Asian Disaster Reduction Center in Japan has developed tsunami teaching materials alongside Thai teachers for use in schools in the tsunami-affected coastal areas of Phang Nga and Phuket.[33] A 40-page text-book has been developed that covers not only tsunami but earthquake, flood, fire safety and evacuation.[34]

3.2.4 Pedagogical innovations

One of the most exciting pedagogical innovations is the "child-to-child" approach, which is a variation on the basic idea of experiential learning discussed above (section 3.1) and elsewhere in this review. The Child-to-Child Foundation, the core of the child-to-child movement, explains the method this way (in the context of health education):

> "Child-to-Child ideas and activities represent an *approach* to health education. They do not constitute an alternative programme. It is more accurate and beneficial to view Child-to-Child activities as components that may be integrated with broader health education programmes that are either at the planning stage or already in operation. The distinguishing characteristics of Child-to-Child are the direct involvement of children in the process of health education and promotion and the nature of their involvement. The most effective programmes are those that involve children in decision-making rather than merely using them as communicators of adult messages. However, whenever children are involved as partners in this way, change is demanded in current structures and methodologies in health and education."

"Child-to-Child ideas and activities spread and take root in many different countries and contexts, for example, in national education programmes; in local programmes and individual schools; in training programmes for teachers and health workers; in youth movements and youth groups linked with schools and school children; in youth groups operating outside of the school system; when schools are linked with medical schools, health centres and health campaigns; when older children help pre-school children; and in programmes and activities designed to help children in especially difficult circumstances. Wherever Child-to-Child activities take place, they stress the potential of children to promote better health:

- To younger children.
- To children of the same age.
- In their families and communities." (Child to Child Trust, and annex 7)

The child-to-child framework centres around a six-step approach to learning, used to elicit children's active participation in promoting health:

1. Identifying a local health issue and understanding it well.
2. Finding out more about the health issue.
3. Discussing what's been found out and planning action.
4. Taking action.
5. Evaluation: discussing results.
6. Discussing how we can be more effective next time and sustain action. (ibid.)

The Child-to-Child Foundation explains the philosophy of the six steps as follows:

"We see children as agents of change, not megaphones to transmit adult messages… The six-step approach has an important effect on the way we teach and learn because:

- It links what children do in class with what they do in the home.
- It links what children learn with what they do.
- The activities are not taught in one lesson and then forgotten; they are learnt and developed over a longer period of time."(ibid.)

3.2.5 Education in emergency situations

A number of organizations run good programmes providing education in emergency situations. UNESCO, UNICEF and a number of NGOs, such as Save the Children, provide temporary schooling for children displaced by natural hazard events or by conflict (UNICEF 2004a).[35] The Office of the United Nations High Commissioner for Refugees is involved with education for child refugees (Sinclair).[36] Local NGOs also play this role. This is an important form of education because it provides some continuity in schooling, as well as giving children and youth a sense of normalcy. In some cases play space is provided, for that same reason or simply as an opportunity to work thorough traumatic experiences using art, drama or story telling. The IFRC and Danish Red Cross support a reference centre for psycho-social support in emergencies.[37] An Interagency Network for Education in Emergencies has developed a set of minimum standards.[38] Toolkits have also been developed (Nicolai 2003; Couldrey and Morris 2005).

The real and perceived importance of education and schools in disaster-affected communities means that there is pressure to rebuild school buildings as soon as possible. However, this produces tension with another equally important priority: to rebuild in safe locations and with designs, materials, and construction methods that will produce a safe school.

3.2.6 Connecting with children and youth at play and leisure

Young people's activities outside school can teach them about risk reduction. Games, comics and music are integral parts of the lives of many youth. These media have become important vehicles for transmitting disaster risk knowledge. One example, mentioned earlier in section 3.2.1.1 and section 3.2.2, is the game "Riskland".[39] Another example, in box 2, is the rap video "Grandpa Quake" in Turkey.

In evaluating these approaches, however, one must distinguish between passive and active learning. Most of the examples of "entertaining" material involve passive learning. There is no actual engagement with the world. Active learning through leisure activities, like hands-on learning in the classroom, involves doing something about a local hazard. Club activities excel in this respect.

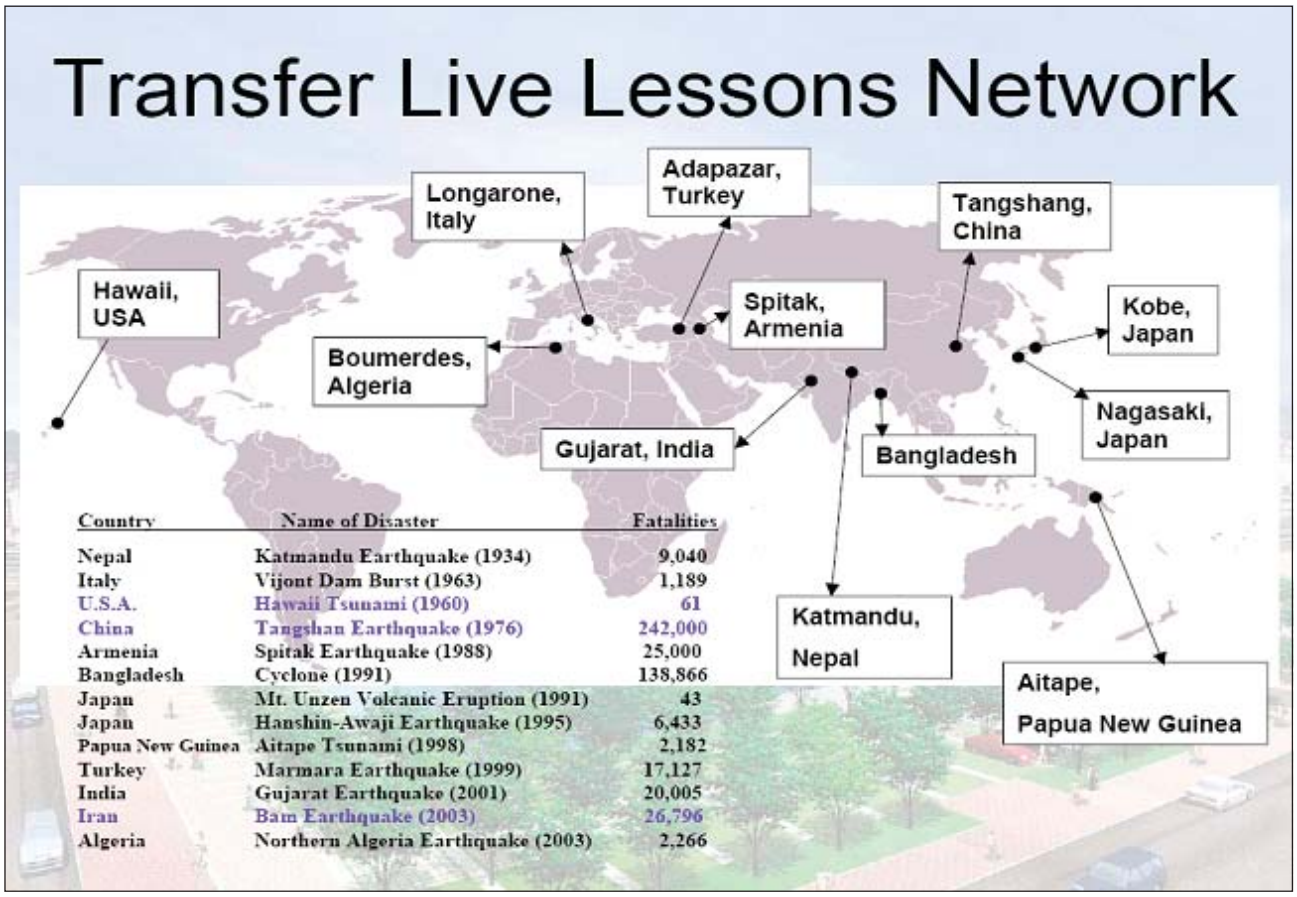
Perhaps encouragement can be gained from the success of programmes that invite the active

Box 2

From rap song to classroom ditty: the making of "Grandpa Quake" in Turkey

In the period following the 1999 earthquake in Turkey, a lively rap video came out called "Grandpa Quake". It featured images of an earthquake expert, Professor Isikara, in the mix, his voice and face "sampled" from a television interview. He is former head of a major earthquake research institute in Istanbul, and had toured the country visiting schools, becoming known as "Grandpa Quake". He also produced the first children's books on earthquakes. While the video initially offended the professor's dignity, he quickly recognized it's potential to increase awareness of earthquake risk. Subsequently, a team concerned with communicating with children took the song, with permission, and set it to a cartoon. The cartoon and song have been used extensively in Turkish schools to promote earthquake safety.

Figure 8

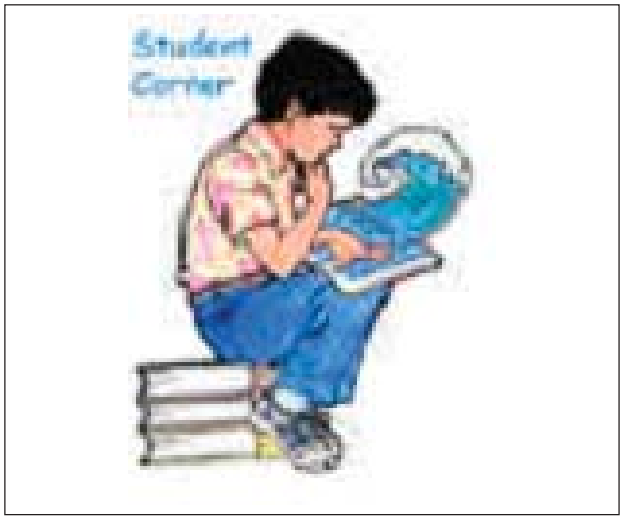


(Source: Yoshiaki Kawata, Director, Disaster Reduction and Human Renovation Institution)

participation of children and youth in environmental stewardship, including everything from monitoring water quality and caring for injured animals to performing recycling and community gardening. UNICEF has published important studies that document the usually untapped ability of children and youth to actively participate in urban planning and care of the earth.[40] Given that many disasters are triggered in part by poor land-use practices and bad location decisions, these same documented abilities and enthusiasm could be focused on risk reduction.

Another effective approach to children and youth is the disaster museum. The best-known disaster museum is the Earthquake Museum in Kobe, which is simultaneously a memorial to those that lost their lives in the Great Hanshin Earthquake in 1995, a natural science museum, a research institute, and a training centre. It has been run since 2002 by the Disaster Reduction and Human Renovation Institution.[41] In the two-year period from 2002 to 2004, the museum had 1.2 million visitors, 42 per cent of whom were young people. Starting in 2006, the DRI will promote a network of museums and other forms of public display, beginning with 12 sites in 11 countries (See figure 8). Other museums include the tsunami museum in Hilo, Hawaii, US, where students learn about the devastating 1946 and 1960 tsunamis that affected the island of Hawaii; and, as mentioned earlier in Section 3.2.1.4, the Science Museums of China.[42]

Detail from Pacific Tsunami Center web site

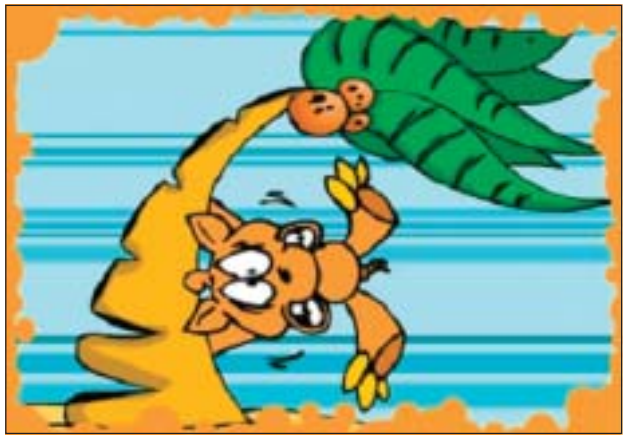


(Source: Pacific Tsunami Center)

Computer literature can also be a good means to reach out to children and youth. Students in some countries will find pages on the web site of disaster preparedness agencies dedicated to explaining hazards to young people. One example is "Proteccion Civil Infantil" to be found on the web site of Mexico's National Disaster Prevention System (SINAPROC)[43] (See figure 9).

Figure 9

Graphic from Proteccion Civil Infantil web site



(Source: Proteccion Civil Infantil)

Adolescents may be difficult to reach with these kinds of electronic resources. However, the experience of the environmental movement, as well as the success of HIV-prevention outreach, suggests that their energies can indeed be mobilized.

3.2.7 Youth voluntary activities

The general experience with volunteerism the world over is that youth, along with elderly people, often have the most time to offer their skills and labor. Their volunteer efforts can not only educate them about disaster risk reduction, but also can benefit the community by adding energy and new insight to risk-related projects. A large number of the volunteers who flocked to Kobe, Japan following the Great Hanshin Earthquake were young people – an estimated 600,000 of them. Some of the spontaneous youth-volunteer initiatives after Kobe have now become community-based disaster preparedness institutions, such as the "Recovery Stockyard" in Nagoya. Likewise, in New Orleans, many young people in their late teens have been spending a few weeks or longer working on recovery projects.

High school students in Vancouver joined the work of Families for School Seismic Safety by painting posters. The community then displayed the posters all over the city, and at the World Seismic Engineering Conference held in that Canadian Pacific coast hub (See photo 3).

3.2.8 Inspiring and supporting girls

Women and girls often are seen primarily as victims of disaster, rather than as capable and knowledgeable agents of disaster risk reduction (Enarson and Morrow 1998). To counter this bias, outreach material such as curricula, games and videos should prominently feature models of women and girls as defenders of their communities and professionals in disaster management. One useful resource for this practice is the 2001 report *Environmental Management and the Mitigation of Natural Disasters: A Gender Perspective*, by the UN Division for the Advancement of Women (DAW) and the ISDR secretariat. This report includes good examples from around the world of women fulfilling these active roles (see box 3).

Such outreach on female roles in disasters also may support broader goals for girls in education by countering the passive stereotypes that form an obstacle to girls' success in school. A major objective of the MILLENNIUM DEVELOPMENT GOAL for education is to get and keep girls in school, ensuring that they are supported and that they advance well in the education system. There is still a very large gap between boys and girls

(Source: Wisner and Monk 2005)

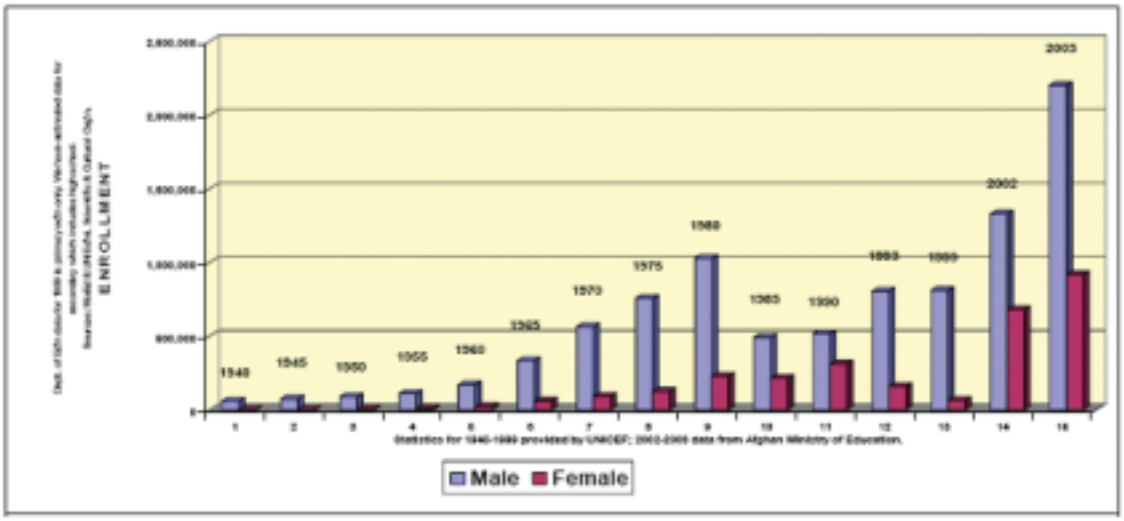
Box 3

DAW and ISDR secretariat examples of women active in disaster reduction

- All approach adopted in Canada demonstrates the value of supporting women's initiatives to work collectively in neighbourhood groups. The model adopted is one of listening not telling, providing women with the skills and tools they need to meet their goals. Building such neighbourhood groups leads to resilience on a daily basis, not just in disasters.
- In Turkey, the Foundation for the support of Women's Work (FSWW) is fulfilling an enabling and facilitating role, working through the community centres they had established before the devastating earthquake in 1999, to provide women with the support, skills, training, information and contacts needed to rebuild.
- In Armenia, disaster risk education is promoted in schools and through the mass media by a women's development group emphasizes disaster mitigation and focuses on mothers and teachers fostering seismic protection skills among to children.
- In Egypt, an innovative partnership has been created in Alexandria between women's health and environmental management and will soon integrate emergency management, leading to the training of trainers. Girls are trained as 'environmental promoters', and thus empowered in the unconventional area of environmental health.
- In Nepal, the Participatory Disaster Management Programme begins by convening separate gender groups to discuss the different needs and priorities of women and men. Before a joint executive committee meets to refine and endorse their input. In many groups, women are active in greater numbers than men and thus women's participation in risk reduction has increased. Furthermore, women are leading mixed-sex groups, thus demonstrating their empowerment through the programme.

Figure 10

Male versus female enrollment in Afghanistan



(Source: Intili et al. 2006)

3.2.9 Reaching street children and working children

Reaching street children and working children will require innovative strategies to integrate disaster risk reduction training into existing outreach programmes. Forty million children live on the streets in Latin America, 25 million in Asia, and 10 million in Africa. An additional 120 million children under the age of 15 work full-time and another 130 million work part-time (Scanlon et al. 1998, annex 6). Few of these 325 million children go to school. For these children, therefore, one must look beyond school-centred risk reduction education.

As a starting point, one must be clear that these children face far more immediate and severe dangers than most natural hazards – including murder, HIV-AIDS, and very dangerous working conditions. In the long run, the root causes of their homelessness, early entry to the labor market, and often official invisibility need to be understood and addressed. Dealing with root causes, however, is a lengthy process and implies major structural and policy changes at the societal level. In the short run, it may be most productive to integrate messages about prevalent natural hazards into on-going public health and other street outreach to these groups of youth and children.

An additional group one must consider is child-headed households. In Rwanda, for example, many thousands of older children actually headed households, caring for younger siblings because parents and other adult relatives were killed in the genocide (ACORD 2001). An empirical question remains as to whether risk reduction messages and campaigns aimed at the adult population communicate well with this younger group. In principle, as care givers and guardians, they are motivated to learn, but are the messages and means available to them adequate?

This review must note that the challenge of reaching working children, homeless youth and children, and child-headed households raises a big question concerning the international community's ongoing efforts to secure "education for all", as well as efforts to make the school a centre for community disaster risk reduction. Universal education efforts are often geared towards a goal of around 100 million school-aged but non-attending children. However, a quick look at the number of street and working children shows the number of affected children and youth to be far higher. Even with 100 per cent implementation of many universal education goals, therefore, a large number of children and youth will be left out. This makes it all the more important to develop strategies to "piggy back" disaster risk reduction training on existing street outreach programmes.

3.2.10 Putting it all together: the global actors

International organizations, NGOs, agencies of the UN system and regional organizations all are active in disaster risk reduction education, demonstrating and supporting good practice as well as raising related education policy questions with national decision makers. They often work in scores of countries, which makes it possible for them to share good practice internally among their national organizations as well as with national governments and other stakeholders. Here are some examples.

3.2.10.1 ActionAid

ActionAid has active education and disasters departments. As mentioned earlier (in section 2.1), the two have combined forces recently to launch a "Disaster Risk Reduction through Schools" project, focused on schools in seven of the 49 countries where this NGO works: Ghana, Malawi, Kenya, Haiti, Bangladesh, Nepal and India.

The ActionAid project approaches education as a part of community life. It aims to involve students and teachers, as well as community leaders, parents and school administrators, in assessing the safety of their schools and developing plans to make them safer. The approach integrates education and school protection, training the students – and also the community – in an interactive co-learning process termed "participatory vulnerability assessment" (PVA). PVA uses such tools as oral history of past disasters, risk mapping, and brainstorming (see additional discussion on community-based disaster management in section 5.1).[44]

ActionAid plans to use the experience gathered to enter into a dialogue with the seven governments at various levels about education as a tool for community risk reduction and increased protection for schools. The group also anticipates involving teachers' unions in this project.

3.2.10.2 Save the Children

Save the Children also works in the areas of both education and disaster management. The organization notes that children have particular needs in emergencies, which fall into three main categories:

- Material (such as shelter, food and health).
- Developmental (such as schooling and play).
- Emotional (protection and psychological healing).[45]

Save the Children is active in trying to satisfy these needs during emergencies caused both by conflict and natural hazard events.

In practice, programmes can stretch out beyond immediate emergencies. So, for example, in Thailand, Save the Children has supported the Thai Volunteer Association in developing a school curriculum on tsunami hazard in a participatory manner with children that were affected by the December 2004 tragedy.[46]

3.2.10.3 Plan International

Plan International (Plan) is also active in disaster risk reduction education. It has a concept of "child-centred disaster risk reduction" and a five-year plan, starting in 2006, to pursue this in schools and also communities in the 62 countries where it is active.[47] In certain countries, such as Pakistan, the local Plan office has a country-specific 2006-2010 plan that reflects this child-centred orientation.

Plan's core approach is to treat children and youth not as "recipients" of aid, but as agents of development. It supports children's welfare and rights through community development, specifically activities in which the children and youth themselves play an active role.

In field work and interviews, the energy, dignity, and agency of the children in Plan projects comes out strongly. To give just one example, children involved in one Philippines project spoke up in a village meeting and called attention to the fact that a very poor group of people living nearby had been completely left out of the participatory planning meeting – thereby contributing information that was essential to producing a comprehensive risk reduction plan (Twigg 2004).[48]

3.2.10.4 Education International

Teachers and their unions are one source of advocacy for a system that allows the use of good curricula and that can utilize the energy and enthusiasm of children and youth. Education

International, the largest international federation of teachers' unions, is engaged in teacher training in tsunami-affected Aceh province, Indonesia. Its programme there includes the subject of natural hazards.[49]

3.2.10.5 International Federation of Red Cross and Red Crescent Societies

The IFRC has 183 national societies throughout the world.[50] It indirectly supports school safety and education through the development and diffusion of its well-known participatory methodology for risk self-assessment, called Vulnerability and Capacity Assessment (VCA).[51] More directly, its national societies put on a variety of activities in schools, including first aid training and the formation of "clubs" or "brigades" that are capable of assisting in emergencies and providing leadership among students.

The IFRC has been active in a number of ways in education and school protection:

- "In a fast-mapping developed by [its] department in Geneva. More than forty national societies responded that are working on disaster risk reduction. In some cases, mainly disaster preparedness; including mapping, school disaster plans, school brigades, etc.
- Adaptation of training material in coordination with the local or national governments (Ministries of Education and/or National Emergency Agencies).
- Within national societies, first aid is a regular training component that is offered to the education system (primary, secondary and tertiary).
- Provision of training material to be [used at] school level."[52]

What does this mean for specific countries? In Indonesia, the national Red Crescent society is supporting teacher training and creating teaching material for schools on disaster management. The Vietnam Red Cross participates with schools in Thanh Hoa Province and has produced books and flip charts for teaching. In Kazakhstan, the national society has focused on urban schools, for which it has adapted IFRC materials and prepared cartoons and videos. National societies in Colombia, Bolivia, and Venezuela have harmonized their teaching materials and approach with those of the national governments.

3.2.10.6 UNESCO

During the International Decade of Education for Sustainable Development, UNESCO is working throughout the world to integrate disaster risk reduction into education at primary and secondary levels. It is also concerned with the safety of school buildings, a concern of UNESCO's since the 1980s (see section 3.4 below).

3.2.10.7 United Nations Development Programme

UNDP country offices in various countries are active in promoting inclusion of disaster-relevant material into school teaching. The Disaster Reduction Unit within the UNDP Bureau of Crisis Prevention and Recovery provides support for these country-based initiatives.[53]

3.2.10.8 United National Centre for Regional Development

The UN Centre for Regional Development office (the "Centre") in Kobe, Hyogo Prefecture, Japan takes a comprehensive approach to reducing the vulnerability of school children and school buildings through risk awareness training that includes children, teachers, parents, community and political leaders, as well as members of the local construction industry.[54] Currently the Centre is active in Fiji, India, Indonesia and Uzbekistan. In the past, the Centre has successfully completed projects in Nepal and Afghanistan. The Kobe-Kathmandu schools exchange programme, an integral part of the Nepalese training, has been ongoing since 2001.

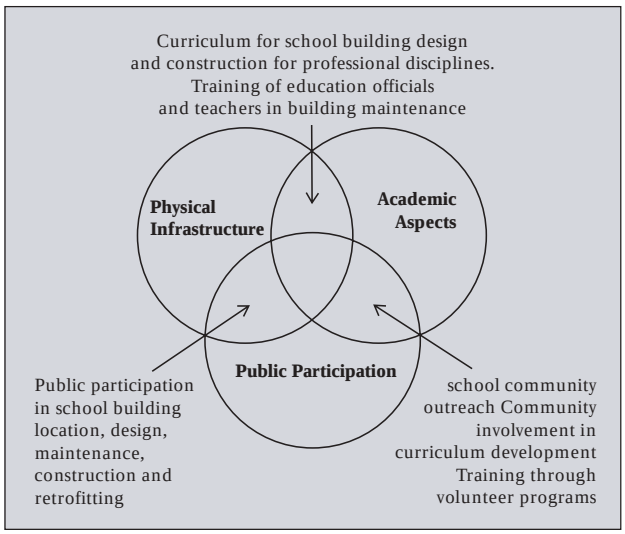
3.2.10.9 Organization of American States

The Organization of American States (OAS) has been working on disaster risk education from the top down, in meetings with regional education ministers, and from the bottom up, through as voluntary network of schools called EDUPLANhemisférico.[55] It is seeking to increase the already quite substantial teaching in schools and improve its quality, as well as to protect schools. On the level of tertiary education, OAS sponsors a

second network of colleges and universities to raise awareness and reduce vulnerability in campus life through structural and non-structural measures. The comprehensive approach of its networks is diagrammed in Figure 11.

Figure 11

Logic of EDUPLANhemisférico



(Source: Natural Hazards Project, Organization of American States)

3.2.10.10 South Pacific Applied Geoscience Commission

The South Pacific Applied Geoscience Commission has a programme on school risk awareness, assessment of hazards to schools, and assistance in protecting schools. It is testing this approach in Fiji.[56]

3.2.10.11 Asian Disaster Preparedness Center

The Asian Disaster Preparedness Center (ADPC) in Bangkok has a specific school earthquake protection programme, and also includes outreach to children in some of its many disaster risk reduction training courses (see section 4 on training, below).[57]

3.2.10.12 Caribbean Disaster Mitigation Project

The Caribbean Disaster Mitigation Project was active in the 1990s training people to protect schools against hurricanes and other hazards.[58] The project was completed in 1999. The OAS-sponsored EDUPLANhemisférico, mentioned above, is following up on its work within the membership of CDERA – the Caribbean Disaster Response Agency.[59]

3.3 Tertiary education

Many countries offer effective undergraduate teaching about hazards and disaster, as well as post-graduate qualifications in disaster-related subjects. Courses containing relevant content include engineering, medicine, public health, economics, development studies, political science and policy studies, geography and a number of natural sciences. Specialist courses in seismology, volcanology, climatology and soil physics are clearly also relevant. Increasingly, students of computer and information science are becoming involved with tools of great importance to disaster reduction, such as geographical information systems (GIS) and geographical positioning systems (GPS), as well as in the modeling of risk decision-making.

Large numbers of highly-skilled and qualified persons are emerging from China, India, Philippines, Indonesia, the EU,[60] Eastern Europe, the Russian Federation and the Andean Community. Others train in Australia, New Zealand, the US, Canada, Mexico, Chile and Argentina.

In the Latin American and Caribbean regions alone, diploma and masters programmes are offered at the University of the Andes-Medellin, the University of Costa Rica, the Technological University in Nicaragua, the National University in El Salvador, the University of Piura, and others in Cuzco and Lima in Peru. There is a distance-learning programme set up in a cooperative arrangement between the National University of Colombia-Manizales and the Barcelona Polytechnic Institute. The UNDP and CEPREDENAC (the Coordination Centre for the Prevention of Natural Disasters in Central America) have just started a diploma programme on enhancing development projects with risk considerations and methodologies. There are also hazard and risk courses offered in the Department of Geography and Geology, University of the West Indies at Mona.[61,62]

3.3.1 Link between research and policy

When a country's own academics conduct research, results are more likely to find their way into policy decisions. However, due to the imbalance in human resources in the world, relatively few countries in

the global South have a large number of highly-trained professionals working to link research to policy.

Table 2 illustrates this fact. It summarizes 83 national responses to a survey by the ISDR secretariat prior to the WCDR. The survey asked whether countries had academic research that linked up with national- or local-level disaster risk reduction programmes.

A great deal of the research on risk reduction in Africa is carried out by foreign teams. As a result, in the survey, only five African countries reported significant applied research activities. Granted, not all African countries filed reports before the pre-WCDR deadline; subsequently, three more countries reported some linkage between risk-reduction research, and government policies and practice. However, Kenya and Cote d'Ivoire noted that such work was limited or needed support. Uganda's academic/ government collaboration appears to focus solely on earthquake issues.

Other parts of the world also show a gap in applied research capacity. Surprisingly few Asian and Pacific countries reported such linkages – only nine altogether – and one of the nine, the Philippines, noted that collaboration is still limited. However, the results do not include responses from three of the largest countries from this region – China, Indonesia, and Malaysia.

Table 2

Countries linking academic research and policy/practice at national or local level

Arab States	Asia and Pacific	Latin America AndCaribbean	Africa	OECD	Central and Eastern Europe,And CIS
Algeria	Bangladesh	Bolivia	Algeria	Austria	Albania
Jordan	India	Brazil	Cote d'Ivoire	Canada	Czech Rep.
Morocco	Iran	Br. Virgin Isl.	Ghana	Finland	Hungary
	Mongolia	Colombia	Kenya	France	Lithuania
	Pakistan	Costa Rica	Mauritius	Germany	Macedonia
	Papua N. Guinea	Ecuador	Senegal	Greece	Romania
	The Philippines	El Salvador	South Africa	Japan	Russian Fed.
	South Korea	Haiti	Uganda	New Zealand	Slovakia
	Turkey	Mexico		Portugal	Slovenia
		Montserrat		Sweden	
Other:		Nicaragua		Switzerland	
Israel		St. Lucia		United States	
Monaco		Venezuela			

Abbreviations: Br. Virgin Isl., British Virgin Islands; CIS, Commonwealth of Independent States; Czech Rep., the Czech Republic; OECD, Organization for Economic Co-operation and Development; Papua N. Guinea, Papua New Guinea; Russian Fed., the Russian Federation

On a related front, research programmes are quite common in Latin America and the Caribbean. Some of these programmes are quite strong. However, researchers are often still trained abroad, as there is still a lack of graduate teaching in areas such as social science and disaster.

3.3.2 Resources and support for higher education in disaster risk reduction

There are a number of good programmes that support scholars at the university level. These include Asian Disaster Preparedness Center's (Bangkok) visiting scholar programme, the ProVention Consortium's Applied Grants Program,

and the Asian Disaster Reduction Center (ADRC)'s visiting researcher programme. Free downloads of college texts, instructors' guides, and syllabi are available from the US Federal Emergency Management Agency (FEMA)'s Higher Education Project.[63] The World Health Organization promotes the inclusion of disaster management in medical school training worldwide. The United Nations University Institute for Environment and Human Security has a programme called "Strengthening Tertiary Education in Disaster Risk Reduction."

3.4 Protecting educational infrastructure

A comprehensive approach to school safety is rare.[64] Such an approach should embrace design, location, construction materials, construction methods, supervision of construction, inspection and associated building codes, as well as maintenance and monitoring of the integrity of the structure. But a comprehensive approach is easy to justify. Schools, training centres, university buildings – in common with health facilities and other essential public and private structures – are subject to collapse, inundation and other damage in extreme natural events. These endanger building occupants and interrupt or destroy important community functions. In addition, because schools and other larger structures often serve as shelters in time of need, their loss can places a double burden on an afflicted locality.

All too often, however, school safety efforts are narrow in focus. Most attention before and during the IDNDR was given to protection of schools from earthquakes. However, other hazards are equally or, in some cases, much more common. These include strong wind, coastal storm, tsunami, tornado, lightning strike, fire, flood, landslide, volcano and lahar (volcanic mud) flow. Only a few countries give attention to the location of schools in relation to these natural hazards. Schools in urban situations face additional complications, such as the combination of a natural hazard event followed by industrial leaks and dangerous pollution or explosions.

Comprehensive school safety must also include non-structural mitigation of risk. Where secondary schools have laboratories, flammable and toxic chemicals must be stored so that they are not spilled in an extreme event. School kitchens should be designed to minimize fire risk, and similar measures should be taken in other high-risk areas.

3.4.1 Community perceptions of risk and priorities

Natural hazard risk is not always the first safety concern of school authorities, parents or children. Communities' risk priorities are shaped both by recent events and institutional biases. Security against various forms of violence preoccupies many; where, for instance, the memories remain of the violent attack on a school in Beslan, Russian Federation, or of the shootings by students at Columbine High School, Colorado, US. Bullying in school is a public concern in Japan, and there are programmes to prevent violence against female students in Ghana and Malawi.[65]

In situations of great social unrest or outright civil war, as seen recently in Afghanistan, Iraq, Sierra Leone, Liberia, Sri Lanka and parts of Colombia, parents may be concerned about their children's security on the way to and from school. Fear of child abductions by militant groups such as the Lord's Resistance Army in northern Uganda clouds normal school life for many.

Fire and toxic hazards to students are also concerns that may be more pressing than natural hazards. A school fire killed 83 students in Tamil Nadu, India in 2004.[66] This was one of half a dozen fires over the preceding five years that resulted in student fatalities.[67] Kenya lost the lives of 68 teenagers in a school dormitory fire in 2001.[68] Communities suffering such losses, as well as parents and teachers elsewhere in these countries, would clearly give fire safety high priority. Additionally, in some places, industrial contamination of air and soil may also be perceived as a greater threat to those attending schools than natural hazards.

John Twigg, parent and chair of the Governors' Board of Edith Neville Primary School in London, showed what communities look at and how they organize their concerns very well when he wrote the passage below. As a senior researcher at the Benfield Hazard Research Center at University College London, Twigg has a background in risk reduction;

however, he confided that he was "speaking as much as a chair of governors at a primary school than as a disaster researcher", worried about how best to care for his school's students.

> "I've been thinking about this recently, in the light of events at the school, including the July 7 bombings and our ongoing updates of policies and procedures; we're even going to do some comprehensive risk assessment for the first time. For us, these issues seem [to] all cohere around the single central aim of "staying safe". This is a focal point for everything to do with risk: critical incidents and emergency procedures, general health and safety (including risk assessments, structural safety, etc), the curriculum (and there are numerous entry points for risk and safety issues here), personal social and health education (including "stranger danger", road crossing skills, fire awareness and evacuation), child protection and broader socio-educational inclusion. I think it's possible to develop a holistic framework for analysis or assessment based around "staying safe" and incorporating all the above dimensions."[69]

There are also disciplinary and other kinds of institutional perceptions that influence how a community confronts risks to school infrastructure, which can create additional challenges. Box 4 provides a telling review of the different perspectives one encounters around one major issue in school safety – building codes.

3.4.2 The threat to schools

Schools can be damaged or destroyed, and students can be injured and killed by a wide variety of extreme natural events, ranging from meteorological phenomena such as high winds, tornados and floods, to geophysical phenomena such as landslides, volcanic eruptions and tsunami. This review is unable to provide a systematic review of school exposure to all relevant hazards. Rather, it seeks to illustrate the scale of the problem and to identify both pressing challenges and good practices through a discussion of the most-studied hazard – earthquakes.

The discussion demonstrates that the threat from earthquakes to human life is both serious and growing with increased efforts to place children in schools. Addressing the risks is difficult, but essential to avoid mass tragedy, destruction and waste of substantial development investments. Both bottom-up and top-down risk reduction strategies are effective. Mitigation activities, structural and non-structural, can help a great deal to protect life and property, and to education the larger community.

History shows that schools are painfully vulnerable to earthquake damage. In 2004, a group of ten experts from six countries reviewed the safety of schools in the world's seismically active zones. They estimated that over the decade 2004-2014, some 4,800 school children were likely to die in school collapses due to earthquakes (Weisner et al. 2004). This calculation was made two years after the death of 26 school children in an earthquake in Italy. At the time, the estimate seemed too high. The devastating 2005 earthquake in Kashmir now shows that the review may have underestimated the risk.

Citing Pakistan government estimates, UNICEF has stated that at least 17,000 school children died when the 2005 earthquake hit as children attended morning classes. Six thousand, seven hundred schools were destroyed in North-West Frontier Province and 1,300 schools were destroyed in Pakistan-administered Kashmir (BBC 2005).[70] A more detailed account of the damage and destruction of schools comes from the thesis of a Pakistani military officer (table 3).[71]

Many other countries have large areas subject to high seismic activity. Where and how will new schools be built in these areas? How can existing schools be protected?

In attempting to measure the scope of the problem, one study simply totaled the school-aged population in countries with significant populated areas in the "High" or "Very High" seismic hazard zones on the world map created by Giardini et al. (2000). The result: ***roughly one billion children aged 0-14 live in countries with high seismic hazard zones. Several hundred million are at risk when they are***

Box 4*

Different perspectives of hazard resistant building codes
(only slightly exaggerated)

A **seismologist** usually criticizes the stipulations of existing building codes that were prepared several years before because there is later evidence, which suggests redefinition of the earthquake hazard.

Engineers want to incorporate their recent research findings and press for stricter building codes. They are less concerned with stronger buildings themselves than with the adoption of their professional endeavours.

An **investor or owner of a building** dies not want to append the additional 2-5 per cent of the building cost to provide additional hazard risk protection for an extreme event that "probably will not happen, anyway".

Contractors cannot be bothered with extraneous regulations and troublesome building inspectors, especially if their demands are going to reduce the profit margin of the construction.

The **government** has not been able to implement even the existing building code because of the lack of suitable implementation mechanisms, including building inspectors.

Decision makers are afraid that the implementation of building codes may result in cost increases. They do not press implementation of building codes even for public construction. Public administrators are preoccupied with other pressing or important matters.

Politicians do not risk diminishing their popularity, as the enforcement of codes is considered to be an unpopular and restrictive process of control. Besides, there are other important aspects of the construction industry to attend to, like contracts.

The **community** does not understand the process and is confused, especially after a disaster.

The **media** recognizes a controversial topic when it sees one, particularly if people have been killed as a result.

None of the primary stakeholders seems to be discussing the problem in any common forum.

So, more vulnerable buildings continue to be built…

What is required to break this cycle?

Courtesy of the **Asian Disaster Preparedness Center** (ADPC)

**(5.25 in original)*

(Source: ISDR secretariat 2004)

attending school. (This a very rough approximation. Recent developments in multi-factor mapping will soon allow one to be more precise, pushing regional mapping down to national and even sub-national scales.[72])

Groups are working to publicize and address this problem of school seismic risk. During 2004, in the run up to the WCDR, many expert groups highlighted the exposure of school children to seismic risk. A major OECD report documenting how 14 countries addressed school safety and security, particularly in emergency situations, made it clear that it is neither expensive nor technically difficult to reinforce most schools.[73] [74] Also shortly before the WCDR, the host nation Japan,

Table 3

School loss in the 2005 Kashmir earthquake

Type of school	Number of schools before Earthquake	Number destroyed in Earthquake	Loss
Primary Schools in affected area	7314	4599	62%
Middle Schools in affected area	1250	826	66%
High Schools in affected area	618	537	86%
Colleges in affected area	99	98	85%
University in affected area	1	1	100%

(Source: Col. Jamal Nasir)

announced funding for a new programme focused on reducing the vulnerability to earthquakes of school children in the Asian-Pacific region.[75] More recently, OECD and GeoHazards International have embarked on an international effort to raise school construction building code standards and enforcement practices in OECD countries.[76]

The problem, however, is not only developing and disseminating international standards. There is so much corruption in public and private construction that Transparency International made the problem the special focus of its 2005 "Global Corruption Report".[77]

Table 4 summarizes school collapses due to earthquake up to 2004.

The scale of the task and the importance of local conditions mean that parents and teachers and many other local people have to commit themselves to pushing for the safety of their schools. The numbers of school buildings that need inspection and possible strengthening is very great. UNICEF estimates that more than 7,500 new schools are needed from 2004-2007 solely in Afghanistan in order to meet the global targets laid down by the Millennium Development Goals (UNICEF 2004b).[78] On the other side of the world, in California, there may be as many as 8,000 non-ductile (inflexible) concrete school buildings in need of attention (Bernstein 2005).

This is by no means a trivial problem, and recall at this point that the only hazard being considered is earthquake. Many more schools are exposed to flash flooding, high wind damage, storm surges, tsunamis and landslides.

The great effort on the part of the donor nations and national authorities rapidly to boost the proportion of school-aged children who attend school could have the ironic and tragic consequence of putting more children at risk of death or injury in earthquakes and other hazards. Education for All (discussed earlier, see section 3.2.9) is a world-wide effort to increase school attendance that began in the 1990s. It was formalized as Millennium Development Goal 2 in 2000 ("achieve universal primary education"), and has been repeatedly reaffirmed since (for example in WCEA 1990 and WEF 2000). Great efforts are being made to increase the reach of education, accompanied by a flurry of school construction.

School seismic protection and protection from other hazards, however, simply are not mentioned in the literature reviewed on Education for All programmes. And the attention being given to seismic safety during the construction of this new educational infrastructure appears to be inconsistent. Five African country officials responded to a mini-questionnaire prepared for this review, which asked if there was a national policy concerning the safe construction and location of schools. Senegal and Republic of Congo answered in the affirmative. The other three answered in the negative.

Table 4

School collapses in earthquakes yielding mass casualties

Date (Source)	Location	Consequences / schools	Consequences / children
7 December 1988 (NGDC 2004)	Armenia	Extensive damage to schools.	Likely thousands of schoolchildren killed including 400 at an elementary school in Dzhrashen which collapsed.
10 May 1997 (CNN 1997)	Ardakul, Iran.	Primary school collapsed.	110 students killed.
9 July 1997 (FSSS 2004)	Cariaco, Venezuela.	Two schools collapsed.	46 students killed.
26 January 2001 (FSSS 2004)	Swami Narayana School, Ahmedabad, India.	School collapsed.	At least 25 children killed.
31 October 2002 (Augenti et al.	San Giuliano di Puglia, Italy.	Primary school collapsed.	26 children and 3 adults killed. 35 children escued alive from the building but some rreports suggest that one child died later.
24 February 2003 (Harmsen 2003)	Bachu, Xinjiang, China.	Middle school collapsed.	At least 20 students killed.
1 May 2003 (Gülkan et al. 2003)	Bingöl, Turkey.	Middle / secondary school dormitory collapsed.	84 students killed; more than 114 in the dormitory survived. 4 school buildings collapsed but only one was occupied.

The number of near misses during earthquakes is greater. On these occasions, there were few-to-no people in the schools when the destruction took place (table 5).

The situation is clarified further if one focuses attention on the 20 countries in the world that experienced the greatest number of earthquake fatalities over the period 1900-2000 (table 6). If Education for All initiatives are successful in all of these 20 countries, but no special attention is paid to the seismic safety of school buildings, it is possible that at least another 34 million children will be placed at risk of earthquakes while they are attending school. A mere six countries would account for around 24 million new students enrolled and attending schools. These countries are highlighted in bold print in table 6.

One must allow for the existing high standards of school construction in Japan, which will ensure some protection for their children, and for the fact that, in large and geologically diverse countries such as China and Mexico, not all newcomers to school live in zones of highest seismic hazard. Nonetheless, these caveats still leave a considerable number of EFA beneficiaries vulnerable to seismic hazards.

3.4.3 Country experiences with school protection

Four countries illustrate the range of challenges faced and strategies adopted to improve school seismic safety. Since this is the most advanced form of protection for schools from natural hazards, lessons learned here in terms of organization, finance, building code enforcement, training of builders, and mobilization of community and political support can be applied to dealing with other hazards.

3.4.3.1 Algeria

School buildings in Algeria are at risk from earthquakes due to geography, history and a number of social factors.[79] Ninety percent of Algeria's 30 million people live in a band about 60 km wide and 1200 km long that extends along the coast of the Mediterranean Sea. This band is located on the African and Eurasian tectonic plate boundary, and has repeatedly experienced moderate-to-strong earthquakes. During the 20th century, these earthquakes claimed at least 10,000 lives, injured about 27,000 and made homeless approximately 550,000 others (Benouar 1994 and 1996).

Table 5

School collapses in earthquakes when few people were in the building

Date (Source)	Location	Consequences/schools	Consequences/children
3 February 1931 (Dowrick and Rhoades 2004)	North Island, New Zealand.	Several schools were severely damaged.	The earthquake happened at mid-morning during school playtime when the children were outdoors enjoying the summer weather. Some students were killed, but the death toll could have been several hundred.
10 March 1933 (FSSS 2004; NGDC 2004)	Long Beach, California, US.	70 schools collapsed.	The earthquake hit early in the evening after children had left for the day which saved their lives. Five students were killed in a gymnasium.
31 October 1935 (NGDC 2004)	Helena, Montana. US.	Secondary school collapsed.	No one was in the building at the time of the earthquake.
4 March 1952 (USGS 2003)	Sapporo, Japan.	400 schools collapsed in Sapporo.	The low number of casualties suggests that no one was at school at the time of the earthquake.
27 March 1964 (FSSS 2004; NGDC 2004)	Alaska, US.	Primary school destroyed by an earthquake-induced landslide. Half of Anchorage's schools significantly damaged.	The earthquake struck on a holiday, Good Friday, so schools were closed.
10 October 1989 (Bendimerad (2004;NGDC 2004)	El Asnam, Algeria.	70-85 schools suffered extensive damage or collapsed.	The earthquake occurred out of normal school hours, so children were not at school.
19 September 1985 (FSSS 2004)	Mexico City, Mexico.	Several schools collapsed.	The earthquake happened in the morning, so the children were not yet at school.
25 January 1999 (Garcia & Cardona, 2000)	Pereira & Armenia, Colombia.	74% of schools damaged.	Earthquake took place at the noon hour; so children were not in the buildings.
21 September 2001 (Angelier et al. 2003)	Taiwan.	A three-story school collapsed.	The earthquake happened in the middle of the night, so no one was in the building.
24 February 2003 (Harmsen 2003)	Xinjiang, China.	Dozens of schools collapsed.	The earthquake struck 27 minutes before thousands of children would have been in classrooms.
21 May 2003 (Bendimerad 2004)	Boumerdes, Algeria.	130 schools suffered "Extensive to complete damage".	The earthquake occurred out of normal school hours, so children were not at school.

School buildings have suffered considerable damage in the earthquakes (see example in photo 4). Factors explaining damage to schools can be best understood by considering the period during which they were built.

Algeria's schools may be classified into three categories, based on when they were constructed. All three are vulnerable to seismic damage, but for different reasons. The first category, built during the colonization era (1830-1962), accounts for about 30 per cent of the school building stock. It is characterized by well-advanced degradation due to ageing and lack of maintenance.

The second category, built after independence, in response to a rapidly growing population and the democratization of educational opportunity, was designed and constructed quickly, without taking into account seismic risk. There was no seismic

building code in Algeria until 1981. Particularly during the 1970s, in what was called the "cultural revolution", the government had to build as rapidly as possible at the expense of control and thus quality.

The third category of school buildings were built most recently, since 1983. These schools were constructed according to a seismic building code, and under technical supervision. Schools in Algeria are all built by the government, and the government adopted one structure for all schools that could be duplicated easily across the country. The structures' standardized dimensions and design elements are far from those of an ideal seismically-resistant structure as recommended by Algeria's own seismic codes.

Table 6

Primary education data on top 20 countries for earthquake fatalities 1900-2000

Nation	Age Group	School-age population	Children out of school who should attend
China	7 to 11	110 499 000	8 054 600
Japan	6 to 11	7 335 000	300 000
Italy	6 to 10	2 789 000	6 400
Iran	6 to 10	9 221 000	**2 436 300**
Turkey	6 to 11	7 969 000	no data
Peru	6 to 11	3 416 000	4 600
Armenia	7 to 9	199 000	no data
Pakistan	5 to 9	19 535 000	**7 785 400**
Indonesia	7 to 12	26 081 000	**2 046 300**
Chile	6 to 11	1 751 000	**1 956 000**
India	6 to 10	112 469 000	no data
Venezuela	6 to 11	3 286 000	394 600
Guatemala	7 to 12	1 869 000	293 300
Afghanistan	7 to 12	3 372 000	no data
Mexico	6 to 11	13 070 000	78 400
Nicaragua	7 to 12	810 000	155 900
Morocco	6 to 11	4 071 000	**8 952 000**
Nepal	6 to 10	3 065 000	**846 800**
Taiwan	no data	no data	no data
Philippines	6 to 11	11 330 000	822 600

Note: Numbers refer to a single year between 1999 and 2001.
(Sources: UNESCO 2005. Earthquake mortality from EM-DAT.)

Numerous reports show the deficiencies in design, construction techniques, and materials (e.g., poor quality of concrete) in school buildings with respect to recent earthquakes. The following typical damage to school buildings has been recorded:

- Rupture of staircases.
- Destruction of joints.
- Destruction of short columns.
- Damage in Masonry.
- 'Pancake' collapse due to weak columns, overly strong beams and heavy roofs composed of reinforced concrete slabs.

Table 7 shows the scope of school damage during recent earthquakes.

Such damage causes enormous financial loss to the government. For instance, according to the National Ministry of Education, after the Boumerdes earthquake disaster of 2003 in the provinces of Boumerdes and Algiers, 100 primary schools had to be rebuilt completely for the sum of $4.28 million, and 253 primary schools were rehabilitated for $10.65 million. In addition, 12 junior high schools were completely rebuilt for the sum of $10.28 million and 111 junior highs were rehabilitated for $20.85 million. Also, 10 high schools were rebuilt for the sum of $21.42 million, and 58 high schools were rehabilitated for $12 million.

Fortunately, so far these destructive earthquakes in Algeria have occurred after school hours or on weekends. Thus, no loss of life or injuries have been recorded at schools. This good luck may have made government and the civil society alike less aware of the high vulnerability of the schools. It may also go some way toward explaining why there has so far been no implementation of a ministerial instruction dating from 1989 that required the reinforcement of all public buildings, including schools and universities. As a matter of fact, the introduction of new materials, such as reinforced concrete, in the absence of proper seismic resistant design, building codes and enforceable regulations

Table 7

School damage in the last destructive earthquakes in Algeria

Earthquake	Magnitude	No/Light damage	Moderate damage	Collapse	Total affected	Damage Ratio (%)
1980 El-Asnam	7.3	5	25	70	100	95
1989 Chenoua	5.7	167	36	7	210	20
1994 Mascara	5.6	30	16	4	50	40
1999 Temouchent	5.8	36	17	6	59	39
2003 Boumerdes	6.8	1304	753	103	2160	58

(Source: Bendimerad 2004)

has increased the risk to structures and their occupants. Relatively minor reinforcements could reduce the potential for damage to these structures.

3.4.3.2 Nepal

Schools in Nepal, both their buildings and its occupants, face extreme risk from earthquakes because of highly vulnerable building stock, high occupancy, and high seismic hazard.[80] In response, a Nepalese NGO, the National Society for Earthquake Technology Nepal (NSET) has conducted an innovative programme to strengthen existing school buildings and promote earthquake resilient school building construction. NSET's experience shows that seismic retrofitting and earthquake resistant new construction can be affordable, through the use of local craftsmen and materials, as well as technically viable.

Nepal is located in one of the most seismically active regions of the world, due to the subduction of the Indian plate below the Tibetan plate. On average, Nepal is hit by a major earthquake once every 100 years and by a medium-size earthquake once every 40 years. In 1988, eastern Nepal experienced a 6.6 magnitude earthquake. More than 950 school buildings were damaged (Thapa 1989). Fortunately, the earthquake happened at night, so the schools were not occupied.

A review of the seismic vulnerability of public school buildings and possible intervention options in the Kathmandu Valley showed a grim situation. The study surveyed 900 public school buildings, of which 78 per cent were normally constructed buildings and the remaining 22 per cent were standard two-room steel sheds, constructed by the government after the 1988 earthquake. The study showed that even in greater Kathmandu — the economic, political and technological hub of Nepal — more than 60 per cent of the schools are made of weak construction materials. These include mud, fired or unfired brick, or stone in mud mortar. None of the school buildings in the survey were earthquake-resistant. More than 25 per cent were hazardous for use even in normal times, because of their precarious condition, although some of these were not in use (NSET 2000).The seismic assessment of these normally-constructed school building shows that in the case of seismic shaking addressed by the building code, more than 77 per cent of the school building would suffer severe damage beyond repair, and other 25 per cent would suffer repairable grade damage.

Most of the Nepalese school buildings are produced by the community itself, mostly employing local craftsmen, who play a pivotal organizational and technical role. Most of these craftsmen have no formal training, and some are illiterate. The process is characterized by the high degree of informality. The local availability of the construction materials such as fired or unfired bricks, stone in mud mortar and timber controls the construction process. The use of modern materials such as cement, concrete, and steel bars is limited by affordability and accessibility, and is confined to urban areas and areas accessible by transport. Most new school buildings in Nepal are built according to convention, rather than being specifically designed. Trained technical people in Nepal are generally not involved in the construction of school buildings unless there is

Photo 4

Ain Temouchent earthquake 1999 school damage, Algeria

(Source: Professor Djillali Benouar)

financing from government. This is because of both the low budgets for most school construction and because of a lack of awareness and knowledge on the part of graduate engineers of traditional and informal construction methodology (Bothara and Sharpe 2003). As a result, most school buildings lack earthquake resilience.

The NSET programme built on the fact that most school construction in Nepal takes place locally in this decentralized, traditional and informal manner. The programme strengthened structural as well as non-structural components of the school buildings for seismic safety (Bothara et al., 2004). This programme involved craftsman training, technology development and transfer, and development of increased community awareness. Activity thus focused on schools has far-reaching effects. By raising awareness in schools, the programme reaches the entire community, as lessons trickle down to parents, relatives and friends.

When designing seismic retrofitting or earthquake resilience for new construction, NSET's focus has been on the socio-cultural and economic issues that affect acceptance by the community. NSET developed an approach involving outreach to all stakeholders – school staff, students, local community, local clubs, local and central government. These groups have all been involved in the process to ensure that they become aware of the risk and support the solution. School building construction is used as an opportunity to train masons, and to transfer simple but effective technology to others in the community, including house owners.

Following this approach NSET had by 2003 already retrofitted four unreinforced masonry school buildings and engaged in construction of 16 new schools in and around Kathmandu Valley. The programme was successful in transferring technology to local craftsmen, who were quite keen to learn about the complete process and to adopt the technology. These masons became the propagators of the safety message in the vicinity of these schools, leading to the replication of earthquake-resilient construction.

3.4.3.3 Colombia

The capital city of Colombia, Bogotá, is the most important political, administrative, economic and cultural centre of the country.[81] Bogotá's population was estimated to be around 6.9 million in 2003. Nearly half of these people live below the poverty line (46 per cent); while nearly a million live in extreme poverty.

The city of Bogotá has disaster risk reduction at the centre of its planning process, and in this context school seismic safety ranks very high. Having diagnosed the scale and urgency of the problem in Bogotá, the city is now taking steps to reinforce the most hazardous school buildings. The challenges the city still faces include extending its school safety programme to private schools that cover nearly half the school aged population and accelerating the rate of school reinforcement.

Among the most common hazard events affecting Bogotá are earthquakes and landslides, both of which may affect not only schools, but a student population of nearly one million young people.[82] Although there has not been a severe earthquake in Bogotá since 1917, there is certainly the potential for one (Ingeominas and Uniandes, 1996, Ramírez, 1975). Also, elsewhere in Colombia, 74 per cent of the schools in the cities of Pereira and Armenia suffered damage in the 1999 earthquake (Garcia and Cardona 2000). Fortunately, this occurred during the lunch hour, and no children were in the school buildings.

The city has put in place several risk identification methods in the past few years. These include compilation of records of disaster events, generation of hazard maps, studies of physical and social vulnerability, and studies of environmental degradation. One of the means of reducing risk from earthquakes and landslides in Bogotá is the assessment of seismic risk of bridges, hospitals, and schools. This has become a core part of the city's economic and social development plan. Of these assessment programmes, the best-known is the Department of Education's effort to identify school seismic risk and to reinforce schools.

Much of the educational infrastructure in Bogotá is more than 40 years old and does not meet minimal standards of safety. For this reason, the Department of Education commissioned a systematic review of schools, which ran from 1997-2003 (Secretaría de Educación del Distrito Capital de Santafé de Bogotá, 2000). This study covered approximately 2,800 buildings at 706 schools (including the addition of 16 schools resulting from new construction in 2004). Some 498,000 students attended these schools – a number that amounts to roughly 54 per cent of the student population in Bogotá. The other 46 per cent of the student population attends private schools and was not covered in this review.

By law, only hospitals and not schools in Bogotá require inspection and seismic reinforcement. Some professionals and leaders in Colombia see this as a legal anomaly and want to extend the law to cover schools. However, in the meantime, and much to Bogotá's credit, the Department of Education launched its programme for public school safety without any legal mandate. However, this also means that there is no legal compulsion to force inspection and reinforcement of private schools until the law in changed. The shift in awareness of the importance of school seismic safety on the part of the city government came, in part, because of outreach by the Colombian Association for Earthquake Engineering and by Universidad de los Andes and other universities.

The school safety review found that 434 of the schools presented high risk to students. Some 772 buildings at these schools fell into this category (16 per cent). The study also found that 60 schools had buildings in urgent need of reinforcement. In 2004, retrofitting was underway or under contract at half of these schools.

The cost of structural reinforcement at all 434 schools is estimated to be $100 million; however, the Department of Education would like an additional $50 million invested at these problem school sites in addition to the funding of basic structural retrofitting. As an additional demonstration of political will, the funds for reinforcing buildings at the first 31 schools has come entirely from the Bogotá city budget, and the school safety programme has been supported by the previous as well as the current mayor of Bogotá. These are substantial sums of money, especially for a city that faces many other needs. However, it is axiomatic that the best way of guaranteeing the safety of students is to ensure that new school buildings are built properly in the first place.

Assessing and reducing the risk to schools in Bogotá takes place in a more general planning and management context. For example, zones at high risk of landslide, where no mitigation works are possible, are declared to be protected land. Human occupation is restricted in these areas as well as those considered at high risk to floods. The year 2000 land use master plan for Bogotá contains hazard and risk maps that delineate land use, details of special treatment for high risk areas, and arrangements for issuance of building permits, as well as protection plans for utilities and services.

The city also relies on community based networks to control illegal land occupation and has developed a large-scale relocation programme for families living in high-risk conditions. In 2003, it was estimated that some 185,000 people lived in informal settlements in a total of 34,230 informal housing units. In Bogotá there are 173 illegal settlements that account for 14 per cent of the total land area. The city administration has developed a massive legalization programme since 1995, thus reducing the number of informal settlements from 1,451 to its current number, an eight-fold reduction in less than ten years. Nevertheless, as much as 60 per cent of the population of the city lives in

informally constructed dwellings. While most of these are located in legal settlements, they still represent a challenge to seismic safety.

3.4.3.4 Turkey

Turkey has more than 8 million children attending schools in 64 provinces in zones of high seismic risk (see figure 12).[83] In response, the country has taken steps to improve school design and construction. Currently, the dangers from school buildings are almost entirely due to shoddy construction, although low awareness of non-structural hazards is also a problem.

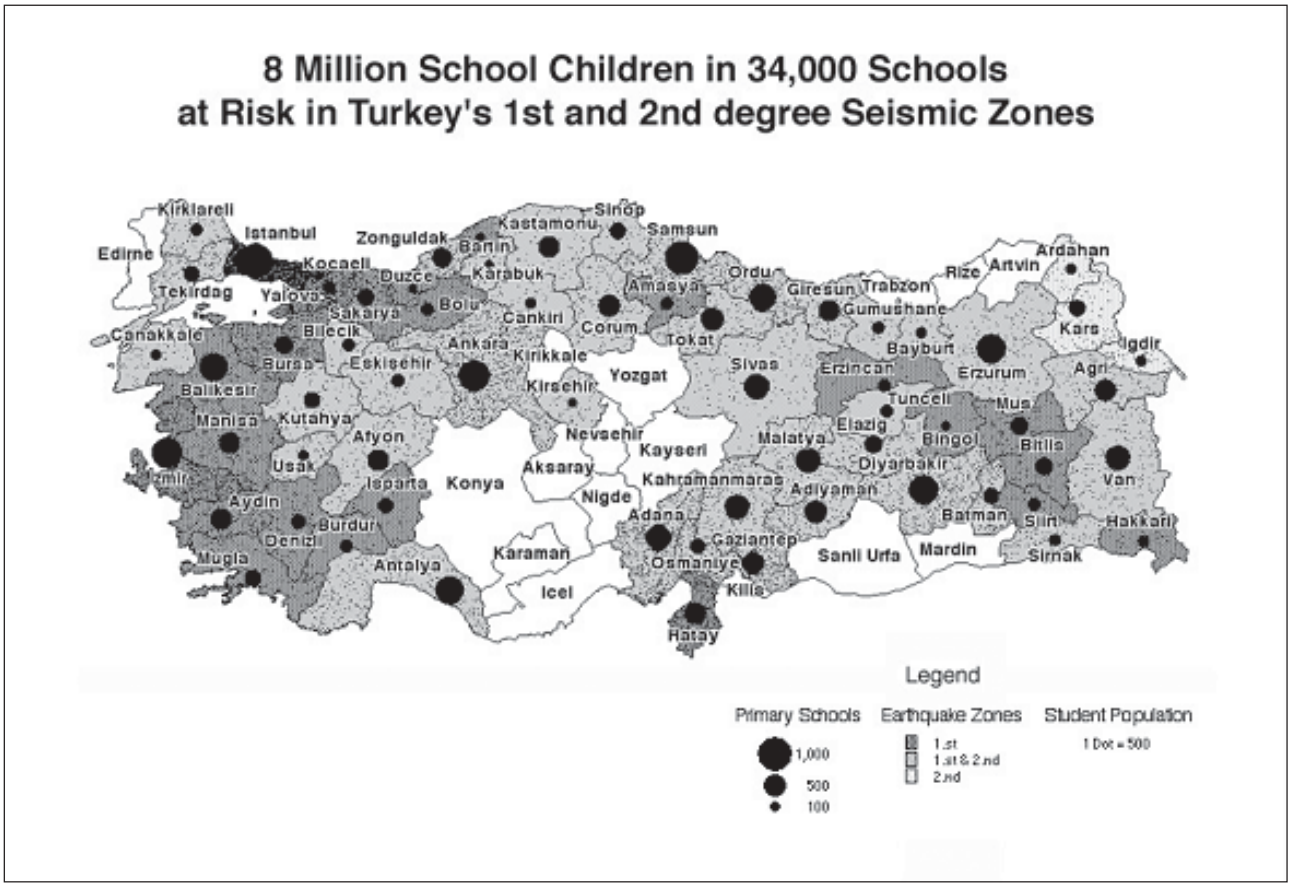
The 1999 Kocaeli (magnitude 7.4) and Duzce (magnitude 7.2) earthquakes, which resulted in approximately 20,000 fatalities, raised awareness of the school safety question. The 2002 (magnitude 6.0) Afyon-Sultandag (magnitude 6.0) and 2003 Bingöl (magnitude 6.4) earthquakes kept awareness high. During the 1999 earthquake in Kocaeli, 43 schools were damaged beyond repair, and 381 sustained minor to moderate damage (Erdik 2001). School was suspended for four months, causing major disruption to the lives of families and children. In Istanbul, 60 km away, there was damage at 820 (50 per cent) of 1,651 schools. Damage at 131 of these sites necessitated at least temporary school closure. Thirteen schools were immediately demolished, and another 22 were later slated for demolition when retrofitting proved too costly. Fifty nine schools were strengthened and 59 repaired.

In the Bingöl earthquake, out of 29 schools in the affected area four school buildings collapsed completely, 10 were heavily damaged, 12 slightly or moderately damaged and three undamaged (Gülkan 2004).

Public schools in the Kocaeli earthquake fared better than residential buildings and private schools

Figure 12

School Children at Risk in Turkey



(Source: S. Ulgen, IMAGINS, Inc.)

(Erdik 2001). Had children been at school during the Kocaeli earthquake, far fewer would have lost their lives. The fatality rate in residential buildings in the Kocaeli earthquake was 1.5 per 100 in heavily-damaged buildings and 16.5 per 100 in totally-collapsed buildings (Petal 2004). Similar damage in higher occupancy buildings of the same type would cause higher fatality rates. In the single example of the school dormitory in the Bingöl earthquake where 84 children died, the fatality rate was 44 per 100. Average risks are theoretical and do not occur. Either a school is not occupied and no one dies or it is occupied and the fatality rates are high, and the tragedy wholly unacceptable.

There is much that is right with school construction in Turkey. As a result of an assigned importance factor of 1.5, public schools are designed to withstand a 50 per cent increase in earthquake design loads (Erdik 2001). Schools have regular symmetrical structural designs, and those that are only one or two stories have fared well, for the most part meeting standards for life-safety, if not continuous occupancy. The lethality of school buildings is almost entirely attributable to shoddy construction, and is even greater in taller buildings that may also have design defects.

For decades, all public construction was under the authority of the Ministry of Public Works and Settlement. Earthquake building codes on the books since the 1930s were updated most recently in 1976 and 1998, yet the existence of these laws has not guaranteed the safety of construction. The reasons are numerous.

There are no independent professional qualifications, proficiency standards, or continuing licence or education requirements for architects or engineers, other than undergraduate or graduate degrees. Similarly, no professional qualifications are required for building contractors. There are also no guidelines for reliable and systematic building inspection during construction. Penalties for non-compliance with building codes are beset with bureaucratic and social impediments, and often are simply not applied. Legal liability in some future event with low-frequency occurrence can hardly be a deterrent with so many to share blame. Public construction has also suffered from a standard (though not legally-required) preference for lowest bid in public tenders. The civil service employment system also lacks proficiency standards and qualifications for professional staff; so at the local level, capacity for project supervision and control varies widely. Wage and salary levels are low, and there has been opportunity for both favoritism and corruption. There are no ombudsman or advocacy services to support consumer whistle-blowers.

Regardless of these problems, Turkey still needs new school buildings. Therefore, it continues to build, making efforts to create safe facilities. This work is by no means simple. School construction in Istanbul, for instance, involves three overlapping tasks:

- Immediate response to damage caused by the 1999 earthquake.
- Implementation of a comprehensive retrofitting and replacement for seismic risk mitigation.
- Follow-through on an ambitious programme of school expansion and construction, which was initiated to respond to the acute shortage of class space caused by the requirement for three additional years of compulsory education enacted in 1998.

After the 1999 earthquake, responsibility for school construction was shifted to the Ministry of Education's Division of Investments and Facilities (DIF). In turn, DIF appointed consultants from the private sector to oversee the new facility design and construction. DIF also developed standard designs for the new facilities. It financed new school construction by a combination of government funds and charitable contributions raised by not-for-profit foundations. New construction and procurement laws also went into effect; however, the cumulative impact of these changes and pressures is not yet known (Gülkan 2004).

Istanbul gives priority first to regional boarding schools, then to schools in the 12 highest risk districts and to those in proximity to the Marmara Sea coast. The overall mitigation and retrofit effort targets more than 1,800 buildings, which constitute the 80 per cent of stock predating the 1998 Building Code. This ambitious programme is budgeted for $320 million (Yüzügüllü et al. 2004).

Looking beyond building construction, an additional problem in Turkey is that awareness of non-structural hazards remains low. Classroom doors often open inwards, and shelving and laboratory equipment remains unfastened. However, the country is beginning to make some progress on this issue. Concern that children advised to "drop, cover and hold" might be injured by flimsy wooden desks led to plans in 2001 to produce and distribute 80,000 steel desks to more than 500 schools in the most vulnerable areas.

3.4.4 Non-structural protection measures

Although the foregoing sections have focused on structural concerns, there is much similar work to be done to prevent death, disability and injury through non-structural protection methods. Schools must secure the contents of the buildings. School personnel need disaster management plans, emergency response skills, and regular drills to cope with expected disasters. A culture of safety is must be multi-faceted, and activism in one area encourages changes in consciousness, expectations and demands in all.

Non-structural protection is a good way to get parents and the community involved. For example, the City of Berkeley, California (US) briefed parents on the simple things that can be done to keep equipment and books from flying around in laboratories and libraries during an earthquake. Parents then spent several weekends volunteering their time to put these measures into effect with simple hand tools.

In an analogous manner, community participation with an NGO in Sri Lanka allowed inclusion of roof water catchment and storage in a school built to replace one destroyed by the Asian tsunami. Not only is this an everyday improvement in the school water supply, but it provides an emergency water source for future disasters.

In a similar example, the Youth Non-Structural Mitigation Program sponsored by the American Friends Service Committee in Turkey involved 50 high school youth in providing non-structural mitigation for four Istanbul neighborhoods.[84] They participated in a 32-hour training programme, learning about earthquake safety and how to secure building contents to prevent injuries and deaths from crushing, falling, piercing, and cutting during an earthquake. The participants then carried out community service projects providing non-structural mitigation in community health clinics, schools, and homes of elderly and disabled residents. They also reached out to publicize their efforts through posters, models and display at a city-wide fair (see photo 5).

3.4.5 Resources for school protection

Multiple resources are available to help make schools more resistant to disasters. Many focus on seismic safety. Detailed guidelines for national school safety programmes are provided by OECD (2004). These include hazard mapping, revision (where necessary) and – above all – enforcement of seismic building codes by national, provincial and local governments. The guidelines also prescribe training for engineers, so that they can understand and engage with local masons and other builders, as well as calling for invention of more innovative funding models for structural reinforcement.

A new organization has been launched to campaign worldwide for more comprehensive school safety. Called the Coalition for Global School Safety (COGSS), the organization focuses on world-wide consciousness raising, arming advocates with compelling evidence of risks, feasible risk-reduction methods and strategies for local advocacy. With support from the Earthquake Engineering Research Institute branch in Northern California, COGSS is creating a web-site and CD with a "mother slideshow" chronicling school seismic disasters and near misses for advocates to commemorate the 100th anniversary of the San Francisco Earthquake of 1906 in April 2006.[85] COGSS plans to mobilize a broad cross-section of professional stakeholders from more than a dozen disciplines through a series of reviewed articles for professional journals. They also aim to help stimulate a worldwide cultural paradigm shift through a series of articles designed for a wide range of popular magazines.[86]

A sample of other resources available is listed below. These sources show the existing range of low-cost, accessible technology and design that can help build new schools and retrofit existing ones to increase resilience against earthquakes. Many use a community-based approach.

Photo 5

Students at non-structural mitigation city-wide fair

(Source: Marla Petal)

- Application of techniques, developed in Nepal, to school reconstruction in Gujarat, India (UNCRD – Kobe and SEEDS and other partners (Patanka New Life Plan.)). <http://www.hyogo.uncrd.or.jp/publication/report.html>
- Design of earthquake- and wind-resistant primary school for Gujarat, India (Shaw 2002). <http://www.onlinevolunteers.org/relief/earss0315-school.html>
- Disaster-resistant design guidelines for Afghanistan from UNCRD. <http://www.hyogo.uncrd.or.jp/publication/guide.html>
- Community-based school maintenance and seismic protection in Indonesia through the Asian Urban Disaster Mitigation Program of the Asian Centre for Disaster Preparedness and UNCRD. <http://www.adpc.net/audmp/projectoutputs/indo/report-june-04-00-tr.html>
- School seismic and wind safety surveys and pilot projects on several Caribbean islands with the assistance of the Organization of American States and Office of Foreign Disaster Assistance (USAID). <http://www.oas.org/CDMP/schools/schlrcsc.htm>
- Organization of American States resource page for school natural hazard vulnerability reduction. <http://oas.org/nhp/schools_introduction.html#education>
- Manuals for building seismic-resistant structures with traditional materials (in Spanish). <http://www.desenredando.org/public/libros/index.html>
- Manual for improved adobe construction, University of Technology, Sydney, Australia. <http://www.eng.uts.edu.au/~ddowling> (World Adobe Forum under construction at this web site.)
- UNESCO/ UNEP-APELL guidelines for safe schools. <http://www.uneptie.org/pc/apell/publications/pdf_files/APELL%20for%20Schools%20and%20Educational%20Buildings.pdf>

Photo Credit: Dr PV Unnikrishnan

CHAPTER 4

Training Courses

Training courses in disaster risk reduction are becoming quite common in most of the world, in the form of both distance learning and face-to-face classes. Participants vary from senior policy makers to community leaders, to specialists seeking in-service acquisition of new knowledge (For examples, see annex 12).

In keeping with its focus on identifying good practices, this review outlines useful disaster risk reduction training resources currently available through international organizations, regional organizations and training centres, as well as in certain individual countries. It also highlights some interesting innovations in the field. As a supplement to this outline, an earlier overview of some of the available training programmes was published by the ISDR secretariat in *Living with Risk: A Global Review of Disaster Reduction Initiatives*. The report's directory of training courses is displayed on the web site, *ReliefWeb* (ISDR secretariat 2004).[87]

The UN Disaster Management Training Program (UN-DMTP) has been a hub for this form of knowledge transmission for a number of years.[88] Its web site includes an extensive training data base.[89] The Asian Disaster Preparedness Center in Bangkok and the University of Wisconsin Disaster Management Centre also are well known centres of training.[90,91] The World Meteorological Organization does a great deal of training, including distance learning.[92] Other UN organizations and the IFRC also do some training in this area on specialized topics; the UN-DMPT data base lists 15 UN agencies that provide one kind of disaster-related training or another.

The World Bank has developed several online resources for training trainers in disaster management that cover a comprehensive natural disaster risk management framework, financial strategies for managing the economic impacts of natural disasters, safe cities, community-based disaster risk management, and damage and reconstruction needs assessment.[93]

Short courses are also provided at Emergency Management Australia's training centre at Mt. Macedon outside Melbourne, and in Kobe at the Asian Disaster Research Centre, as well as the African Centre for Disaster Studies at Northwest University in South Africa.[94,95] The UN-DMTP lists a total of 11 training institutions in southern Africa.

For the Pacific region, the Pacific Emergency Management Training Advisory Group coordinates disaster risk management training activities, and Swinburne University of Technology in Australia has an accredited disaster management course focused on this region. The South Pacific Applied Geoscience Commission also provides training. The Pacific Disaster Centre lists a total of 16 training institutions in the Asia-Pacific region that were active in 2003-2004 (PDC 2005).

In Latin America, the Pan American Health Organization produces a large number of training guides and materials.[96] Much training is done in the region by USAID-Office of Foreign Disaster Assistance and the regional delegation of the IFRC, as well as by national societies.

RedR is an international federation of regional offices that offer training in diverse aspects of humanitarian assistance, including disaster risk reduction.[97] Begun in 1979 by an engineer who had worked in a refugee camp, the training still maintains an engineering emphasis. RedR maintains a very full training schedule.[98] The Sphere Project also trains in the area of humanitarian assistance, with more emphasis on management and less on engineering.[99] It also produces material for trainers of trainers. Training for those working with refugees and displaced persons is also available through the Norwegian Refugee Council and the UNHCR.[100]

Besides these international and regional training centres, in some countries training is highly developed, as in Philippines, Japan, Mexico, Turkey and the US. Inspired by the spontaneous rescue and relief efforts of citizens following the 1985 Mexico City earthquake, US professional observers developed an 18-hour course that lay people can take over a series of weekends called Citizen Disaster Response Training (CERT). This includes light search and rescue, fire suppression, first aid,

transportation of the injured, communications and leadership. CERT-qualified persons proved very effective in the immediate aftermath of the 1994 Northridge earthquake, and now many US cities offer this training. In the Philippines, the Centre for Disaster Preparedness has developed training material for the lowest level of that nation's administrative hierarchy, the Barangay. This is more ambitious than CERT and more collective, providing skills not only in preparedness but also in vulnerability and risk assessment.

The International Recovery Platform (IRP), established in 2005, has developed the beginnings of a database on worldwide resources to train personnel for recovery actions.[101] This side of IRP's work – the capacity building component – is coordinated by the International Labour Organization.[102] An interesting innovation is the attempt to develop a distance learning system, based in part on South-South exchange of case studies and experiences, called GOLFRE ("Global Open Learning Forum on Risk Education").[103]

The IFRC has 300,000 employees worldwide and 105 million volunteers. The IFRC has developed a great deal of training material for this "in-house" constituency, as well as training material used widely outside IFRC circles, including its well-known Vulnerability and Capacity Assessment guidelines (see also section 3.2.10.5 and section 5.1).[104] Figure 13 is taken from a description of an ambitious, multi-country project to develop organizational capacity within national societies.

Figure 13

IFRC organizational capacity development model

(Source: ARC)

Photo Credit: Dr PV Unnikrishnan

CHAPTER 5

Informal Education and Communication

A diverse array of informal education and communications practices helps further the awareness and practice of disaster risk reduction. This review looks at the current state of two such practices, community-based disaster management and adult literacy programmes, as well as at the role of the media.

5.1 Community-based disaster management

Community-based disaster management (CBDM) is a form of self-education by a group of people, usually residents of the same rural or urban locality, on how to reduce their disaster risk. It often benefits from workshops or on-the-spot training by NGOs or other extension agents. The tools and methods are often, but not always, based on theories of participatory action research that go back several decades. Diverse organizations refer to these tools, respectively, as Community Risk Assessment (CRA), Participatory Vulnerability Analysis (PVA), Vulnerability and Capacity Assessment (VCA), as well as by other names.[105] CBDM has become very common among at a project level in many parts of the world, and many manuals, guidelines and aids exist.[106]

However, organizations only recently have begun to systematically review the diversity of applications and methods used in the field. One exercise by the IFRC has taken a second look at the VCA practiced by many of its national societies since it first published guidelines in 1999 (IFRC 1999). In another, the ProVention Consortium has begun to systematize applications and develop user-guidance notes to a series of case studies collected from all parts of the world. In this case, an effort was made to follow up, where possible, on CRA applications, to see if participants actually implemented the action plans they created, and if CRA use had any other longer-term social effects.

One of the first groups to develop participatory, community-level tools was the Network of Social Science for Prevention of Disaster (La Red) in Latin America (Zilbert Soto 1998). Other early and influential manuals came from the Centre for Disaster Preparedness in the Philippines (Heijmans and Victoria 2001). Collaboration between Durban University's Department of Adult Education and DiMP-Cape Town University produced one of Africa's earliest manuals in 1998, co-published with Oxfam UK (von Kotze and Holloway 1998). Australia has also witnessed a good deal of community-based risk assessment (Buckle et al. 2000 and Wisner et al. 2004). Various forms of CBDM are the subject of training courses offered by the Asian Disaster Preparedness Center in Bangkok and an integral part of projects such as the Asian Urban Disaster Mitigation Program.[107]

In fact, many NGOs, bilateral and multilateral projects claim to be using "participatory methods" and claim to respect local knowledge and to "listen". In many cases this is truly the case, within the limits of the outsider-insider relationship, power relations, the urban-rural divide and other barriers. Nevertheless, some of what passes for "participation" amounts to a very quick chat with a few people who are then called a "focus group". This is a variation of what participation guru Robert Chambers has called "development tourism" or the "tarmac bias" (Chambers 1981), and clearly should not be considered desirable practice.

5.2 Adult literacy

Adult literacy is a fundamental requirement for risk communication. It is possible to organize evacuations in populations with low literacy rates, as work of the Red Crescent during a series of cyclones in Bangladesh, where adult literacy is 41 per cent (34 per cent for women), has shown. However, to engage a population in considered dialogue with planners, climate and weather forecasters, and other experts, literacy is critical.

Cuba's experience shows this. The country has a very high level of educational attainment, including 99.8 per cent literacy in the general population (99.8 per cent among women). The Cuban people seem quite comfortable with technical hurricane forecasts and seem to understand concepts like the "cone of probability" as storms track across the Caribbean toward Cuba.

Worldwide adult literacy stood in the period 2000-2004 at nearly 82 per cent, but there is wide variation, as can be seen in table 8. The gap between men and women (in part a reflection of the fact that

African girls are much less likely to attend school) is particularly striking. Low-income countries have only 64 per cent of adults who can read and write, whereas the middle income rate is close to 90 per cent and OECD countries very nearly 99 per cent. Female literacy rates in some places are abysmally low: 34 per cent in Ethiopia, 32 per cent in Mozambique, 31 per cent in Bangladesh, 29 per cent in Senegal, 22 per cent in Benin, 13 per cent in Chad, 12 per cent in Mali, 9 per cent in Niger, and 8 per cent in Burkina Faso (WRI 2006).

The Millennium Development Goals emphasize primary school education, especially for girls. This is, of course, an undisputed priority. However, one should not forget adult women and men who could increase the control they have over their lives if they learned to read. Newly-acquired literacy can be used as a jumping-off place for community-based risk assessment and action planning (see section 5.1 above on community-based disaster management). Also, there are very specific correlations between literacy, especially female literacy, and child survival and productivity (See figure 14).

Table 8

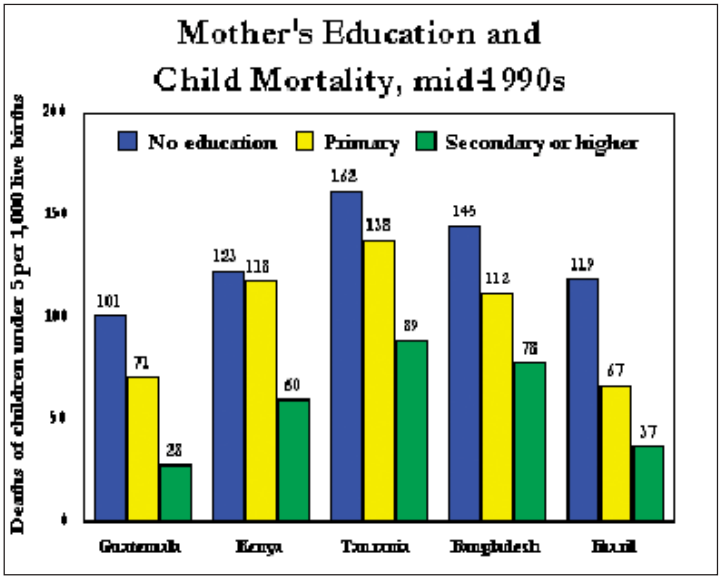
World adult literacy rates

Region	Percent of Adults	Percent of Women	Percent of Men
Asia (excluding Middle East)	78.0	70.7	85.0
Central America and Caribbean	87.2	85.9	88.7
Europe	90.7	98.4	99.1
Middle East and North Africa	72.5	63.0	81.6
Oceania	92.6	91.7	93.5
South America	90.8	90.4	91.4
Sub-Saharan Africa	60.3	52.6	68.7

(Source: WRI)

When adult literacy training is tied to the concrete realities of a person's life-world, the training itself can become the basis of subsequent action campaigns. In this way, Tanzania was able to mobilize millions of citizens in massive health and nutrition initiatives some 30 years ago (Kopoka 2000).

Figure 14



(Source: Demographic and Health Surveys, Population Resource Center)

5.3 Media and risk awareness

5.3.1 Through a glass darkly?

Public education about natural hazards and vulnerability is well developed. At the same time, the media have much remaining, untapped potential to educate the larger population about disasters and risk reduction. This review highlights good practices in different media formats that can be built upon to help realize this potential, as well as a few telling gaps.

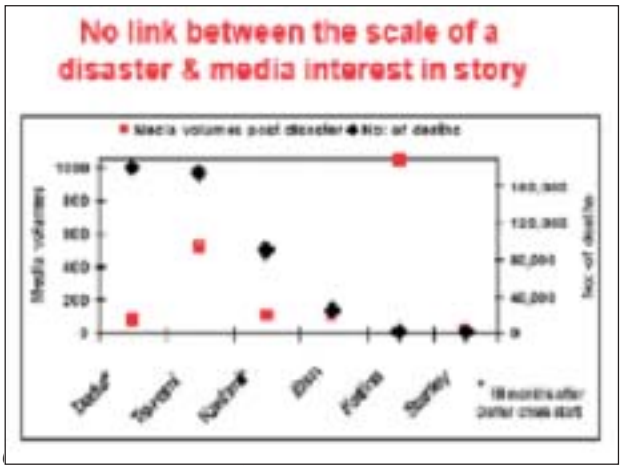
But first, a few words about the tricky role of the media in disasters. Although it has been difficult, so far, to interest mainstream media in disaster risk reduction, both development agencies and journalists have generally accepted that the media plays a critical role in covering the immediate aftermath of disasters (DFID 2000). Nevertheless, even this limited role is sometimes considered counterproductive. For example, referring to the flooding that affected the Indian state of Maharastra in 2005, the State's Secretary for Relief and Rehabilitation remarked:

> The media's role was even more appalling. For the media, the world began and ended with Mumbai. We had flooding in 10 districts at the same time. It was the largest disaster faced by the state. We evacuated more than half a million people in all the other districts. Yet for most of the media, this part of the world didn't even exist. That is precisely the reason the entire world talks about Mumbai floods, making no mention of flooding in the rest of Maharastra.[108]

Where not directly counterproductive, disaster coverage may still be disproportionate to the humanitarian scale of events. In a rigorous, quantitative study of Western print media coverage of humanitarian disasters during 150 days from 1 February 2003 to 15 December 2005, the media consulting firm CARMA made disturbing findings. Looking at 64 daily and weekly print news publications, CARMA found that:

"There appears to be no link between the scale of a disaster and media interest in the story [see figure 15]. Of all the disasters, [Hurricanes] Stanley and Katrina suffered the least deaths. Katrina also had one of the lower population displacement rates. But Katrina got far more attention in global media than any other humanitarian disaster studied. [The Kashmir earthquake] attracted similar media interest to [the earthquake in] Bam while suffering 3.5 times as many deaths (90,000). The Tsunami attracted nearly double the coverage of Darfur, but generated similar a death toll (circa 180,000) - if the timeframe is limited to the first eighteen months after the crisis emerged, the Darfur media interest falls to 73 articles for 180,000 deaths. Katrina generated 1,035 articles across the nine media markets analysed. The Asian Tsunami came second with 508 articles, Darfur third with 312 articles, Kashmir with 102 articles, Bam with 90 articles and Stanley last with 25 articles."

Figure 15



- **"There is a clear correlation between the perceived economic impact of a disaster on western markets and the quantity of media coverage."**
- **"Even for Bam and Kashmir, the combined totals of articles on the political and economic dimensions of the story outweigh those on the humanitarian response (32 per cent versus 24 per cent for Bam; 35 per cent versus 19 per cent for Kashmir)."**
- **"The Hurricane Stanley emergency stands out as the worst indictment of the selfish Western approach to humanitarian disasters.** Here, there is no obvious significant economic or political interest. Consequently, there is virtually no

coverage of any kind (25 in total) beyond the first few days, or coverage that focused on the humanitarian response."[109]

Results from another monitoring service, Tyndall,[110] support CARMA's finding that disaster coverage is not linked to scale. Tyndall found two disasters listed among 2005's top stories on the three largest US television networks: the Indian Ocean tsunami, for two weeks in January 2005; and the tsunami's anniversary, during the week of 26 December. Hurricane Wilma and the Pakistan earthquake were top stories for one week each in October; while Hurricane Katrina was among the top stories for 9 weeks between August and November.

No other disasters made it to "top story" in these television news channels – not Darfur, Congo, the African famine or Hurricane Stan. Similarly, during 2004, the Pakistan earthquake and hurricane Ivan both were top stories during one week, while coverage of the Summer Olympics dominated television headlines for three.

This is all the more troubling because awareness of the media's potential importance for disasters is not new. Fifteen years ago, the Tampere Declaration on Disaster Communications (20-22 May, 1991) pointed out "the critical role of the mass media … [and] their broader role in education and opinion-forming, particularly with regards to slow-onset disaster". Yet fifteen years later, slow-onset disasters besetting drought and locust victims in West Africa, as well as persons displaced by violent conflict in Sudan, fell deeply into the information shadow produced by the attention given to the Indian Ocean tsunami and Pakistan earthquake.

Even when they try to cover slow-onset disasters, news media may face obstacles not of their own making. In March 2006, for example, the BBC's permission to film in the drought-affected regions of Niger was withdrawn by the government. Around the same time, the Sudanese government denied entry to Darfur for Jan Eglund, the U.N. Assistant Secretary General for Humanitarian Affairs, eliminating an opportunity for the media to report more closely on events there.

5.3.2 Role of media: awareness, education or consciousness-raising?

Regarding the role of media, a distinction should be made between communication leading simply to risk "awareness", and that which increases risk "consciousness", a new understanding of the deeper causes of vulnerability to hazards. Most risk communication – whether promulgated directly by the state or diffused through the media – is quite superficial and pragmatic. It aims to teach behaviors that will save life in an extreme event.

Risk communication has potential beyond this functional activity. It could help the public become aware of the processes that block desirable changes in the root causes of disaster vulnerability – the laws, labor relations, land tenure, race relations, access to resources and many other institutional, economic and political elements that leave communities at risk. So far, however, one finds very little of this deeper kind of education taking place, except in some of the work of NGOs and community-based organizations.

With this conceptual background in mind, let us examine some effective ways in which disaster risk reduction practitioners are using media.

5.3.3 Broadcasting

The ISDR secretariat is collaborating with the Asia-Pacific Broadcasting Union, an association of 102 radio and television broadcasters in the Asia-Pacific region, to develop radio and television programming that will help people in that region deal with natural hazards.[111] In Latin America, the use of *telenovelas* (soap operas) for risk communication has been raised to a high art.[112] For example, *Nuestras Voces*, a communication NGO in Costa Rica, produced a series of soaps dealing with preparedness for hurricanes. The series included four story lines, each with five half-hour episodes, which were broadcast on 45 radio stations in the Americas.[113]

5.3.4 Print media

Newspapers and magazines vary considerably in the quality of their reporting on disasters. For example, *The Guardian* in London, *Le Monde* and *Marianne* in France, *La Jornada* in Mexico City, *Jeune Afrique* and

The New York Times, among others, have broken away from the sensationalistic reporting that is still all too common, and attempt to provide in-depth coverage of the root causes of disasters. This kind of coverage should, in theory, help to shift the public from awareness of risk to consciousness of causes.

Additionally, much excellent public education material exists in the form of comic books and other easily accessible forms. The Philippine Institute of Volcanology and Seismology, for instance, has produced comics in many Filipino languages for earthquake, volcanic eruption and tsunami. Vernacular language comics of this kind are increasingly common in many countries.

5.3.5 Electronic journalism

The work of Reuters *AlertNet* should be singled out as a good example of both corporate responsibility and effective communication on disasters (see figure 16).[114] The Reuters news agency supports *AlertNet* as an in-house non-profit. While its primary audience is a worldwide network of NGOs active in disaster, the images and stories it carries are used by many newspapers and other broadcast media. Another web site, *BBC Home*, is not as analytical as the best print media, but does provide important cross-links that should aid development of risk awareness in the small proportion of humanity that has access to it.[115]

In another promising initiative, *AlertNet* is establishing, with support from the UK Department for International Development, a support system for journalists to help them get editorial backing to write in-depth stories about disasters. This comes as a response to a study by the Columbia School of Journalism of the communication problems facing NGOs active in disaster (Ross 2004). The study found that it is difficult for journalists to cover stories with complex roots, especially when they lack background, when travel is expensive and possibly dangerous, and when it is hard to find people on the ground to interview.

In response, *AlertNet* is putting together a toolkit for journalists that will include:

- Profiles of crises, including timelines, carefully sourced and up-to-date statistical snapshots, guides to the best resources on the Web, and a simple data comparison tool that will allow journalists to compare statistics from the disaster-afflicted nation with information on their own country.
- 'Who's Out There' guides, which will list relief organizations that work in the field and are willing to help journalists. (The difficulty in contacting relief agencies is one of the top reasons journalists said they couldn't do more humanitarian reporting.)
- A register of journalists who are interested in getting early warning of brewing emergencies, new angles on old ones, advance notice of forthcoming emergency-related events, and a guide to what other journalists are doing to get crises into the news.
- A comprehensive media ranking service, which will assess how much coverage crises are receiving, how much space individual newspapers are giving them, and which relief agencies are getting the most press.
- Online training modules, to help journalists get up to speed with the nuances of humanitarian reporting.

Other, similar, aids for journalists exist, if perhaps in less high-tech forms. For example, an excellent publication for journalists in South Asia (with a much wider application) was published in 2002 by Duryog Nivaran: *Disaster Communication: A Resource Kit for Media* (Bhatti and Ariyabandu 2002).

5.3.6 Observances and campaigns

World Disaster Day is observed in many countries, and in some, such as Japan, there is an additional national day focused on disaster risk reduction.[116] However, much of the activity undertaken is during these observances is formalistic – whether at the diplomatic level, or in the carnival-like atmosphere in which Japanese children throw buckets of water at targets decorated with "Hello Kitty" icons. No evaluation exists of the actual impact of these observances on the consciousness and behavior of ordinary people.

One might contrast campaigns such as "Make Poverty History" with most disaster awareness campaigns up until now. The former tries to focus people's consciousness on the connections that

Figure 16

AlertNet

(Source: AlertNet)

underlie the reproduction of poverty.[117] Most disaster awareness campaigns, in contrast, have worked more narrowly to publicize specific disaster risks and mitigation activities. The latter emphases are important, but do not hold the same potential to address the root causes of risk.

An alternative approach comes from the Hyogo Framework itself. Some of its resolutions can be seen to urge communication for consciousness raising about root causes and mobilization of the public for transformative action, and not simply instrumental change in risk behavior. Consider, for example, its statement that: "Institutions dealing with urban development should provide information to the public on disaster reduction options prior to constructions, land purchase or land sale" (annex 2, point 'f'). If implemented, this would be a dramatic revelation for citizens in quite a few countries.

5.3.7 Media foundations and resources

The Communications Initiative (CI) is a web community made up of many dozens of foundations, international and United Nations organizations and NGOs.[118] CI is a valuable tool for accessing communications resources – from the operational to the strategic. It deals with poverty eradication, environment and health issues. Its listed focal points include human rights, sustainable development, environment, children, girls, democracy and governance. During the first six months of 2005, CI had almost one million visitors.

Unfortunately, however, searching the site revealed nothing on natural hazards or disasters. Turning to the section on the impact of communications on the Millennium Development Goals, for example, there was no mention of safe schools under Goal 2, the education MILLENNIUM DEVELOPMENT GOAL.[119]

Again and again one comes up against the peculiar gap. Is it that the unity and interdependence of disaster and disaster reduction has not gotten though widely enough to influence this network? Or is the old myth of disasters as fundamentally "acts of god" still so prevalent that disaster risk reduction isn't treated as a natural part of development? Or is the problem that people who use the media to educate about HIV-AIDS, landmines, micro-credit or soil erosion think that "disasters" is too technical an issue – basically one best left to engineers? Whatever the reason, and despite the efforts of Reuters *AlertNet*, the communication specialists at the ISDR and others, a critical mass of journalists and broadcasters has not yet rallied to the cause of disaster risk reduction.

Photo Credit: Dr PV Unnikrishnan

CHAPTER 6

Knowledge Management

Knowledge management concerns the entire process of creating knowledge (research), exchanging knowledge, and using knowledge (application and implementation). Good practice of knowledge management helps reduce the risk of disasters by increasing the level to which people are informed and motivated to participate in a culture of disaster prevention, mitigation and recovery.

6.1 Scientific knowledge and research

> "The foreign learned societies corresponded with the native learned societies; the native learned societies translated the pamphlets of the foreign learned societies into English; the foreign learned societies translated the pamphlets of the native learned societies into all sorts of languages; and thus commenced that celebrated scientific discussion so well known to all men, as the Pickwick controversy." – Charles Dickens, *Pickwick Papers*, 1836-37, Chapter 11.

6.1.1 New paradigms, bridging and new connections

Tackling the complex project of reducing disaster risk around the globe requires work across multiple disciplines. Such cross-cutting efforts raise challenges, including the question of how to effectively pursue relevant research. Individuals and organizations are finding their cross-cutting work on disaster risk reduction greatly aided by use of innovative ways of gathering, organizing, sharing and analyzing knowledge.

6.1.1.1 Inter-disciplinarity

Years ago, in evaluations of UNESCO's "Man and the Biosphere" programme, the distinction between "multi-disciplinarity" and "inter-disciplinarity" became a key concern. Despite their best efforts, the multi-disciplinary teams of scientists had not been able to develop the common inter-disciplinary language and frameworks necessary to make the leap from the former to the latter.

It is encouraging that the current generation of young scientists seems better able to engage in truly inter-disciplinary work. The need for such leadership is strong. As Allan Lavell of the Facultad Latinoamericana de Ciencias Sociales (FLACSO) Secretariat in Costa Rica explained it: "[What is needed is] promotion of alternative forms of post-graduate teaching that takes a holistic, inter-disciplinary point of view and is based on advanced notions of risk and disaster as facets of the problem of environmental management and sustainable human development. … This is a high priority because in the search for increasing numbers of experts who can work in this sector, few are able to approach problems in an integrated way that, above all, incorporates their social aspects."[120]

A good example of inter-disciplinarity is the research organized under the umbrella of the International Human Dimensions Program on Global Climate Change (IHDP). Trained and experienced to work in teams including social scientists, natural scientists and engineers, these new practitioners are the researchers of the future. They also can and should be the managers of disaster risk reduction programmes.

6.1.1.2 Implementation Science

Other venues similarly are seeking to create expertise in integrated management skills and a practical sense of how to implement what science makes possible. For instance, Professor Norio Okada of the Disaster Prevention Research Institute (DPRI), University of Kyoto and his international colleagues are involved in a series of annual meetings focused on integrated disaster risk management.[121] These meetings have lead to collaboration by a wide range of different specialists in an attempt to develop a "field campus", where young scientists get hands-on experience doing applied research. Similarly, the ILO training centre in Turin is helping the International Recovery Platform survey worldwide resources for training and capacity building for better and more effective recovery from disasters.

6.1.1.3 Learning lessons from failure

One often encounters studies of "good practice" or even "success" – even though these concepts are elusive when viewed over the long run in a world of increasing complexity. There are few systematic attempts to understand the lessons of disasters as management and development failures.

Recently, however, some institutions are leading an encouraging drive towards learning lessons even if it means documenting disappointments. In this spirit, the International Recovery Platform has asked Professor Ian Davis of Cranfield University in UK to edit a book due out in 2006 that will pull together comprehensive recovery knowledge. Another valuable institution is ALNAP (Learning, Accountability, Performance in Humanitarian Action – see also discussion in section 6.2). It commissions studies that seek to learn all lessons – the good, the bad and the ugly – in humanitarian actions that include those involving conflict, internally displaced persons and refugees, as well as post-disaster response and recovery. An example is its report, *South Asia Earthquake 2005: Learning from previous earthquake relief operations* (ALNAP and ProVention Consortium, 2005). A third example comes from the studies offered by the EU Joint Research Centre.[122]

6.1.1.4 *Bridging disaster risk reduction, climate change, public health and conflict management.*

Terms like "vulnerability", "hazard" and "risk" are common to the study of violent conflict, public health, climate change and natural hazards. Despite this, it has taken two decades for researchers in these fields to begin to meet together, to read one another's work, to debate and to grope towards common definitions of terms. The fact that venues now exist for such exchanges is a very positive development.

In this way, research will follow the path of development studies. The latter, through a focus on livelihoods, human rights and dignity, has evolved a more holistic conceptual framework. Development practice has also become more holistic as it works with tools, such as the Millennium Development Goals and Poverty Reduction Strategy Papers, that are by nature cross-cutting.

6.1.1.5 *NGOs as innovative knowledge-creators and managers*

The high-quality research work carried out by NGOs over the past few years is a very encouraging development. Perhaps because these platforms are not burdened by weighty academic traditions, inter-disciplinary research comes more easily to them. They are also more likely to blend quantitative, qualitative and participatory methods. The result has been a series of significant evaluation studies such as *A People's Agenda? Post-tsunami aid in Aceh* (Eye on Aceh 2006); ActionAid's 2006 report on human rights and tsunami recovery; and an evaluation of tsunami recovery after one year, organized by Tsunami Response Watch.[123]

6.1.2 Conventional sites of knowledge creation

Most universities in the world are doing research in some way relevant to disaster risk reduction. Disaster risk reduction problems include issues of climate change, biodiversity, public health and health care, as well as complex emergencies that combine natural hazards such as drought with violent conflict, and the nasty combination of natural hazards and technological failure (such as the oil and chemical spills resulting from Hurricane Katrina's impact on the US Gulf Coast in 2005). Thus, faculties of agriculture, engineering, medicine, arts and sciences potentially play a role in research related to disaster risk reduction.

An exhaustive review of centres of excellence in all these subject areas is impossible; however, the following suggests the rich resources in research capacity that exist. These examples all have a track record for producing work that is both of the highest quality and is actually widely used. The ISDR secretariat identified additional centres through an earlier, ambitious review, which can be found in their publication, *Living with Risk*.[124]

In the area of engineering, Kyoto University's Disaster Prevention Research Institute stands out. There are, however, many more centres of excellence, including Beijing Normal University, the Indian Institute of Technology Bombay and Stanford University.

Centres known for their contributions to earth science include Geo-Research Center in Potsdam; Columbia University's Earth Institute;[125] the Federal Institutes of Technology in Switzerland; The Flood Hazard Research Centre at Middlesex University, UK;[126] PHILVOCS in Philippines; OSSO in Colombia; Kandilli Observatory and Earthquake Research Institute; Bogazici University in Istanbul,

Turkey; and the Central American School of Geology at National University of Costa Rica.[127]

In the field of health, the Centre for the Study of the Epidemiology of Disaster at Louvain University in Belgium is very significant, as are UCLA's Center for Public Health and Disaster in Los Angeles, its counterpart at Tulane University in New Orleans, the Harvard School of Public Health, the London School of Hygiene and Tropical Medicine, and its elder sibling, the Liverpool School of Tropical Medicine.

The CGIAR system (Consultative Group on International Agricultural Research) is an extensive system of research facilities spread across the globe. Its research is fundamental to food security in the face of climate variability and change as well as other crop and livestock hazards.[128]

Important research integrating the natural and social sides of disaster vulnerability is done at a number of centres, including the Benfield Hazard Research Centre, University College London; the Disaster and Development Centre at Northumbria University; the Scandinavian Environmental Institute both in Stockholm and Oxford; the UN University Institute for Environment and Human Security in Bonn; the Postgraduate Programme in Natural Disasters at Karlsruhe University;[129] the French CNRS programme on Dynamics of Environment and Society in the Tropics;[130] RMIT in Melbourne; Cape Town and Witwatersrand Universities in South Africa; Autonomous University in Mexico City; and the Hazards Research Laboratory at University of South Carolina.[131]

More specialized on the socio-economic aspects of disaster are the Disaster Research Center at University of Delaware;[132] the Hazards Reduction and Recovery Center at Texas A&M University;[133] the vulnerability programme of Battelle Institute in Richland, Washington;[134] Social Contexts and Responses to Risk (SCARR) based at University of Kent at Canterbury;[135] the International Institute for Applied Systems Analysis's Risk and Vulnerability Program (Luxemburg, Austria);[136] the UNU Institute for Environment and Human Security (Bonn);[137] Stockholm Environmental Institute's programme on Risk and Vulnerability;[138] the Centre for Disaster Studies at James Cook University;[139] and *La Red*, a network of several dozen researchers in a number of Latin American countries.[140]

6.2 Knowledge networks

A vast amount of research was done during the International Decade for Natural Disaster Reduction (1990-1999) (IDNDR). Evaluations of the IDNDR found that a disappointingly small amount of the knowledge created was put into practice. Thus, one of the priorities of the Hyogo Framework is better exchange of and access to knowledge.

Specialized nodes and networks can help improve the exchange of and access to knowledge. These networks exist now for landslides, volcanoes, earthquake engineering, drought, flood, wild fires, climate change and potentially pandemic influenzas: the whole array of hazards that threaten human kind, livelihoods and the built environment.

In addition, some networks seek to analyse multiple types of hazards. ALNAP is a network devoted to learning, accountability and performance in humanitarian action. It evaluates and tries to draw lessons from a wide range of humanitarian action in situations as diverse as civil war and earthquake (see also section 6.1.1.3 above). The Insecurity Forum, another such network, bridges a wide range of hazards and humanitarian situations, exploring the link between insecurity and development.[141]

Other organizations slice the subject differently, focusing on good practices across multiple hazards and from an interdisciplinary centre. The Asian Disaster Reduction Center in Kobe, Japan is one such organization. The ISDR, though its Inter-Agency Task Force working groups, also provides access to many cross-cutting research results, and the ISDR web site also can serve as a problem-focused portal. Another good example is the International Recovery Platform, created in May 2005, which seeks to assemble and make available good practice across multiple dimensions of recovery – from socio-economic through infrastructural and engineering to environmental.

Regional networks also exist, such as La Red in Latin America, the African Urban Risk Analysis Network (AURAN), and the European Disaster and Social Crisis Research Network.[142] There are also useful repositories of published research and reports on a regional basis, such as the Southern African Humanitarian Information Management Network (SAHIMS)[143] and the Regional Disaster Information Center (CRID) for Latin America.[144] A networking function for North America is provided by the Natural Hazard Centre in Boulder, Colorado,[145] and for the UK and Europe by the Benfield Hazard Research Centre.[146]

Some networks have a fixed lifespan, and are set up to deal with a specific problem. Examples include the International Centre for Research on the El Nino Phenomenon (CIIFEN) and the now-completed EqTAP project, which dealt with earthquake and tsunami in Asia and the Pacific. The Millennium Ecosystem Assessment had a life of four years. The various research networks that are loosely assembled under the umbrella of the International Human Dimensions Program on Global Climate Change (IHDP), headquartered in Bonn, have a fixed life, and some have high relevance to disaster risk reduction – Global Environmental Change and Human Security, for example, as well as a new network called Global Environmental Change and Urbanization.

Some other knowledge networks are permanent and have an inter-governmental mandate. Two examples are the Inter-Governmental Panel on Climate Change, and a recent effort at bridging across the focus areas of a number of UN agencies, the Humanitarian Early Warning System.[147]

Photo Credit: Dr PV Unnikrishnan

CHAPTER 7

Action

This section discusses gaps and opportunities in current practices around knowledge, education and disaster risk reduction. To implement the priority actions recommended in this third pillar of the Hyogo Framework, what gaps should be filled? What opportunities leapt out during this review? Focal points where good practice is concentrated and synergies that could be put in place are also discussed in this section. Next come suggestions of some short-term targets so that one can tell if progress is being made in filling gaps and realizing synergies. The section concludes with a discussion of strategy for moving education into its logical place at the centre of risk reduction, for protecting schools and for making sure that knowledge is shared and utilized.

7.1 Gaps and opportunities

This review has revealed much good practice, but also gaps in current activities. Opportunities to fill these gaps arise through diffusion and sharing of good practice, its "up-scaling" within the same country, and the application of additional political will and resources.

7.1.1 Primary and secondary education

▼ ***GAP:*** Educational reforms that would add or blend in disaster-relevant teaching are difficult in systems with standardized examinations and a curriculum that "teaches to the exam". An informant in the US, for example, spoke to a high school biology teacher about an error in the text-book her daughter was using. The teacher replied that he knew it was wrong, but that was what would be on the exam. Other educational systems face the same challenge of exam-oriented pedagogical rigidity. However, the example of India discussed in section 3.2.1.6 shows that it can be overcome.

▼ ***GAP:*** Teaching about hazards is not enough to promote risk awareness or action on the part of children and youth. Academic earth and climate science is good, but should be taught as part of a comprehensive package with disaster prevention and preparedness. Where possible, some of the teaching should focus on locally-relevant hazards. In the German case in section 3.2.1.7, for instance, the geography course for classes 7-8 focused on the world and not Germany; therefore, the teachers simply could not discuss local matters.

▼ ***GAP:*** The converse is also true. Some teaching focuses very narrowly on behaviors appropriate in hazards such as earthquake and fire, with little or no discussion of the processes and context that characterize hazards. This is very superficial training and may not have a lasting effect.

▲▲ ***OPPORTUNITY:*** In primary and secondary school teaching, there are many programmes underway in environmental education. Some of these already include material on natural hazards, as in the Latin American cases discussed in section 3.2. Others do not yet appear to have made that link.[148] There is significant potential for mutual reinforcement of the educational objectives of environmental education and hazard risk awareness yet to be achieved.

▲▲ ***OPPORTUNITY:*** Teacher training and support is the key to a balanced and comprehensive approach to disaster risk reduction in primary and secondary education. Since much good teaching material already exists, the stage is set to make it widely available and get it used creatively in the classroom.

▲▲ ***OPPORTUNITY:*** Education International, the largest of the international confederations of teachers' unions, is active in disaster relief activities. Awareness of disaster risk is certainly high among its leadership. This creates an opportunity to engage their interest in taking the next step and placing education for disaster risk reduction high on their agenda. Synergies exist, as disaster-resilient schools are an issue of workplace safety for teachers and their unions.

▲▲ ***OPPORTUNITY:*** Where there are outreach programmes for street children and others beyond the reach of the school system – such

as the work of Save the Children in life skills and vocational training – safety and disaster awareness could be built in.[149]

7.1.2 Tertiary education

▼ ***GAP:*** Countries of the global South lose many university graduates and other highly-trained people when these individuals find work in industrialized-country universities, foundations and donor agencies, as well as with international NGOs. Some 30 per cent of African university graduates, including as many as 50,000 PhDs, are presently working outside Africa (Ford 2006). This is an enormous problem for capacity-building in general, and capacity for disaster risk reduction research, teaching and policy-making in particular.

Other professionals and highly-trained people from the region die prematurely of violence, HIV-AIDS, and automobile accidents, all of which are very prevalent in parts of sub-Saharan Africa and other areas in the global South. This tragic human waste also contributes to the drain on available capacity. One might summarize both problems with the phrase, "Brain Drain and Brains Down the Drain."

▼ ***GAP:*** A deeply-entrenched, artificial divide exists between what are seen as the "hard" approaches to disaster (e.g., engineering and natural science) and the "soft" approaches (e.g., political and behavioral science). This divide results in fragmented and isolated tertiary education, which makes it difficult for graduates both to function in interdisciplinary teams and to effectively approach disaster risk reduction in real-life situations.

▼ ***GAP:*** Undergraduate and graduate training lacks internships, practicums and other opportunities for real-world application of knowledge. Often graduates have rarely, if ever, seen application modeled for them by their mentors. This exacerbates problems of effective applications of knowledge.

▼ ***GAP:*** For graduate and post-graduate students, entrenched disciplinary boundaries still too often define what research questions are important, what methods are appropriate, and where it is proper to publish results. Such pressures steer too many away from interdisciplinary collaboration, experimental use of methods from other disciplines, and work on the kind of complex problems that attend risk and vulnerability in the real world.

▲▲ ***OPPORTUNITY:*** The available programmes that encourage cross-cultural exchange of graduate students and post-doctorate fellows, as well as interdisciplinary, applied team work, show the potential for producing a new kind of disaster-reduction professional. Such initiatives should be expanded and encouraged with financial support.

7.1.3 Training

▼ ***GAP:*** In the area of training, the first challenge is scale – training needs to happen on a much broader basis. Cascading models of training (training of trainers) is a possible answer, as shown by the examples of Turkey and Costa Rica in section 3.2.

▼ ***GAP:*** Another gap is the variable quality of existing training. Some organizations, such as the Sphere Project and ALNAP, are trying to move disaster relief and recovery training toward agreed standards. But currently, there are rarely consistent, professional criteria for the diverse training courses in prevention and preparedness, and for planning in general.

▼ ***GAP:*** E-learning generally has proven to be much more expensive than early pioneers anticipated. In recent years, various university consortia have recorded very large losses when one figures in the development costs of such distance learning. For example, NYU Online (New York University) lost $21.5 million, Columbia University's Fathom project lost $100 million, and E-University in the UK lost $108 million.[150] An ambitious attempt to mount an electronic masters degree in social vulnerability some years ago, headed by the group La Red in Latin America, could not find seed money, and the

ongoing costs would have been too high for the target group of students to afford. Costs have to come down and the quality of the teaching has to improve before electronic training can have the massive impact that is needed.

▲▲ ***OPPORTUNITY:*** Despite cost concerns, increased access to the internet still means that distance learning is more and more accessible. Internet access also allows trainers to pool their ideas and methods. Standards may emerge naturally in this way, providing that the global South has a strong voice in this process and the healthy trend toward South-South exchange accelerates.

▲▲ ***OPPORTUNITY:*** Until electronic training develops further, or perhaps as a complement to such growth, the model of cascading training of trainers seems a feasible and exciting way to increase expertise in disaster risk reduction.

7.1.4 Protecting educational infrastructure

▼ ***GAP:*** The excellent research and pilot projects focusing on school seismic risk have not been thoroughly evaluated, consolidated, or made available in a form that that can be rapidly adopted on a larger scale. As the numbers provided in section 3.4 suggest, a very large number of schools are at risk. The pre-conditions for scaled-up implementation of design, construction and maintenance methods, forms of supervision and monitoring need to be put in place.

▼ ***GAP:*** By comparison to seismic risk, much less attention has been given to protecting schools from high wind, tornado, flood, lightning strike, storm surge, landslide, volcanic eruption, lahar flow and wildfire.

▼ ***GAP:*** Proposed school locations are seldom screened by decision makers for risk. And developing a strategy to change this by training all location decision makers is a great challenge. Due to the complexity of the education sector itself, such decisions are made in many kinds of ways by different authorities and actors at different scales.

▼ ***GAP:*** The adoption of a building code, by itself, is often considered a solution to the school protection problem. However, without proper maintenance, inspection and enforcement, codes do not protect schools.

▲▲ ***OPPORTUNITY:*** There is an opportunity to build on growing public awareness of corruption and non-compliance to help fight shoddy construction in schools through better development and enforcement of building codes. An effective strategy will require increased knowledge of basic construction practices and standards on the part of the public. However, good civic education practices exist: civil society organizations in India and South Africa, for example, have produced useful citizens' guides to public works and contracting. There is no reason why similar guides to safe school construction could not be produced.

▲▲ ***OPPORTUNITY:*** Rather than seeing an obstacle when communities focus on hazards other than extreme geophysical or meteorological events, efforts can be made to piggy-back natural hazard risk onto other programmes and priorities. The IFRC's National Societies provide a good example of this approach. Their numerous vulnerability and capacity assessment exercises in places like Sierra Leone, Democratic Republic of Congo, Solomon Islands and Bangladesh touch on a wide range of hazards.

7.1.5 Community-based disaster management

▼ ***GAP:*** Unfortunately, "participation" can become both a mechanical process and a new tyranny. Practitioners need to understand that participation is neither magical nor an end in itself. Other kinds of knowledge beyond community inputs are important – such as census data, available maps and aerial photographs and climate data. A judicious balance must be struck in risk assessment and action planning.

▼ ***GAP:*** There is a regrettable tendency to romanticize some local knowledge – a reflective reaction to earlier dismissal of this as primitive or even superstitious. Practitioners must cultivate a balanced view of the diverse kinds of knowledge, understanding that each brings something complementary to complex problems like disasters. One might call the result "hybrid" knowledge.

▲▲ ***OPPORTUNITY:*** More use can be made of participatory geographical information systems as a tool in community-based work. There has been an explosion in use of this suite of technologies, all of which have an emphasis on user-friendliness and accessibility, as well as clear consciousness of ethical issues, local-capacity building, and the avoidance of dependency. Such mapping has been used already in disaster-related areas, although much of the experience has been developed in the area of natural resource management. The practitioners of participatory geographical information systems also tend to value highly local and indigenous technical knowledge.[151]

7.1.6 Media, communication and risk awareness

▼ ***GAP:*** A sophisticated network of media institutions and foundations called the Communications Initiative exists to tap into and to focus the power of the mass media on development questions. However, a review of this initiative reveals not a word about risk or disaster. Whatever the reason, and despite the efforts of Reuters AlterNet, the communication specialists at the ISDR and others, a critical mass of journalists and broadcasters has not yet rallied to the cause of disaster risk reduction.

▼ ***GAP:*** Many of the games and risk-awareness aids developed so far for children and youth use approaches that fail to explore the true nature of risk reduction.[152]

▲▲ ***OPPORTUNITY****:* The MediaBridge initiative by Reuters *AlertNet* shows that the time is ripe for a critical mass of journalists to create a new kind of reporting on disasters, one with more attention to root causes that follows the successes of prevention and the long-term realities of recovery.

▲▲ ***OPPORTUNITY****:* The insurance industry worldwide already engages in a risk communication. For some time, disaster policy experts have discussed using variable insurance rates as signals to encourage risk reduction – such as lower rates for home owners who do a seismic retrofit or flood-proof their house. In a similar way, those engaged in public risk awareness should partner with the insurance industry and study their public communication methods. For example, in Australia, ten insurance and re-insurance companies have partnered with a university to provide a web-based tool for the public to assess risk to flood, wildfire, coastal storm, earthquake and hail.[153] This kind of partnership could be more common.

7.1.7 Scientific knowledge and research

▼ ***GAP:*** The main gap regarding scientific knowledge and research involves how to put a vast amount of existing knowledge to work in the real world under messy, marginally-controlled conditions.

▲▲ ***OPPORTUNITY:*** The bridge-building between communities of researchers working on natural hazards, climate change, health, violent conflict and humanitarian assistance is encouraging and should be supported.

7.1.8 Knowledge networks

▼ ***GAP:*** There is too little connectivity and flow of experience and knowledge, both South-South and South-North. Africa still has fewer total internet connections than does the US borough of Manhattan, in New York City. Journals and books can be prohibitively expensive for African universities and other institutions despite efforts by charities like Book Aid.[154] All institutes and researchers in the North should take care to ensure that copies of publications get to colleagues in the

African countries suffering this book drought, as well as to other parts of the world where there is similar difficulty in accessing information.

▼ ***GAP:*** There is no inter-governmental body equivalent to the Inter-Governmental Panel on Climate Change (IPCC) for the question of minimum standards of social protection from natural hazards. Such a body could help communicate that standards should be required of each national government in the world, as a matter of obligation and the human rights of their citizens.

▲▲ ***OPPORTUNITY:*** If there were political will to acknowledge the human right to protection from avoidable harm in extreme natural events, an Inter-Governmental Panel on Disaster Reduction could be set up along the lines of the IPCC. Hundreds of specialists nominated by their governments would eventually agree on a minimum package of measures to protect the public against hazards such as earthquakes and floods. Monitoring progress toward meeting those standards would provide the basis for strong moral pressure.

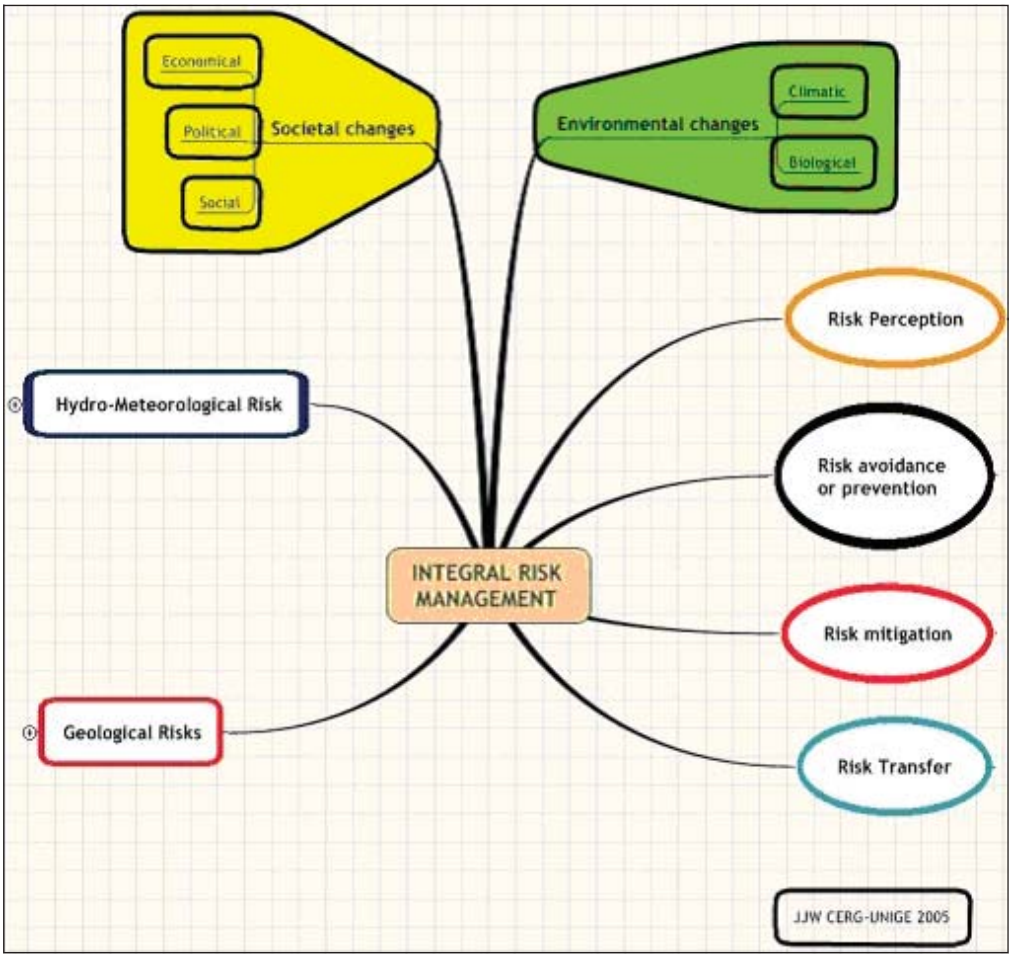
7.2 Focal points

In addition to the ISDR thematic cluster / platform on knowledge and education, some institutions reviewed herein have the potential to lead worldwide disaster risk reduction efforts in particular areas of activity. This report has documented many good practices, but many more have not been mentioned. These suggestions are only an initial step in networking and building a worldwide support system capable of encouraging necessary changes to reduce risks to schools and to increase the role of schools and education in reducing risks.

- *School hazards and safety pedagogy* – Bogazici University, Kandilli Observatory, Istanbul (Turkey), SEEDS (India), SESAM (France), COGSS, ActionAid, PLAN International, UNICEF, IFRC.
- *Tertiary education* – Disaster and Development Centre, Northumbria University; Centre d'Etude des Risques Géologiques – University of Geneva (See Figure 28); DiMP-Cape Town University, DPRI-Kyoto University, FLACSO-Costa Rica.
- *School Protection* – UNCRD (Kobe, Japan), Kyoto University, OECD, OAS, COGSS.
- *Training Courses* – UN-DMTP with Citizens Disaster Preparedness Centre (Manila); Asian Disaster Preparedness Center (Bangkok); Wisconsin Disaster Management Centre (USA); National University of Colombia, Manizales; ACDR, Northwest University (RSA).
- *Community-based risk assessment* – The ProVention Consortium, IFRC, ActionAid, ADPC-Bangkok.
- *Media and Risk Awareness* – Reuters *AlertNet*.
- *Museums and commemorative processes* – The Kobe Earthquake Museum and Recovery Institute (Japan) with its Asian network on sharing experiences.
- *Scientific Knowledge and Research* – UNESCO; UNU-EHS; BHRC-University College London; DPRI-Kyoto University; Beijing Normal University; International Human Dimensions of Global Change Program (IHDP); CENEPRED-UNAM, Mexico; PHILVOCS, Philippines.
- *Knowledge Networks* – There are a number of portals, including those provided by ZENEB in Germany (with emphasis on Africa),[155] by BHRC at University College London, La Red, DiMP at Cape Town University, and Duryog Nivaran, which serves South Asia from a base in Sri Lanka. There is an explosion of healthy international cooperation in knowledge generation and sharing, especially South-South exchanges that no one organization overviews, but ProVention Consortium, UNDP and ISDR secretariat remain key nodes that link many of them. Recent examples include an international mayors' meeting on early warning held in the context of the 3rd International Conference on Early Warning, and the African Urban Risk Analysis Network (AURAN).[156] [157]

Figure 17

View of integral risk management, Centre d'Etude des Risques Géologiques – University of Geneva



(Source: CERG)

7.3 Short-term targets

Over the two years from June 2006 to June 2008, all nations should attain the following short-term targets, or at least make significant progress toward these goals. By then, the world will be one third of the way into the ten-year planning horizon (2005-2015) assumed by the Hyogo Framework. To mark this milestone, the following are designed to be ambitious but attainable sign-posts of progress.

7.3.1 Primary and secondary education

- In centralized state education systems, curricula are developed that explicitly deal with locally-relevant natural hazards and disaster risk reduction, complementing any existing academic treatment of environmental studies or earth science.
- In decentralized state education systems, curricula are developed "from the bottom up" by students, teachers and community members through the use of participatory community vulnerability and capacity assessment tools now widely available.
- In both kinds of systems, networks and training resources are made available through partnerships with NGOs and the private sector so that: (a) teachers can be trained to use CRA methods; (b) schools and school jurisdictions can exchange and pool skills, experiences and resources; and (c) some element of the "bottom-up" generation of curriculum and pedagogy may also be incorporated into the "top-down" process in centralized systems.

7.3.2 Tertiary education

- Each nation's universities and professional associations in areas such as architecture, public health, engineering, planning, economics, social sciences, public administration, climate and earth sciences review their linkages with higher education and with local government and NGOs with a view to providing more hands-on practical internships and experiences for students.

7.3.3 School protection

- Each nation reviews the safety of its schools with regard to a full range of locally-relevant natural hazards.

- Each nation costs out the repair or retrofit of schools and the building of new schools over the life of the EFA efforts, and adds this to the sum of resources it tries to mobilize from diverse sources.

- Each nation establishes a legal and institutional framework for systematically reviewing, monitoring and implementing school protection that involves professionals, government officials, teachers, school administrators, parents, children and youth.

- Where feasible and appropriate, countries join in regional groups for exchange of experience and pooling of expertise and resources for the rapid protection of schools.

7.3.4 Training

- The problem of turn-over of public servants is solved in each nation by institutionalizing both standard and frequently-updated "hand-over" processes and frequent in-service refresher seminars and drills.

- "Training of trainers" successfully reaches the primary, most-local level of the governmental administrative system.

- Specialized high-level training seminars and workshops are available and utilized by all senior government officials.

7.3.5 Informal education

- There is an increase of over ten percentage points in the rate of adult literacy for both women and men in all nations where literacy rates for either group are currently below 90 per cent.

- Participatory, community-based vulnerability and capacity assessment methods are widely used by civil society, recognized by local government units and supported where possible.

- Messages about the prevalent natural hazards are integrated into ongoing public health and other kinds of street outreach to homeless and working children and youth (who are not in school).

7.3.6 Mass media

- The mass media in each nation develop a working group that links with professionals, academics and government in a two-way, regular exchange of information, resources and training opportunities so that all concerned are clearer about: (a) the nature of hazards, vulnerability and risk; and (b) the communications options available for building awareness among the public and for assisting with warnings when necessary.

7.3.7 Research

- Steps are taken at the national level (e.g., in the Ministry of Science and Technology, National Research Council, or their equivalent) to encourage application of research results, to develop a resource bank of knowledge to be applied, and to compile a roster of researchers available to partner with government and civil society in risk-related applied research.

7.3.8 Knowledge management

- In accordance with a holistic view of knowledge management that begins with problem formulation and proceeds through knowledge creation and application, nations should develop a "culture of safety". Nations should scrutinize the link between knowledge and action, and identify and fill any gaps (see annex 3).[158]

7.4 Strategy

The Hyogo Framework envisions and encourages an ambitious ten-year process of techno-social change and institutional development. It builds on prior international efforts such as the IDNDR and the World Summit on Sustainable Development. It also places disaster risk reduction squarely within the context of the achievement of the Millennium Development Goals.

What strategy could the ISDR thematic cluster/platform on knowledge and education use to pursue the piece of this ambitious work that concerns education and knowledge?

Recalling the state of the world described at the beginning in section 2.4, there are clearly some large, cross-cutting strategic issues that need to be moved into place. There will be discussed below. However, these "big" issues, such as promoting "political will", do not provide immediate traction. Therefore, in the sections that follow, a more limited notion of strategy will be presented, one that proposes a focused starting point that is likely to win support globally.

7.4.1 Cross-cutting and overarching strategy

The *Global Survey of Early Warning Systems* ("Global Survey"), launched at the 3rd International Conference on Early Warning, concluded with a series of cross-cutting issues and gaps.[159] These provide an excellent introduction to the strategy mapped out in this area by the Hyogo Framework.

The first major issue raised by the authors of the Global Survey concerned **political will**: "Inadequate political commitment to and responsibility"(ISDR/PPEW 2006). Clearly, if recent reviews have found that education progress is too slow, some of the blame must apportioned to political leadership with other priorities – both in donor countries and in the receiving nations. If that is the case, what chance exists for the world to reach any of the targets suggested for harnessing education to the task of risk reduction and for protecting schools? A crude calculation is possible showing that school protection would add perhaps $2 billion to the estimated $10 billion cost of implementing Education for All initiatives (see annex 4). If the $10 billion appears to be difficult to find, how could one hope that the additional cost of safe schools will be financed?

The next cross-cutting issue in the report to the Global Survey concerns **weak coordination**. The review has revealed poor coordination through the education sector and between research and practice.

The next two cross-cutting problems – **limited grassroots participation** and **problems with knowledge sharing** – seem to be less severe when one views the whole panorama of knowledge and education. In the present review, it has been possible to document a good deal of participatory activity and a large and increasing amount of sharing on good practices. Whether this is sustainable without donor and NGO stimulation and support, and whether it can spread and become institutionalized in government and civil society are, of course, the big questions.

An additional point made in the Global Survey is highly relevant to a strategy for **up-scaling good practices identified in this review:** "Many of the significant shortcomings in early warning systems are not of technical nature and require the engagement and guidance of other types of organisations, particularly concerned with socio-economic development and civil society action" (ISDR/PPEW 2006).

Despite the continuing importance of research, it is clear that there already exists an enormous amount of knowledge that is simply not being applied. This knowledge is not being communicated to students at various levels of education or to the general public, and it is not being applied by contractors, builders, planners and businesses. Ultimately, the strategy for getting full value from education, media, research and other sectors to protect schools must involve engaging fully with "socio-economic development and civil society action." Therein lie the difficulties, the obstacles to be overcome, and the opportunity.

7.4.2 Focused strategic starting points

From the very large, interconnected system described by the terms "education" and "knowledge", it is possible to focus strategically on three vital priorities.

(1) Teach About hazards and risk reduction

Promote teaching in primary and secondary schools of locally important hazards and what can be done to reduce risks.

(2) Make schools into centres for community disaster risk reduction

Using participatory vulnerability assessment tools, make schools an example of how the surrounding community can map its own hazards, assess its vulnerability and capacity in the face of risks from those hazards, and make action plans to address the risks.

(3) Protect schools

Take steps to assess the hazards to schools and to address them, ideally with a multi-hazard approach that would include, where appropriate, such hazards as earthquake, high wind, flash flooding, landslide, coastal storm surge and tsunami, etc.

New schools should be designed, sited, and constructed with hazard in mind. Old schools should be strengthened if necessary. All schools should be properly maintained.

It should not be difficult to develop an international consensus among the 168 countries that signed the Hyogo Framework on these priorities. The manner in which they are pursued in each nation will vary enormously across the globe. The "immediate targets" listed earlier provide broad guidance. There will be many highly local efforts, and these should be welcomed. The ISDR should recognize any nation acknowledging these three priorities and working towards them in their own way as active from the point of view of the ISDR secretariat's global schools campaign. The emerging "network of networks" in support of that campaign will draw on all the good practice identified in this review and the efforts of all the stakeholders.

For example, school protection requires media attention and also research as well as dissemination of existing research findings. Teaching about natural hazards and risk reduction requires teaching training and support as well as reinforcement of the messages by the media, by science museums, by youth clubs, NGOs and the business community. To make schools the centre for proactive disaster risk reduction by surrounding communities implies mobilizing parents, community leaders, local research institutions, local government and local businesses as supporters. Adult literacy and the encouragement of the mass media are also important in order to sustain commitment to the process.

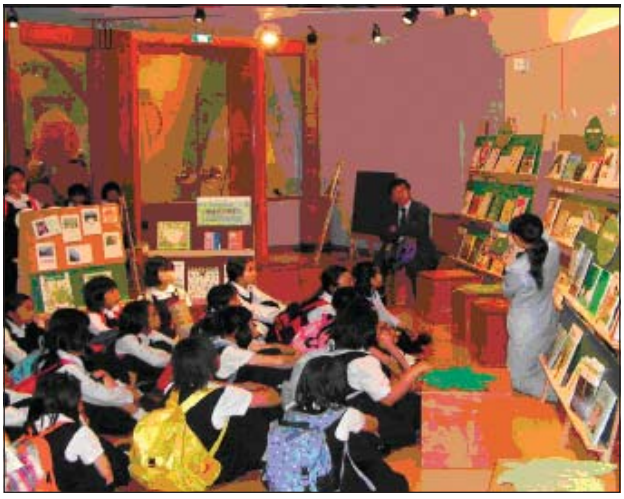
Thus, the whole of the education and knowledge portion of the Hyogo Framework is there in the background when one focuses attention on the three school-centred priorities mentioned above.

7.4.3 What Can Stakeholders Do?

7.4.3.1 What nations can do

1 Of nations reporting to the ISDR secretariat before the World Conference in Kobe, only 33 of 82 claimed to have national efforts to teach disaster-related subjects in primary and / or secondary school. ***All nations should commit to teacher training and curriculum development to support large scale teaching of disaster risk reduction.***

2 ***All nations can and must review the seismic safety of their schools***



(Source: Yoshiaki Kawata, Director DRI)

Low-cost, effective technology exists for strengthening schools and for building new, safe schools at little additional cost. ***Nations can and must develop comprehensive policies toward school safety taking all locally-relevant hazards into account. Nations can and must use as risk reduction opportunities decisions made about the location of schools, maintenance of buildings, design, construction methods and building materials.***

7.4.3.2 What the UN and international organizations can do

3 They can work with professionals, educators, communities, children and youth to ***develop a short list of "quick-win" actions that can rapidly increase the safety of schools and raise risk awareness among all those at or concerned with schools.*** "Quick wins" are actions in support of the Millennium Development Goals that are almost certain to bring big benefits quickly.

4 They can ***support coalitions and partnerships, facilitate the creation of knowledge networks (including South-South exchanges), build capacity, and guide others to existing resources for training***.

7.4.3.3 What donors can do

5 Donors can ***link these issues to the Millennium Development Goals, but not just the education Millennium Development Goal.***

6 Donors can ***calculate and add the cost of protecting schools*** to the approximately $10 billion required to achieve Education for All (See annex 4).

7 Donors can ***pick a dozen "fast-track" countries*** that have considerable numbers of schools in dangerous locations or otherwise at risk and show ***the potential for rapid scaling up of school protection.*** These countries should receive a large increase of assistance to push such programs to forward. The UK set a new standard by pledging an additional $15 billion over ten years for education (BBC 2006). Other donors should follow suit, and some of the money should be used for school protection.

8 In Highly-Indebted Poor Countries that have many schools at risk and *do not* show "fast track" potential, ***assistance is also required, but perhaps could be combined with "debt for safety" swapping in order to stretch donor resources*** (See annex 9).

7.4.3.4. What the private sector can do

9 Included in the private sector are the ***many private schools in the world***. Where private schools are parts of national or international networks and associations, their ***apex organizations can provide guidance and resources so that their students study safety and their schools are safe.*** In some cases, ***private schools can twin*** with public-sector schools, helping them achieve standards of structural safety greater than that mandated by national standards and enriching their curricula and teaching resources.[160]

10 Contractors and builders and their professional organizations can ***establish and enforce strict codes of conduct so that high standards are met in school construction***.

7.4.3.5 What educators and other professionals can do

11 Professionals are working hard to enrich education with knowledge important to sustainable human development, peace, justice and safety. Nevertheless, there are ways that their efforts can ***focus more clearly on natural hazards without detracting from the work they do in other important areas***.

7.4.3.6 What parents can do

12 Parents can ask ***questions about school safety at school board meetings***. They can lobby government officials for the resources required for school safety. Parents can also join with other community members to ***support their children's study of risk reduction*** and help to ***spread the use of participatory risk assessment*** in the community.

13 Parents who have lost children in school disasters can join together as an NGO to do whatever they can ***to prevent other parents from suffering similar losses***. The way grieving parents organize will take diverse, culturally appropriate forms around the world.

14 ***Parent Teacher Associations*** exist in various forms in many countries. These can become the forum for discussions of what their children and youth learn about safety and hazards and how schools can be protected.

7.4.3.7 What communities and schools can do

15 There is no need to wait for the necessary changes to cascade "from the top down." ***Spontaneous initiatives from "the bottom up"*** are vital as well. ***Schools can therefore start right now*** with the addition of some teaching about risk reduction and natural hazards. An hour a week spent in this way can reap enormous benefits in terms of lives saved and the risk awareness of the future generation.

Francesco Iovine Primary school in the Molise region of Italy, October 31, 2002

(Source: Families for School Seismic Safety)

7.4.3.8 What children and youth can do

16 Children and youth can take advantage of opportunities for ***first aid and other kinds of training*** provided by organizations such as the Red Cross and Red Crescent. It is also possible for older children and youth to teach younger children.

17 More ambitiously, ***youth can and should demand greater social protection*** where it is missing.

18 Outside school, children and youth can ***pass on to their parents what they are learning*** about hazards and risk reduction. As the title of this review enjoins us all, we should "let our children teach us!"

Dedication:

Nasreen Huq, ActionAid country director for Bangladesh, who was tragically involved in a fatal car accident on Monday 24 April 2006.[161]

CHAPTER 8

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1

Annexure

Terms of Reference for an Education and Disaster Reduction Consultant

Background

In January 2005, the World Conference on Disaster Reduction (WCDR, 18-22 January 2005, Kobe, Hyogo, Japan) took place and represents a landmark in worldwide understanding and commitment to implement a disaster risk reduction agenda. This commitment was captured in the Hyogo Declaration and the Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters, adopted at the WCDR.

The Hyogo Framework constitutes the essential guide for implementation of the International Strategy for Disaster Reduction in the coming years and it constitutes an unprecedented conceptual shift that takes account of the complexity of action in disaster risk reduction and the large variety of actors whose inputs are required in the pursuit of this objective. It provides the basic concepts and prescribes an expected outcome; details three strategic goals for disaster risk reduction and a set of five priority areas for action; and assigns tasks to stakeholders at different operational levels to reach the expected outcome.

Knowledge and Education represent one of the Hyogo Framework priorities for action and during the IATF/12 a number of clusters were created, including on knowledge and education. The work of the cluster would be organized through a phased approach, focusing on identifying the priority themes, sectors and initiatives and critical gaps in relevant areas of the Hyogo Framework.

Tasks

In the framework of the implementation of the Hyogo Framework and within the context of the cluster on Knowledge and Education, the consultant will produce a desk study on knowledge and education and disaster risk reduction. The study will aim to:

- Identify good practice that can be replicated;
- Serve as a baseline for future impact assessment, especially at country level;
- Identify how good and innovative practice can be scaled up (what partnerships will be effective and where synergy between different stakeholders will be most effective).

During the performance of the specified tasks the following issues will be examined: bottom-up approaches; delivery/benefice and appropriateness of initiatives to the people living in poverty; respective roles, responsibilities and contributions of local and national governments; roles of civil society, especially of the teachers unions.

To reach the above the consultant will perform the following tasks:

- Review studies, initiatives and lessons learnt relative to knowledge and education within the context of disaster risk reduction available within the ISDR (matrix of commitment and initiatives, studies undertaken by the ISDR secretariat and relevant agencies, review of material available within the ISDR web site relative to the knowledge and education, review the national information reports submitted in preparation for the WCDR relative to knowledge and education, and the overall report prepared by the ISDR secretariat).
- Identify, survey and critically review literature that promotes education for disaster risk reduction.
- Identify, survey and critically review work carried out by local, national and international agencies in promoting education on disaster risk reduction.
- Capture and report on experiences made in this field and on good practices in place regarding safe educational establishments.
- Develop targets for good practices in knowledge and education relative to disaster risk reduction.
- Identify stakeholders interested in this field (building on the matrix of commitment and initiatives) and ascertain whether any intergovernmental organizations have taken any initiative or showed political commitment.
- Identify where are the centers of innovation in this field.
- Identify synergies between different stakeholders that are effective in creating change down to community level, or are effective at drawing and disseminating lessons from community level out to national and international level. The media is a key player in this process and should not be overlooked.
- Identify gaps in both previous studies and on-going work that should be addressed.
- Suggest a strategy for filling the gaps in previous studies and on-going work.

2

Annexure

Excerpt from the Hyogo Framework:
Priorities for Action

3. Use knowledge, innovation and education to build a culture of safety and resilience at all levels.

18. Disasters can be substantially reduced if people are well informed and motivated towards a culture of disaster prevention and resilience, which in turn requires the collection, compilation and dissemination of relevant knowledge and information on hazards, vulnerabilities and capacities.

Key activities:

(i) Information management and exchange

(a) Provide easily understandable information on disaster risks and protection options, especially to citizens in high-risk areas, to encourage and enable people to take action to reduce risks and build resilience. The information should incorporate relevant traditional and indigenous knowledge and culture heritage and be tailored to different target audiences, taking into account cultural and social factors.

(b) Strengthen networks among disaster experts, managers and planners across sectors and between regions, and create or strengthen procedures for using available expertise when agencies and other important actors develop local risk reduction plans.

(c) Promote and improve dialogue and cooperation among scientific communities and practitioners working on disaster risk reduction, and encourage partnerships among stakeholders, including those working on the socioeconomic dimensions of disaster risk reduction.

(d) Promote the use, application and affordability of recent information, communication and space-based technologies and related services, as well as earth observations, to support disaster risk reduction, particularly for training and for the sharing and dissemination of information among different categories of users.

(e) In the medium term, develop local, national, regional and international user friendly directories, inventories and national information-sharing systems and services for the exchange of information on good practices, cost-effective and easy-to-use disaster risk reduction technologies, and lessons learned on policies, plans and measures for disaster risk reduction.

(f) Institutions dealing with urban development should provide information to the public on disaster reduction options prior to constructions, land purchase or land sale.

(g) Update and widely disseminate international standard terminology related to disaster risk reduction, at least in all official United Nations languages, for use in programme and institutional development, operations, research, training curricula and public information programmes.

(ii) Education and training

(h) Promote the inclusion of disaster risk reduction knowledge in relevant sections of school curricula at all levels and the use of other formal and informal channels to reach youth and children with information; promote the integration of disaster risk reduction as an intrinsic element of the United Nations Decade of Education for Sustainable Development (2005–2015).

(i) Promote the implementation of local risk assessment and disaster preparedness programmes in schools and institutions of higher education.

(j) Promote the implementation of programmes and activities in schools for learning how to minimize the effects of hazards.

(k) Develop training and learning programmes in disaster risk reduction targeted at specific sectors (development planners, emergency managers, local government officials, etc.).

(l) Promote community-based training initiatives, considering the role of volunteers, as appropriate, to enhance local capacities to mitigate and cope with disasters.

(m) Ensure equal access to appropriate training and educational opportunities for women and vulnerable constituencies; promote gender and cultural sensitivity training as integral components of education and training for disaster risk reduction.

(iii) Research

(n) Develop improved methods for predictive multi-risk assessments and socioeconomic cost–benefit analysis of risk reduction actions at all levels; incorporate these methods into decision-making processes at regional, national and local levels.

(o) Strengthen the technical and scientific capacity to develop and apply methodologies, studies and models to assess vulnerabilities to and the impact of geological, weather, water and climate-related hazards, including the improvement of regional monitoring capacities and assessments.

(iv) Public awareness

(p) Promote the engagement of the media in order to stimulate a culture of disaster resilience and strong community involvement in sustained public education campaigns and public consultations at all levels of society.

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3

Annexure

Overview of the Hyogo Framework (ISDR secretariat 2005)

B. Essential elements of the Hyogo Framework

7. The Hyogo Framework provides a clear and authoritative framework for pursuing disaster risk reduction and builds on other relevant multilateral frameworks and declarations (see A/CONF.206/6, chap. I, resolution 2). The Framework constitutes an agreement that was developed through exhaustive negotiations between States, experts and collaborating organizations. It reflects their intention to take a holistic approach in identifying and putting into action complex multidisciplinary disaster risk reduction measures over the next 10 years. Most important, it gives new impetus to the strategies outlined in the Yokohama Strategy by setting out the collective and individual roles and responsibilities of groups of stakeholders in its implementation and follow-up.

8. Starting with the premise that the expected outcome should be a substantial reduction of disaster losses, in lives and in the social, economic and environmental assets of communities and countries, to be achieved over the next 10 years, the Hyogo Framework calls for the pursuit of the following three strategic goals:

   (a) More effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction;

   (b) Development and strengthening of institutions, mechanisms and capacities at all levels, in particular the community level, with a view to contributing systematically to building resilience to hazards;

   (c) Systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes for the post-disaster reconstruction of affected communities.

9. In addition, the Conference adopted the following five priorities for future action, with a set of key activities:

   (a) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation;

   (b) Identify, assess and monitor disaster risks and enhance early warning;

   (c) Use knowledge, innovation and education to build a culture of safety and resilience at all levels;

   (d) Reduce the underlying risk factors;

   (e) Strengthen disaster preparedness for effective response at all levels.

10. The Hyogo Framework emphasizes that the primary responsibility for implementation and follow-up lies with States, involving national public administration structures, the scientific community and civil society. States are called upon to build a strong sense of ownership in the area of disaster risk reduction within their populations and support of local Government capacities. Most important, States should also conceive mechanisms that allow bottom-up disaster risk reduction initiatives, originating at the community level and contributing to the shaping of disaster risk reduction policy and programmes at the national level.

11. The roles of regional institutions and organizations include transnational responsibilities, since disasters and risk are not bound by national borders. In that context, the Hyogo Framework specifically notes the need for developing regional initiatives and the risk reduction capacities of regional mechanisms.

12. International organizations, including those of the United Nations system and international financial institutions, are called upon to integrate the goals of the Hyogo Framework into their own strategies, making use of existing coordination mechanisms such as the United Nations Development Group and the Inter-Agency Standing Committee, as well as the resident coordinator system and United Nations country teams. They should assist disaster-prone developing countries in their efforts to increase institutional and technical capacities to address the priorities set out in the Hyogo Framework.

13. The Strategy system, through the Task Force, platforms and the secretariat, in collaboration with agencies and experts, is to provide support to this process, specifically to assist in facilitating and coordinating action among stakeholders. The Strategy system also has a decisive role in furthering advocacy and resource mobilization and information-sharing and reporting.

4

Annexure

Major Gaps Identified by Global Survey of Early Warning Systems

Major Gaps (in technical monitoring and forecasting services)

1. While significant progress has been made with respect to the technical aspects of observing, monitoring, and forecasting of natural hazards, many major overall gaps exist, particularly in the developing and least developed countries.

2. Availability and sustainability of adequate observing systems for monitoring of hydro-meteorological hazards,

3. Need for adequate level of technical capabilities (resources, expertise and operational warning capacities) in the operational technical agencies responsible for monitoring and forecasting of severe events, such as the NMHSs,

4. Internationally negotiated data-exchange policies and procedures to share essential data in a timely fashion (real-time for many hazards) among countries for the analysis and development of modelling and operational forecasting capabilities in support of national warning systems, such as for tsunami and earthquake,

5. Multi-disciplinary collaboration for enhancing forecasting tools,

6. Recognition and integration of existing hazard warnings into the disaster risk reduction decision process in a more effective and proactive fashion.

7. Overall, systems exist to provide forecasts and warning against impending disasters induced by hydrometeorological hazards, but the scope of hazard coverage at the country level is highly variable and reflects countries' economic development level. The global geographical distribution of early warning systems is uneven: developed countries and disaster-exposed areas of the developing world operate more warning mechanisms than African countries and than other developing countries with historically less disaster exposure.

8. Food security and climate early warning systems, including drought and desertification monitoring, and sub-regional flood warning are most advanced in Africa. In Asia, improvements have been significant in windstorm, flood and epidemic disease warning. Systems for early warning of floods and various windstorms are the most advanced of all warning systems throughout the American continent. Systems also exist for tsunami and forest fires and some volcano-related hazards (eruptions and lahars) but those for landslide, earthquakes, climate change and El Nino are least developed.

9. Most countries have in place warning systems for the dominant hazards that affect them, such as for drought and famine warning in African countries, for weather, earthquake, hydrological, pest and wildland fire in China, for storm surges in Bangladesh, and, for earthquake, cyclone and flood in Philippines. Other countries only operate warning systems of disaster warning for portions of their national territory. Good examples of effective systems of warning include those for cyclones in Mauritius and storm surges in Bangladesh, and, the new approach to weather warning in France.

10. Globally, the fastest onset hazard (earthquake) and the slowest (drought) are the most difficult to predict and pose significant challenges to development of early warning systems worldwide. Compared to the two other types of hazards, systems for warning against biological hazards are relatively fewer. Overall, most early warning systems focus on hazard warning, except emerging systems for environmental hazards, such as drought, that integrate vulnerability assessment.

Major Gaps and Challenges (in the Dissemination of Warnings and Information)

11. Warning messages do not reach all at risk. In developing countries this is a result of underdeveloped dissemination infrastructure and systems, and in developed countries of incomplete coverage of systems. This resource

constraint also contributes to the lack of necessary redundancy in services for information in many countries. Other gaps include:

Inadequate institutional arrangements

12. Warning services are limited in many developing countries because there are no formal institutional structures with requisite political authority to issue warnings. This situation is partly due to limited understanding of the true nature of early warning and reluctance of governments to grant the political authority that goes with warning responsibility. Warning communication often fails as a result of weak inter-personal and inter-agency relationships, including between early warning services and response units and other sectors. There is often a disconnect between key technical agencies and the authorities for effective exchange of technical information and hazard warnings. This reflects a lack of clarity regarding the role played by each agency in the chain of warning dissemination. Agencies may thus fail to issue warnings when necessary thus losing public trust and leading to lack of response by the public.

Political failure to take action

13. There are also breaks in the warning-communication chain due to political considerations. Government authorities may choose not to pass on warning information to the public if they feel doing so poses unacceptable political risks. These include: (a) inappropriate timing of the crisis, (b) lack of resources to assist public preventive actions, (d) unwillingness to cede political authority to warning officials, (e) lack of political strategic importance of the region at risk, (f) inadequate public capacity, (g) fear of litigation in case of economic losses.

Lack of clarity and completeness in warnings issued

14. Often warnings are incomplete because they do not meet essential requirements for effectiveness including: brevity, clear and uncluttered presentation, use of non-technical language, identification of areas affected, and, explanation of potential losses, the chance of the loss occurring within a certain timeframe and instructions to reduce losses through response actions specified in each message. This is partly because of lack of common standards for developing warning messages within and across countries. It may also be unclear to the public whether the information is a forecast or a warning, as the inherent uncertainty of warnings may not have been appropriately conveyed. Lack of clarity of warning messages is often due to unclear responsibilities about who provides forecasts and who provides warnings. Often the problem is simply insufficient resource and capacity support to mid-level management to provide adequate warnings.

Lack of adequate systems and technology

15. Although at the international level the GTS is already fully operational in many countries, some serious shortcomings still exist at the regional and national levels. WMO promotes projects and international cooperation for strengthening the GTS where needed, in particular for the NMHSs of developing and least developed countries (LDCs) for the exchange and distribution of early warning system alerts and related information in regions at risk from natural hazards. However, in these countries there is a need for updating equipment and linkages to the GTS Regional Telecommunication Hubs (RTHs). Furthermore, some of the RTHs connections and capacities need to be enhanced to ensure realtime exchange of some information, particularly for hazards with short leadtimes, such as tsunamis.

Lack of standardized nomenclature, protocols and standards nationally and internationally

16. Another source of confusion in warning dissemination is that different issuers of alerts within a single early warning system may use varying protocols for issuing alerts, resulting in varying standards in language, messages and other aspects of warnings. People may not understand the warning, as warning terminology tends to be confusing. Alert

stages, which are often expressed in colors or numbers (such as green, yellow, orange, red or I, II, III, IV), vary by country, leading to problems in translating alert stages across territorial and linguistic boundaries, creating confusion on the level of danger. There is a need for a single, consistent, easily understandable, global nomenclature to be used as a standard by all issuing authorities across all hazards and risk situations. Furthermore, there is need for development of standards, protocols and procedures for exchange of data, bulletins, alerts, etc. for some of the hazards, which traditionally have not been exchanged internationally among the countries (e.g., tsunami)

Failure to garner the public's interests and concerns

17. Perhaps the most important reason for people failing to heed warnings is that the warnings do not address their values, interests and needs. The messages are not sufficiently targeted to the users and do not reflect an understanding of the decisions stakeholders need to make to respond to the warning. The warning may be perceived as not relevant to the individual or impossible to heed given reluctance to abandon assets upon which livelihoods depend, such as livestock, or of importance to the individual, such as pets. Furthermore, most warnings are not targeted to those at risk but are delivered to the whole population through the media. This practice undermines public compliance with warnings because those not affected by the first warning tend to ignore subsequent warnings.

18. Lack of public interest in warnings also occurs because early warning systems only provide information on impending crises. They do not report on positive developments in the system, such as scientific advances that will enhance the provision and effectiveness of warning services, advances in the development of early warning, and, positive outcomes of response to previous warnings to engender public confidence and trust in future warnings.

Inadequate understanding of vulnerability by warning issuers

19. Early warning systems can also underestimate the risks communities face because of inadequate risk assessment for particular target groups. Due to the historical emphasis on the technological aspects of early warning, there has been inadequate attention to the use of traditional and local knowledge, experience and forecasting practices in considering risk scenarios.

Proliferation of communication technologies without identification of single authoritative voice

20. The use of the new information and communication technologies, particularly the internet, in disseminating warnings, while useful in expanding the coverage and reducing time lags in warning dissemination, is creating problems of untargeted messages inducing wrong responses due to misinterpretation. This problem is also related to the type of hazard under consideration. For example, while the internet has been a useful communication tool for hurricane warning dissemination in Latin America, the Caribbean and North America, its use in disseminating warnings on El Nino has at least once prompted wrong responses among agricultural operators causing unnecessary losses.

Ineffective engagement of the media and the private sector

21. Warning dissemination is often inadequate because the engagement of warning authorities with the media is ineffective. The media is interested in reporting news and not necessarily in disseminating useful warnings. Thus, conflicts can arise when the media publish information about potential disasters that eventually contradict warning messages. Often warning system managers do not know when and how to provide disaster information to the media, and warning messages are often not translated into languages all stakeholders will understand.

22. Most warning dissemination systems focus on utilizing public sector agencies in communicating warnings. But, given the need to pursue each individual with warning

information, there is the need to involve the private sector. For example, participation of networks of tourism institutions in communicating warnings would expand the scope of dissemination.

Ineffective integration of lessons learned from previous warnings

23. Finally, warning dissemination can be ineffective because of the lack of information feedback about disaster education, preparedness and response. This is because warning dissemination is often a static process and does not continually evolve based on feedback and learning from previous experience.

Major gaps (for the risk knowledge component)

24. Risk assessment has often been predominantly concerned with the physical aspects of hazards. Consequently, there has been considerable progress in assessing the physical vulnerability of the built environment but less on the human aspects of social, economic and environmental vulnerability. Given the growing importance of vulnerability factors in conditioning disaster risks, early warning systems are starting to integrate vulnerability analysis and monitoring in hazard early warning. For example, the conceptual framework of famine and food security early warning systems has shifted to an emphasis on vulnerability analysis, mainly livelihood sustainability. Also, some systems are integrating warning information on drought, flood, desertification, famine and food security.

25. A holistic approach is required to assess risks to different target groups and generate warnings. Many societies in developing countries depend on their traditional knowledge systems and practices derived from the institutional memory of their communities to protect their livelihoods and assure resilience to hazardous natural events and processes.

26. Although significant progress has been made in some countries and long historical records do exist in some cases, in others data are scarce and there are significant variations in data quality. Furthermore, there remain inconsistencies in the historical records across national boundaries and over time.

27. At the national level, many challenges remain, including:

- the need for observing instrumentation and networks
- data collection and management systems
- technical capacity and resources for maintaining observational networks
- data rescue to translate massive amounts of paper-based records into digital form
- on-going quality control to ensure consistency and completeness of the records
- data archiving capacity to archive large databases, and
- ensuring that the data is available to all users.

28. Increasingly at the political level countries are recognizing the importance of investing in hydro-meteorological and other hazards data as a national resource, and are consequently directing more resources to their national meteorological services. Development of these capacities should be considered as an investment towards enhanced risk management and socioeconomic development in disaster-prone countries.

29. There also remains a major challenge to incorporate risk information in hazard warning messages produced by technical agencies to ensure that decision makers and the public can understand the implication and risks associated with an expected disaster. This would require close collaboration between technical agencies responsible for monitoring and hazard-warning development and agencies involved in risk assessment and disaster preparedness and response.

30. Gaps in disaster risk information systems include inadequate recognition of the importance of high-quality socio-economic and sectoral data (such as population distribution, infrastructure and building information). It is human nature to dislike being considered vulnerable and monitored, which makes it difficult to collect accurate data, particularly for variables such as health. Also, the lack of internationally agreed and locally-contexed early warning indicators makes it difficult to assess progress and impacts of early warning systems.

31. At the societal level, the danger of loss of societal memory about hazards, particularly infrequent but high impact hazards, for example due to decimation of whole generations by HIV/AIDS in some countries, is real and imminent. Such loss of community heritage of risk knowledge will compound problems of lack of understanding of high-intensity low potential hazards and negatively affect the ability to react to hazard risks and warnings.

Major gaps and challenges (in preparedness to respond to warnings)

32. The failure to adequately respond to warnings often stems from lack of planning and coordination at the national and local levels. Agencies may not understand their roles and fail to communicate and coordinate effectively. Government may fail to adequately plan for adequate evacuation and emergency shelter for all of its population. National preparedness plans may not reach the entire population, all of which needs to be aware of its vulnerabilities, trained and well-rehearsed in heeding warnings and provided with the means to take action. Some major gaps and needs include:

Lack of appropriate multi-agency collaboration and clarity of roles and responsibilities at national to local levels

33. Often response plans do not work due to uncoordinated reaction among preparedness actors. Where clear lines of responsibility and authority do not exist within the warning and response chain, their effective implementation and coordination suffer.

Lack of public awareness and education for early warning response

34. In many countries, response plans exist but are not known to the public due to weak public information and dissemination capacities in many countries. Public education and awareness of warnings is weakened by limited integration of disaster education in school curriculum. In general, the majority of countries in the world, including in some developed areas, do not have educational programmes of study on disaster risk at basic school level. Even in countries where such programmes exist, disaster risk reduction education is still not integrated in private school education.

Failure to conduct simulation exercises and evacuation drills

35. Few countries regularly practice their preparedness plans, limiting effectiveness. This is one of the priority challenges to enhancing warning effectiveness. For repeated hazard events, frequent activation of response plans for rehearsals poses public resources allocation challenges. For low-frequency events, the challenge is how to maintain the interest of both the public and authorities in preparing for rare occurrences. The key is to keep the risk of disaster on the public radar through regular rehearsals of response plans.

Limited understanding of vulnerabilities and of the public's concerns

36. Effective community response to warnings is limited by inadequate understanding of risks. Often, communities are unable to adequately relate their vulnerabilities to their response needs, as they do not adequately understand their vulnerability to hazards and sometimes do not know who in the community is vulnerable. Likewise response planners often do not have an understanding of what triggers people to act on warnings and on the community's behavioural patterns. Often there is not a clear process for integrating risk information in emergency preparedness and

response planning. Consequently, preparedness plans do not sufficiently take into account peoples' subjective risk perception and the acceptable levels of risk for individuals and communities. Because the public at risk holds different perceptions and adopts different coping strategies depending on many considerations, where the cost of warning-induced actions outweigh subjective perception of safety levels, it is likely that warning messages will be ineffective in inducing self-protection by those at risk.

Need for a participatory approach in developing preparedness strategies

37. Even where community understanding of risk is widespread, warnings often fail to induce the desired response because warnings are not in the right language or format for the target audience. This is commonly due to inadequate participation of all role-players, particularly the media and the public, in planning dissemination strategies and interventions.

Need to include longer-term risk-reduction strategies in preparedness activities

38. Efforts to mitigate disaster losses through effective response to early warnings are sometimes not effective because they focus only on inducing reaction to their warnings and not adequately on inducing generally proactive and positive pre-disaster response behavior. People take precaution against imminent danger not only by reacting to official warnings but also by responding to other perceptions, including self-instruction and peer advice. However, most response activities undertaken in compliance with official warnings do not induce permanent risk-safety behavior. For example, people living in hazard-prone areas often return after evacuations.

Lack of enforcement of warning compliance

39. Responding to a warning involves perceiving, understanding, believing, verifying, personalizing the message, deciding on a course of action, and acting on that decision. There is increasing and seemingly inordinate reliance on people's ability to act to save themselves and not enough enforcement of compliance regulations associated with warnings in some developed societies.

40. Responding effectively to warnings requires adoption of the means most appropriate to people at risk. In several societies, traditional mechanisms still dominate their response strategies. However, these local coping mechanisms are often ignored and not sufficiently integrated in formal response plans.

Photo Credit: Dr PV Unnikrishnan

5

Annexure

A rough approximation of the cost of safe schools

1. **Assume a school age population of roughly 1 billion.** UNESCO's Institute of Statistics gives a partial total of nearly 900 million for 2002 and there are at least 100 million – many of them girls – who don't go to school and are to be the beneficiaries of Education for All.

2. **Assume an average school size of 300 students.** Obviously some are much larger, some quite a bit smaller.

3. That gives a total of **3 million schools in the world** (give or take; no one really knows – another gap that needs filling).

4. **Assume that 2/3 of these schools need protection** from one natural hazard or another.

5. That gives a total of **2 million schools needing protection** in the form of retrofits, re-location, or (in the case of new schools or school expansions required by Education for All) use of construction that may be as much as 5% more expensive.

6. **At an average cost of $1,000 per school protected** (some much less with a lot of local labor, local material, and good, low cost design; some much more expensive)…

7. **The total cost of school protection would be $2 billion.**

6

Annexure

EXPLOITATION OF CHILDREN – A Worldwide Outrage

STREET CHILDREN – A Worldwide Problem

(Excerpted from Casa Alianza paper)[162]

The phenomenon of street children is global, alarming and escalating. No country and virtually no city anywhere in the world today is without the presence of street children. It is a problem of both developed and developing countries, but is more prevalent in the poor nations of Latin America, Asia and Africa. Poverty, family disintegration due to health or death, neglect, abuse or abandonment, and social unrest are all common triggers for a child's life on the streets.

"Street children" is a term often used to describe both *market children* (who work in the streets and markets of cities selling or begging, and live with their families) and *homeless street children* (who work, live and sleep in the streets, often lacking any contact with their families). At highest risk is the latter group. Murder, consistent abuse and inhumane treatment are the "norm" for these children, whose ages range from six to 18. They often resort to petty theft and prostitution for survival. They are extremely vulnerable to sexually transmitted diseases including HIV/AIDS.

An estimated 90% of them are addicted to inhalants such as shoe glue and paint thinner, which cause kidney failure, irreversible brain damage and, in some cases, death.

- The number of street children worldwide is almost impossible to know, although the World Health Organization (WHO) and UNICEF in the mid '90s estimated the number to be 100 million.

- The social phenomenon of street children is increasing as the world's population grows; six out of ten urban dwellers are expected to be under 18 years of age by the year 2005.

Asia and Africa

- According to UNICEF, there are about 25 million street children in Asia and an estimated 10 million in Africa (1998).

- Africa today has 10.7 million orphans just as a result of AIDS and the numbers are growing (UNAIDS). With fewer and fewer family members left to care for them, many –if not most – of these children will join the street children of Africa who are already there because of poverty, wars and ethnic conflicts.

- In Dhaka, Bangladesh, there are 10,000 girls living in the streets (World Vision).

- There are 5 to 10,000 street children just in Phnom Penh, Cambodia (World Vision).

- In the Philippines, the Department of Social Welfare and Development estimated, in 1991, 1.2 million street children. Action International Ministries says 50,000 to 70,000 street children live in Manila alone.

- India's Ministry of Social Welfare estimated that of the 10.9 million people residing in Calcutta in 1992, there were 75,000 to 200,000 children living in the streets. Agencies agree the number is much higher now, and deaths of parents from HIV/AIDS are likely to cause the numbers to rise more rapidly.

- UNICEF estimates there are 16,000 street children in Vietnam, 20,000 child victims of prostitution, and 4,300 child drug users.

Latin America

- In 1996, the Inter-American Development Bank and UNICEF estimated there were 40 million children living or working on the streets of Latin America – out of an estimated total population of 500 million.

- In Central America, the majority of street children are aged 10-17; approximately 25% are girls.

- The Government of Mexico has estimated the country has 2 million street children.

- In Brazil, seven million children are abandoned or homeless (WHO 1994). From 1990 to 1994, about 4,600 street children were killed (*Los Angeles Times*).

- Street children are targets of death squads in Colombia; in 1993, 2,190 were murdered (*Ottawa Sun, 1996*).

Europe and North America

- The Council of Europe estimates 7,000 street children in the Netherlands, 10,000 in France, 500 to 1,000 in Ireland, 6,000 to 7,000 in Turkey, 1,000 in Bucharest, Romania.

- In Moscow, the BBC has reported that 5,000 children and young people are abandoned on the streets every year.

- In the United States, the federal government reported there were about 500,000 under-age runaways and "throw-aways" (by their parents) – New York Times 1990.

Child Labor

- The International Labor Organization (ILO) estimates that 250 million children between the ages of 5 and 14 work in developing countries. About 120 million children under the age of 15 work full-time and another 130 million work part-time.

- Some 50 to 60 million children between the ages of 5 and 11 work in hazardous circumstances. In addition to traditional involvement in agricultural and domestic work,

- children are now involved in a whole range of extractive and manufacturing sectors, often in dangerous and exploitative conditions. At its worst, this involves the trafficking of children as child sex workers, a modern form of slavery (ILO).

- The ILO estimates 20 million workers under the age of 15 in Latin America. Child labor is common in the countries where Casa Alianza operates:

  - in Guatemala, 41% of the child/adolescent population work.

  - in Honduras the figure is 41%.

  - in Mexico, 29%.

  - in Nicaragua, 20%.

- An estimated 20 million children, perhaps as many as 40 million, in South Asia toil in debt servitude, weaving at looms, making bricks, or rolling cigarettes by hand, working to pay off debts contracted by their parents in exchange for their labor. Countless others spend their childhood and adolescence in domestic servitude. (UNICEF: *The State of the World's Children*, 2000.)

- Each year, an estimated one million children all over the world are sold or "trafficked" nationally and across borders into the illegal sex trade. (UNICEF Convention on the Rights of the Child.)

Violence

- During the 1990s more than two million children were killed and more than six million injured or disabled in armed conflicts. According to the Coalition to Stop the Use of Child Soldiers, at least 300,000 children, many as young as 10 years of age, are currently participating as "child soldiers" in armed conflicts around the world.

Poverty and Disease

- Of the world's 1.2 billion people living in poverty, more than 600 million are children (UNICEF: *The State of the World's Children 2000)*.

- About 130 million children of primary school age are not in school; two-thirds of them girls (UNICEF Convention on the Rights of the Child).

- Despite some recent economic growth, 90 million (almost 50%) of Latin America's children live in poverty (World Bank).

- In the United States, 13% of children are still living in poverty (National Center for Children in Poverty, Columbia University).

- Each day, 8,500 children and young people around the world are infected with HIV (UNICEF: *The State of the World's Children 2000*).

- In Africa, 10.7 million children under the age of 15 have been orphaned by AIDS and another 500,000 have been orphaned in other countries due to AIDS (UNAIDS).

- Each day, 30,500 children under five years of age die of mainly preventable diseases, and thousands more are ill because of unsafe drinking water and poor sanitation (UNICEF *: The State of the World's Children 2000*).

Invisibility

When children do not have official papers, they do not officially exist. Estimates are that one-third of all children born every year, about 40 million babies**,** are not officially registered. This leads to difficulty in registering for school, receiving basic health care and immunizations. Furthermore, this invisibility make children more vulnerable to exploitation through illegal adoption or abduction, and often leading them into illegal activities such as prostitution or other forms of forced and dangerous labor.

7

Annexure

Child to Child Trust guidelines

for parents, teachers, health workers, community workers, volunteers and others

(excerpted from: http://www.child-to-child.org/disaster/index.html)

The Child-to-Child Trust

Child-to-Child: Helping children affected by Natural Disasters

Children surviving natural disasters like earthquakes, hurricanes and tsunamis have several challenges to cope with. They suffer trauma from losing friends, family members, homes and possessions and witnessing devastation in their communities. These children along with their families and communities also face the further threat of disease and illness due to shortages of food, clean water, shelter and poor hygiene conditions.

There are a number of ways that adults can support children to help themselves, other children, their families and their communities improve and rebuild their lives. Here are some examples of important health messages both adults and children should know and suggestions on what adults and children can do to take action when faced with natural disasters.

How can adults help children cope with natural disasters?

Adults are traumatized by the loss and uncertainty that disasters cause their families, communities and themselves. As a result, their sadness and stress may cause them to forget about children's need for love, affection and security. In crisis situations, parents, family members, community leaders, health workers, and teachers are important sources of support for children.

What important information should adults know to help children cope with natural disasters?

- All children react differently to crisis situations. Some may withdraw and become very quiet. Others may appear to be coping well but inside may be feeling hurt, sad and scared. The stress of crisis situations may also cause some children to become more aggressive.
- In crisis and emergency situations children need constant love, affection, security and hope that the situation will improve. Try to avoid punishing or scolding children during this time as this may add to the suffering they are going through.
- Play and sporting activities are one of the best ways for children to deal with stress.
- Both boys and girls can promote good hygiene and safety practices, illness prevention, and provide emotional support to both children and adults.
- Some children may question why disasters happen or feel guilty or responsible for the problem. Adults should spend time listening and talking to them about their feelings during and even months after the disaster.

What can adults do to help the children?

- Try to give children regular routines again so that they feel secure and stable. Set times for going to school, eating, playing and sleeping.
- Create a safe and clean area for children to play with one another.
- Provide children with discarded materials (e.g. fabric, stones, sand, empty bottles, newspapers) to create toys, games and puppet for themselves and other children.
- Encourage children to teach each other singing and movement games that require no equipment.
- For children who may not be able to attend school, spend a few minutes each day to tell or read them stories or play simple counting games. These activities can help children develop their reading and maths skills.
- Reassure children that their lives will be re-built and improved. Also discuss how the children themselves can help others so that they feel part of the solution and empowered to take action. Make sure, however, that children are not burdened to take on responsibilities that adults should be doing or tasks that would put them in harm.
- Encourage children to perform plays and songs about health messages for the community's healing.
- Talk to other adults in the family or community about ways to support children's emotional health and well-being.

- If adults need to leave the children to go somewhere, tell them where they are going, when they will be back, and who will care for them so the children do not feel insecure or frightened.
- Spend time with children comforting them, talking to them, singing to them or telling them stories regularly.
- If children react severely to stress for a long time, seek help from a counselor or someone who knows how to help children.
- Protect children from further neglect, emotional, or physical harm.

What should adults feel when helping children?

- Confident in children's ability to improve the health and well-being of themselves, their families and their communities.
- Concern for children's physical, mental and emotional health after a disaster.

How can children cope with natural disasters?

What are some important health messages children should *know* about coping with disasters?

- The spread of illness, which can happen after disasters, can be prevented by washing hands with soap, ash or water regularly after going to the toilet, before eating and handling food and before feeding young children.
- There should be a special designated place for going to the toilet if no latrine or toilet is available.
- Young children and babies should be kept away from sharp and dangerous objects and debris that could injure or harm them.
- Children who have a fever should be kept cool, uncovered, and wiped with a damp cloth.
- If a child's breathing is quick or noisy, they should get help from an adult or medical worker.
- If a child has diarrhea, they can give them plenty of drinks and light food to eat, particularly salty foods. If diarrhea is more serious give Oral Rehydration Solution (ORS or Nimcol) to prevent dehydration.
- Boil water for at least 20 minutes to kill germs and make sure it is safe and clean. Water should also be kept clean by not touching it with dirty hands or utensils and covering it so that it is free of flies, dust, and dirt.

What can children do to take action?

- Help younger children and babies who feel sad, lonely or scared by sitting with them, holding their hands, talking to them, singing to them, telling or reading them stories and making them laugh through games or jokes.
- Help children who are ill, injured or have a disability by talking to them or telling them jokes or stories, even if they do not know the child.
- Teach and lead groups of younger children to play simple games that involve running, singing, dancing and movement.
- Create songs or dramas with simple health messages that can be taught to other children and performed for adults at home or in the community.
- Create very basic toys from discarded materials such as newspapers and empty water bottles. For example, a ball can be made out of crumpling up some newspaper. A simple puppet or mask can be made to encourage children to express their feelings.

What should children feel?

- Concern for the physical, mental and emotional health and well-being of themselves, other children and adults in their homes and communities.
- Confident that they can play a part in helping their families and communities recover from disasters and rebuild their lives.

Supported and loved so that they do not feel scared, insecure, sad or guilty.

Photo Credit: Dr PV Unnikrishnan

8

Annexure

ISDR system thematic cluster/platform on knowledge and education

The thematic cluster / platform is currently formed by the following members and associates. Please note that the current cluster members list might be subject to updates.

Contact persons

UNESCO (Convener): Badaoui Rouhban

ISDR secretariat: Paola Albrito

The list of organizations, actors, networks and experts currently **associated** with the ISDR thematic cluster / platform on knowledge and education is below:

- **Coalition for Global School Safety (COGSS)** – To find out more contact: Ben Wisner – bwisner@igc.org and / or Stephen Bender – baybender@verizon.net.

Initial members

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- **French Red Cross** - To find out more see: <www.croix-rouge.fr/goto/index.asp> or contact: Matthieu Le Seach - Matthieu.LeSeach@croix-rouge.fr.

- **Plan International** - To find out more see: <www.plan-international.org> or contact: Hoa Phuong Tran - hoa-phuong.tran@plan-international.org .

- **Risk Red** – To find out more see: <www.riskred.org> or contact Marla Petal and Ilan Keman – riskred@riskred.org.

- **Search and Rescue Assistance in Disaster (S.A.R.A.I.D.)** - To find out more see: <www.saraid.co.uk> or contact: Garry de la Pomerai - Gdpsaraid@aol.com; gdp@saraid.co.uk.

- **SEEDS** - To find out more see: <www.seedsindia.org/schoolsafety> or contact: Anshu Sharma - anshu@seedsindia.org.

- **Architects for Humanity** – To find out more see: <www.architectureforhumanity.org/>

- **IIEES** – International Institute of Earthquake, Engineering and Seismology. To find out more see: <http://www.architectureforhumanity.org> or contact Mahammad Mokhari - mokhtai@iiees.ac.ir .

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- Bergische Universitat Wuppertan, Germany - Civil Engineering Department. To find out more contact Dr. Hamid Isfahani - isfahani@uni-wuppertal.de .

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- **AFPCN - French Association for Natural Disaster Reduction**. To find out more contact Olivier Schick - olivier.schick@numericable.fr.

- **Ministry of Ecology and Sustainable Development, Direction de la Provention de Risk Majeurs - Paris, France**. To find out more see: <http://www.prim.net> or contact Mr. Jacques Faye - jacques.faye@ecologie.gouv.fr.

- **Ministry of Interior and Planning, Directorate of Defence and Civil Protection, Sous direction de la Gestion des Risques.** To find out more contact Ms. Chantal Dauphin - chantal.dauphin@interieur.gouv.fr .

- **Ministry of Home Affairs, General Directorate of Civil Protection and Emergencies - Madrid, Spain.** To find out more see: <http://www.proteccioncivil.org> or contact Mr. J.P. Lahore, e-mail: jplahore@civil.mir.es .

The work of the cluster is further enriched by exchanges and feedbacks by a number of national, regional and international actors that have shown an active interest in the subject. Exchanges and forums via e-mail are constantly running. If you wish to be part of this network do not hesitate to get in touch with the ISDR secretariat focal point

Photo Credit: Dr PV Unnikrishnan

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Annexure

ActionAid school project

List of national coordinators and the project manager of DRR_DFID project

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10.

Annexure

Highlights of other national experiences with DRR teaching

Russian Federation[163]

Programs of Higher Education

"Since 1991 the program of the course 'Life Security' (LS) meant for 136 study hours was introduced in higher educational establishments. About 50 study hours of this program are devoted to the issues of the life and territory protection from emergency situations. Students at higher educational institutes study:

- theoretical foundations of life security in the system 'man – environment – machine';
- legal, regulatory, technical and organizational aspects of life security, including of civil defence;
- basics of man's physiology and rational working conditions;
- anatomical and physiological consequences of the impact of harmful, hazardous and destructive factors in emergency situations;
- ways and means to improve security of technique and technological processes;
- methods for study of stable performance of production objects and technical systems in emergency situations;
- methods of forecasting of emergency situations and their impacts;
- organization of civil defence."

"Students learn how to elaborate actions on protection of the population and personnel of enterprises from emergency situations, to take measures to improve stable operation of economic objects, systems and branches, to master methods of management of a modern enterprise in emergency situations."

"In general, a positive dynamics is observed in education of young people. While in the mid-1990s the course 'Foundations of Life Protection Science' passed 950 thousand pupils of general educational establishments and more than 880 thousand pupils of primary and secondary vocational educational establishments, then at present these figures have increased to 12.5 million and 1.5 million pupils, respectively. Approximately 2.5 million students of higher educational institutions in the Russian Federation passed the course "Life Security" having received necessary knowledge on behavior in emergency situations."

"From 1993 the specialists who already have their higher education diplomas should also pass the LS course. In 158 higher educational institutions in Russia the LS faculties exist and in 2003 this faculty admitted 6,000 students."

"To satisfy the growing need of RSES in professionals some state higher educational institutes, such as the State Academy of Management, the Moscow State Technical University, the Moscow State Technological University, the State Academy of Oil and Gas, the Moscow State University of Railway Engineers, the Saint-Petersburg Forestry Academy, the Ural Polytechnical University, the Moscow Institute of Steels and Alloys, educate now bachelors on specialities connected with life security and also on speciality 'Teacher-Organizer of Safe Life Foundations'."

United Kingdom (responding in format of the ISDR secretariat WCDR questionnaire)[164]

Are there educational programmes related to disaster risk reduction in your public school system? If yes, for what age-range? Do you have any educational material developed to support the teachers in this area? (Please attach any relevant documentation.)

"There is currently no formal disaster risk reduction education programme in the public school system in England. However, a range of government departments and agencies provide information to schools, colleges and the public in general to raise risk awareness and mitigation measures. For example, the Met Office provides educational material to all school ranges on the weather and the effects of severe weather. In addition, professional training is provided at the Met Office's own training college, which is recognised as a regional training centre for the UN's World Meteorological Organisation (WMO)."

United States of America[165]

Note: The US report to the ISDR secretariat for Kobe did not follow the format suggested by the ISDR secretariat, did not answer many of the questions in the questionnaire, and was, in fact, written in 2003. Entitled, *Reducing Disaster*

Vulnerability with Science and Technology, and probably written for another purpose originally, this document contains very little on schools except the contents of box 5. It is interesting that the U.S. Department of Education was not a member of the group of national agencies that wrote this report.

Box 5

Excerpt from US National Report pre-WCDR

SEDGWICK COUNTY, KS

State of Kansas School Shelter Initiative

Local officials in Sedgwick County, KS, had recognized the risks of living in Tornado Alley and surveyed their public school facilities. Based on existing safety criteria, they identified the safest places in each of the schools for students to seek shelter in the event of severe weather. In two schools, due to a lack of interior areas, the hallways had been identified as the most secure locations. But on May 3, 1999, these very hallways in both schools were heavily damaged by deadly tornadoes. In one instance a tall boiler chimney collapsed into the hall. Fortunately, the storms occurred after school hours, but had students been present, injuries and deaths would have been likely. These close calls inspired Sedgwick County officials to take aggressive measures to prevent similar events in the future. Working with FEMA's Tornado Safe Room Initiative, Sedgwick County officials have implemented 24 safe room projects in local schools. When all of the projects are completed, these shelters will serve approximately 7,800 students in the area. The community will also use them as polling places, religious service facilities, and meeting locations for groups such as Boy Scouts and Girl Scouts. In Park Elementary, a shelter also serves as a cafeteria and gymnasium. Within 3 months of its completion, it had already been used three times to shelter students during high-wind events.

The Federal Emergency Management Agency (FEMA) has a "FEMA for Kids" page[166] as does the National Atmospheric and Space Administration (NASA).[167]

At the level of the 50 States and thousands of school districts within the U.S. there are efforts to teach about hazards and DRR. For example, California does much teaching about earthquakes,[168] Hawaii about tsunamis,[169] and Florida about hurricanes.[170]

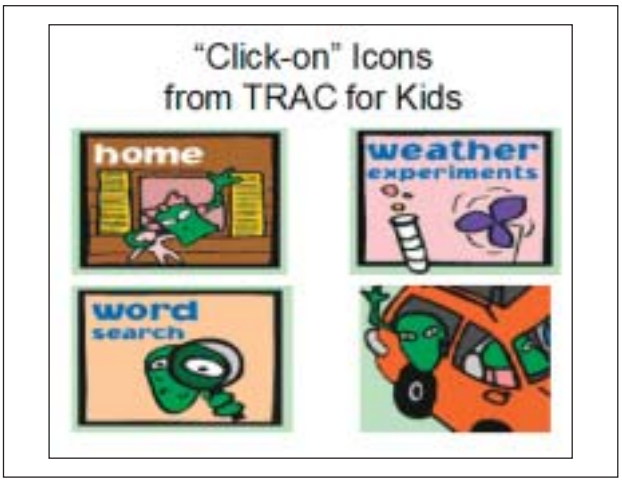
The American Red Cross (ARC) and other NGOs provide instructional material. The ARCs "Masters of Disasters" game is quite well known and respected.[171] TRAC in Louisiana has produced very creative games, posters, and even t-shirts (see figure 18).[172] Private amateurs, journalists, and scientists also have produced web sites for children, for example SkyDiary.[173]

Bangladesh[174]

Are there educational programmes related to disaster risk reduction in your public school system?

"The Disaster Management Bureau (DMB) has been able to introduce disaster management messages and awareness programmes into primary and secondary school curricula up to grade 12. In 1997, the DMB was successful in mandating that all children from grades 6 to 8 be required to read a chapter on disaster management as part of the school curriculum."

Figure 18



Haiti[175]

Note: In brief, this section of the Haiti national report says that teaching focuses on environmental health and earth care, especially soil conservation, reforestation, and the use of alterative energy sources (presumably alternatives to charcoal). Children in classes 1-9 tend to be older than expected (presumably because of interruption in their studies or late starts).

The report goes on candidly to point a great lack of teacher training and support in these areas and a great lack of text-books and teaching material on these subjects. It states that the Ministry of Education is aware of the problem and is trying to address it.

Furthermore, there are some private schools in Haiti that have had good success in teaching about hazards and DRR, and it gives a web site of one of them.

The original passages:

Programmes d'éducation sur la réduction des risques de catastrophe dans l'enseignement public en Haïti.

« Le curriculum de l'école fondamentale, volet sciences expérimentales, apporte aux élèves entre le 1e et la 9e année des connaissances sur :

- L'assainissement et environnement
- La conservation de sol
- Des moyens de corrections de problèmes de l'environnement pouvant être la cause de désastres tel le reboisement
- L'étude d'énergies alternatives pour diminuer la pression sur le bois.

« Les élèves de la 1e à la 9e année ont, selon les normes, entre 6 et 15 -16 ans. Le nombre de sur âgé cependant est très grand. Une récente étude dans la commune de Ganthier, département de l'Ouest, réalisée pour le compte de l'Alliance pour la Survie et le Développement de l'Enfant[176] en juin-Juillet 2004 a montré que :

- Au second cycle (5e, 6e année) plus de 45% des élèves ont 14 ans et plus
- Au troisième cycle (7e, 8e, 9e année) 58% des élèves ont entre 17 et 22 ans.

« Relatif a l'appui pédagogique des enseignants dans le domaine. Peu a été fait. Nous referant a l'étude citée antérieurement, un seul professeur a assiste ces 5 dernières années a un séminaire dont le thème était « environnement ». De plus, ils ne disposent le plus souvent que du livre de l'élève comme matériel didactique et ont grand besoin de formation continue.

« Le MENJS, conscient de ce problème, a donnée mission à ses directions technique de rechercher et d'appliquer une solution urgente pour combler cette carence. Le travail a été initié. La situation n'est toutefois pas la même au niveau de certaines écoles du secteur prive. Les projets de réductions de risques réalisées par des élèves sensibilises par l'enseignement reçu sont de impressionnant. »[177]

Nepal

Nepal's national report gives a minimalist account of school teaching (box 6).[178] There is also a good deal of outreach to schools and children by NGOs in Nepal including NSET, mentioned above in the section on Protecting Educational Infrastructure, SEEDS, and the Nepal Red Cross.

Box 6

> Yes: We have educational programs relating to disaster risk reduction in our public school system for the students of 10–14 yrs of age group. To support the teacher in this area, we have tried to develop textbooks, poster, postcards, banners and other necessary educational materials as required

Ghana

Ghana reports no national program of hazard and DRR education in the schools, but it does, however, list five universities and five research institutes that have links with disaster risk reduction. As noted in the body of the review above, all elements of the knowledge system are linked and potentially mutually supportive. With this much activity at the tertiary level, Ghana could move quickly into a program of teaching and school protection at the primary and secondary level.[179]

Kenya

As mentioned in the body of the review, Kenya approaches teaching primarily under the rubric of earth care. The national report notes that they do not yet teach about floods and fires. Given that these two hazards are very common in Kenya – floods in the West near Lake Victoria and along the Tana River in the East and urban fires in densely populated informal settlements – this would seem to be a high priority (See box 7).[180]

11

Annexure

Discussion of “debt for safety swapping”

Ben Wisner

Dear colleagues,

I am conducting a worldwide review of good practice in education and knowledge management (Hyogo's 3rd pillar) on behalf of ActionAid and the ISDR cluster/platform on knowledge and education. As you also probably know ISDR secretariat, UNESCO and the ISDR partners will be launching a major campaign on education and disaster reduction in June.

My overheated brain, thus cooking in such a cauldron of urgent issues (e.g. think school collapses in Pakistan and mudslide tragedy in Philippines), constraints (e.g as described in ActionAid's recent report on Education for All, *Contradicting Commitments*), and possibilities (e.g. there IS a great deal of knowledge and practice in building and retrofitting low cost schools) ... I wondered if anyone had ever discussed in the IFIs or in the corporate sector something along the lines of the old "debt for nature" swaps?

Please see the message I sent earlier this morning to Salvano Briceno and some others.

Might I have your comments on this idea? Am I re-discovering the wheel?

Margaret Arnold (World Bank, ***in her personal capacity only***)

The idea to me sounds appealing in principle, but I don't know what the Bank experience has been (if any) with similar types schemes. I took the liberty of forwarding your note to some colleagues to see what the feedback is. I'll do some more digging and get back to you.

Kari Keipi (Inter-American Development Bank ***in his personal capacity only***)

This is a great idea.

The IDB has carried out only one debt for nature operation, helping Mexico to be freed of some of the debt with third party lenders in the early 1990s. It was done for ecological conservation of Mexico City.

At the time, when indebtedness was high, there was a great benefit for the indebted nations to do the swap. It appears that these days, although many countries in Latin America still have significant debt, others are repaying their dues before the deadlines. Thus at least this part of a swap would not be as attractive as before. Some bi-laterals might be interested in developing the concept concerning the developing countries' direct debt with them.

Sálvano Briceño (Director, ISDR secretariat, ***in his personal capacity only***)

It is an excellent idea indeed. I had not heard of it before as linked to schools and DRR.

I was involved in the debt for nature swap concept when I was at IUCN and UNEP (20 years ago...), and it is not an easy procedure. It has to be first sold to financial institutions (e.g. World Bank or other) so that it can become a reality in financial terms. Then you need a number of major NGOs wanting to promote and handle it as well. Unfortunately, there are not many major NGOs in DRR but if ActionAid is interested we could start exploring with them…

We could also discuss it informally with the World Bank and those involved in debt for nature swaps, such as WWF, Nature Conservancy and Conservation International to check how it is going. For more details on debt for nature swaps, you can check:

<http://www.worldwildlife.org/conservationfinance/swaps.cfm> , and

<http://nature.org/aboutus/howwework/conservationmethods/conservationfunding/ >.

Charlotte Benson (Economist, Independent Consultant)

If comprehensive mainstreaming of natural hazard risk concerns was achieved and funding available in the PRSP budget envelope allocated optimally then, of course, "debt for safety" swaps would also be implicit parts of the HIPC/PRS process. But we are far from that ...

I have never seen any discussion of a debt-for-safety swap. The only debt swap I have seen discussed in a disaster context is along the lines of a debt for disaster relief/reconstruction swap. Discussions of this appear every now and then but really more as an idea in passing. I don't think it has ever gone anywhere.

A question to you - and no doubt a silly one - but how much funding is needed for school retrofitting? Would it be sufficient in any one country to be considered to warrant a debt swap and all the related negotiations (i.e. transaction costs) that entails?

Just my ramblings!

Ben Wisner

Thanks for the thoughtful ramblings! If a new school costs the local equivalent of, say, $50,000, and low cost anti-seismic features will increase it's cost by 5%, that's an additional $2,500 per school. Also assume that retrofits are of old schools cost $1,000. In a country with 5,000 schools, that would be $5,000,000 for retrofits. Add to this the need to EXPAND schooling in order to meet the MILLENNIUM DEVELOPMENT GOAL for ed, so, say another 1,000 schools @ the additional cost of safe construction = a total now of $7,500,000 over maybe 5 years. I don't know what the transaction costs of debt swaps are (can you give me an idea?), but for a small, highly indebted country, that seems the sort of amount of debt that is not trivial. Some of the early debt-for-nature swaps were of this order of magnitude, if memory serves.

Stephen Bender (Architect/Planner, Independent Consultant – formerly OAS ***in his personal capacity only***)

If I understand the basis for the debt for nature swaps, the private capital markets correctly surmised that sovereign states would be pushed/forced to show movement on environmental management issues that require capital, but for which no national capital was available and at the same time the same sovereign states were trying to aliviate their foreign debt burden. Thus sovereign states were willing to see investment in environmental actions in their countries under conditions that they did not wholly control in exchange for debt relief and infusion of new capital.

Will sovereign states place investment in school retrofit at a priority level sufficient to barter debt for action? Is there an investment/donor community that is willing to put up large sums of capital to purchase debt forgiveness by making schools safe? Where are the signs that the school vulnerability reduction community can organize itself and compete with the environmental community to attract the necessary capital? Is there a school vulnerability reduction community that feels it has as much to gain by pushing this agenda as the environmental community felt when it created the debt for nature swaps? Where is the debt for nature swap phenomena today?

The questions come from appreciating the special circumstances that put together banks or donor governments holding debt paper, countries in debt but with natural resources of international interest, and NGOs with a grand capability of accessing private wealth for their purposes.

It would be in the interest of IFIs to forgive debt they hold in exchange for mitigating against school damage, whose repair is often financed by loans and grants from IFIs. The issue is from where does the capital come to do the mitigating? Who gives the IFIs 10 or 20 cents on the dollar to forgive the debt if the schools are retrofitted? Which governments would spend their own money on such a scheme with other priorities in hand?

David Archer (Director of Education Department, ActionAid)

I have some reservations about this. Much of ActionAid's campaigning has been focused on debt cancellation rather than swapping, and if we were to argue for swapping it might be seen to be too earmarked to focus specifically on safety retro-fitting for schools. This may be particularly the case as debt swaps would generate recurrent income for countries presently servicing debt with a large amount of their annual budget – so in some

respects it is better to invest this in core recurrent costs of education rather than one-off capital costs. My impression would be that there may be other sources of financing for major capital works, for example with Wolfowitz pushing the World Bank back towards a renewed focus on infrastructure.

A different option would be to look at influencing the projections made globally on what it would cost to achieve universal primary education (presently around $10 billion a year new aid is the common figure) or the Education for All targets (to include secondary / early childhoold / adults etc.) – insisting that the cost of retro-fitting to ensure school safety is included (as well as costs of ensuring all new classrooms built are safe). This would involve calculating average cost of retro-fitting and average percentage of schools likely to need it. It would require big assumptions but getting this onto the agenda of the Education for All Global Monitoring Report and Fast Track Initiative may be worthwhile. We want the costs of retro-fitting to be integrated into existing national education plans and budgets – and to be able to draw on existing global mechanisms for financing.

James Boyce (Economist, Political Economy Research Institute, University of Massachusetts)

Not sure what I think of debt swaps in general, since I think a lot of the debt is illegitimate and the first step should be to wipe the illegitimate portion off the slate. But in this arena as so many, the best may be the enemy of the better.

12

Annexure

Mini-questionnaire on training experiences

Training mini-questionnaire

Dear colleagues and friends,

Most of you know that I'm doing a review of the education and knowledge pillar of the Hyogo Framework for ActionAid and ISRD's education cluster group. My report should complement the results of UNDP-UNDMTPs "Future Search" re-think of "capacity" more generally.

Each of you in different ways are have been involved with disaster management training – some face to face, some distance learning, courses for people ranging from parliamentarians to water planners, long courses, short courses, etc.

It would assist me a great deal in writing this report and also give me a chance to highlight the training programs with which you've been associated.

1. *Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on…!*
2. *What would you say has been your most successful training activity? Why?*
3. *What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?*
4. *What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders?*
5. *Is there are group of people you think is as yet untouched by training or particularly hard to reach?*

Joanne Burke (UNDMPT)

1. *Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on…!*

DMTP has had three reviews during the period of 1990-2004. The last "evaluation" type exercise was in 1996 and this had some impact element to it. This was done by John Rogge and Allan Lavell. In 2004 the most recent review was undertaken. However, this was not an impact evaluation – rather a forward looking study/exercise to help determine the future of the DMTP. I also did not feel that it would be relevant or possible to do an impact evaluation since we did not have the baseline information required for such an exercise.

2. *What would you say has been your most successful training activity? Why?*

We did an excellent three-day Disaster Risk Reduction workshop June 05 for 8 Caribbean countries – UNCT, a collaborative activity by BCPR/DMTP and OCHA. I felt the workshop was good because we had good participation from various stakeholders for the design of the workshop, the materials were excellent – we produced a good presenter's guide, participant workbook and CD-Rom of reference materials. Plus, we had an action planning element in the workshop which has led to some good systematic actions by the respective UN country teams. The follow-up is by the OCHA and BCPR Regional Field Advisors. The workshop package is now being adapted to Asia. What made the exercise work was the combination of subject matter experts (DRR and Response) and good instructional design and materials production support.

3. *What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?*

A big obstacle for expanding outreach of training that the DMTP faced was the fact that it produced some very good technical materials/modules in the 1990s. However, these materials were not updated and now it would be difficult to do that. Plus, it is hard to develop good generic training materials – they have to be adapted and tailored to a specific context. So, the DMTP modules were really more good resource materials that could be used for training purposes. Training has to be tailored to a particular audience, need, outcome and result. Another obstacle that is common is that there is often not any good follow-up after training – so the only evaluation is at the end of an event – which doesn't really tell you much about impact – only what happened in the event.

4. What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders?

Two types of groups have taken DMTP workshops – members of the UN system / agencies working at the country level and government officials.

5. Is there are group of people you think is as yet untouched by training or particularly hard to reach?

Hardest to reach groups – the institutions from which trainees are nominated. We have spent so much time and effort training individuals and ignoring their institutional context – which very much diminishes the transfer of training and being able to measure impact. Have to factor that context in when planning and running training – otherwise it is very difficult to change behavior and / or systems. That, for me, is one of the justifications for needing to look at the whole CD issue – for which training or skills development is only one level.

Omar Cardona (National University of Colombia, Manizales)

1. Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on ...!

The participants make an evaluation at the end of the course. We have a survey in order to know what's good and bad and to get suggestions to improve the course. I can send you an example of responses and the comments they have made in Spanish.

2. What would you say has been your most successful training activity? Why?

I have designed three formal graduate courses on disaster risk management in the past. Two were face to face (led by CEDERI of University of Los Andes and by IDEA of National University of Colombia) and one (with the group of Spain) by Internet. It is amazing but, in my opinion, the last one was the most successful because the participation of several persons from Latin America and the Caribbean and Spain. They had interesting debates (some are on line) and made interesting contributions to the shared forum.

3. What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?

The cost is too much for the most of people. ISDR has been an important contributor to get many people of the region to participate with grants or scholarships in the e-learning / training course. They aided a small group each year. Increasing effectiveness is a challenge indeed, because although we have hundreds already with diplomas, only if we get massive numbers of trained people working will it be possible to obtain better results from the effectiveness of DRM.

4. What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders?

In the first two university graduate courses only young professionals and mid-level government workers were participants. In the e-learning / training university course I think we had people doing every kind of activity in many sectors, but only professionals (with an university degree) because it is a graduate course. When we have been flexible to accept people without university formation, for example fireman or rescue workers, they do not finish the course or have difficulties with the tests, debates and exercises.

5. Is there are group of people you think is as yet untouched by training or particularly hard to reach?

Sure, the high level decision makers and politicians of the national level.

Lorna Victoria (Center for Disaster Preparedness, Manila, Philippines)

1. Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on...!

The Center for Disaster Preparedness (CDP) has been involved / engaged in small training activities with communities and local governments. CDP does not have the opportunity to systematically monitor and evaluate impact. When we have the opportunity to organize workshops on community involvement in DM, some of the communities /

NGOs relate changes in disaster preparedness and emergency response.

2. *What would you say has been your most successful training activity? Why?*

CDP undertakes a simple evaluation at the end of each training activity covering content, methodology/ process, participation, technical arrangement. A strong point always is the participatory/ interactive and learner-centered approach.

3. *What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?*

Because of the limit of face to face training, we have been challenged to look for approaches which have multipliers like manualizing our training modules and putting them on our web site for easy download. Another challenge is to be holistic and integrated in training – integrating new framework, concepts, tools, risk reduction measures – disaster and emergency preparedness, community involvement, gender, children's rights, rights based approach, governance and social accountability, particular risk reduction measures such managing built and natural environment, sustainable livelihood, community health, risk transfer...

4. *What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders?*

While we work mainly with communities and NGOs, more and more we involve also local and national government as participants or as part of our training team.

5. *Is there are group of people you think is as yet untouched by training or particularly hard to reach?*

Though there may not be untouched groups by now, we have to make all this training and education available to communities at risk and the most vulnerable in these communities.

You can visit our web site <www.cdp.org.ph> for details of training which CDP has conducted up to 2004 and our training module for the Philippines.

Don Schramm

1. *Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on ...!*

For both the UNHCR Emergency Management Training Program (EMTP) and the UNDP/UNDRO (UNDHA, UNOCHA) Disaster Management Training Program (DMTP), there were several evaluations; check with HCR, UNDP or OCHA for details.

2. *What would you say has been your most successful training activity? Why?*

Distance learning, self-study modules because of ease of access to individuals and organizations worldwide.

3. *What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?*

Time and money

4. *What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders.*

All of the above, plus NGOs and UN agencies

5. *Is there are group of people you think is as yet untouched by training or particularly hard to reach.*

The local community is hard for UWDMC to reach, so we do not try and simply provide the basic materials for others to take and modify for use in their community-based training.

For more than ten years, six of our basic self-study courses have been available free online as "review copies" to be used by individuals and organizations as described in #5 above: <http://dmc.engr.wisc.edu/courses/ssenglish.html>.

Anyone can download the materials and use them for personal study or organized learning. Only when they want to earn credit or work toward the UWDMC Disaster Management Diploma do they pay us.

Our web site is currently in the throes of renovation. When it is ready in several months, ALL our self study course materials will be available online at no cost. That will be similar to the availability of course materials we helped develop for DMTP that are available online at their web site: <http://www.undmtp.org/modules.htm>.

For the moment, here is access info for two draft UWDMC samples as downloadable PDFs: <http://dmc.engr.wisc.edu/webfiles/DD02Disasters&Development.pdf> and <http://dmc.engr.wisc.edu/webfiles/EP07Coordination.pdf>.

Summary

1. *Has the result or impact of any of your training ever been formally evaluated? (If so, could I have a referral to that evaluation?) If not, no matter, continue right on…!*

Most of the training courses have been evaluated in one way or another, however, there seems not to be a common repository of evaluations or meta-study of the lessons of evaluation. The UNDMPT serves this hub function to some degree.

2. *What would you say has been your most successful training activity? Why?*

There is enthusiasm for electronic/ distance learning on the basis that it is accessible and reaches out, potentially, to many people. This observation is consistent with the cases of "cascading" training of trainers of trainers documented in the body of the review (e.g. in Turkey). Others found participatory, holistic, community level training most successful. Application of course materials and follow up were highlighted as marking a good training course.

3. *What is the largest obstacle you face in expanding outreach of training or to increasing its effectiveness in reducing disaster risk?*

Cost was mentioned. Also the difficulty of updating and localizing training materials.

4. *What kinds of groups take your training courses? National officials? Business leaders? Mid-level government workers? Local officials? Community leaders?*

A wider range of participants from different background that might have been expected.

5. *Is there are group of people you think is as yet untouched by training or particularly hard to reach?*

Interestingly, two polar opposites in terms of power and status were mentioned: the highest political decision makers and the community members. Another observation emphasized that what is hardest is to turn ***individual learning*** into ***institutional learning (capacity)*** in one institution (say the Ministry of Education). One might add that even if one institution does actually change, say as the result of a five year period during which several key people are trained and return, the next challenge is ***organizational learning*** – that is, capacity building and change across a wide spectrum of institutions (say half the Ministries or Departments in the Cabinet).

Photo Credit: Dr PV Unnikrishnan

Endnotes

1. To find out more about the thematic cluster/ platform see: http://www.unisdr.org/knowledge-education
2. See the Terms of Reference, annex 1 and the Excerpt from the Hyogo Framework of Action, annex 2.
3. For more information on the UN Millennium Goals, see http://www.un.org/millenniumgoals/
4. Information on the UNESCO slogan call at: http://www.unisdr.org/eng/public_aware/world_camp/2001/pa-camp01-mappchild-eng.htm
5. Xavier Castellanos, IFRC.
6. To view the national information reports see: http://www.unisdr.org/wcdr/preparatory-process/national-reports.htm
7. The author is grateful to Ailsa Holloway, University of Cape Town, and Dewald van Niekerk, Northwest University for this information on South Africa.
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9. The author is grateful to Maria-Augusta Fernandez and Jeanette Fernandes for assistance with this information on Ecuador.
10. The author also must thank Prof. Peijun Shi for sending information about this text-book.
11. See Science Museums of China at: http://www.kepu.com.cn/gb/index.html
12. The author is indebted to Etsuko Tzunozaki, Asian Disaster Reduction Center, Kobe, Japan for access to files and reports on activities in Japan.
13. "Environment and Disaster Mitigation Courses of Maiko High School," electronic message, provided by Etsuko Tzunozaki, Asian Disaster Reduction Center, Kobe, Japan.
14. Thanks to Professor Mustafa Erdik and Marla Petal for information on this section.
15. Thanks to Manu Gupta, Srilekha Majumdar, and Rose Christel for background and specific references on this section.
16. For additional details, see: http://www.undp.org.in/VRSE/DME/book.htm
17. For more information, visit the SEEDS web site: http://www.seedsindia.org/
18. More information on the All India Disaster Mitigation Institute can be found at the web site: http://www.southasiadisasters.net/LR.htm
19. The author is grateful to Meike Rahner, a teacher of geography and French in North Rhine-Westphalia, as well as to Professors Karl-Heinz Otto and Hans-George Bohle, for referrals and information received for this section.
20. One example is: http://www.learn-line.nrw.de/angebote/agenda21/lexikon/erdbeben.htm
21. For more information see: http://www.copernicus-gymnasium.de/edurisk/
22. This overview was provided by Dr. Djillali Benouar.
23. The author is grateful to Carol Kayira, ActionAid Malawi, for information about preliminary plans for the schools project there.
24. For more information, see the following UNDP web sites: http://www.undp.org/bcpr/disred/english/regions/asia/india.htm and http://www.undp.org.in/
25. For more information, see the American Red Cross web site: http://www.redcross.org/disaster/masters/
26. For more information, see the website for PPMS/IFFO-RME at: http://www.ac-versailles.fr/pedagogi/iffo-rme/d03-plan_sesam/sesama.htm
27. OPS (PAHO)/ CERIDE. For more information, see the web site: http://www.eird.org/fulltext/ABCDesastres/index.htm
28. For example, Ed Project Asia: http://www.shambles.net/pages/learning/primary/tsunami/
29. UNICEF *Voices of Youth* web page: http://www.unicef.org/voy/
30. For more information, see UNICEF *Children's World Water Forum* website at: http://www.unicef.org/voy/takeaction/takeaction_2601.html
31. Email communication with Xavier Castellanos, IFRC.
32. For more information, see the Teacher Resource Exchange web site: http://tre.ngfl.gov.uk/server.php?request=cmVzb3VyY2UuZnVsbHZpZXc=&resourceId=11744
33. In collaboration with experts from UNESCO/IOC, UN/ISDR, Kyoto University and Hyogo Prefecture Education Board (Japan) and also in coordination with concerned government agencies, such as Thailand Ministry of Education and Ministry of Interior.
34. Information gratefully received from Akihiro Teranishi , one of the Japanese experts involved.
35. For more information, see UNESCO web site at: http://portal.unesco.org/education/en/ev.php-URL_ID=13433&URL_DO=DO_

TOPIC&URL_SECTION=201.html . See also UNICEF web site at: : http://www.unicef.org/publications/index_30335.html

36. See also the UNHCR web site: http://www.unhcr.org/cgi-bin/texis/vtx/protect?id=405030ee4
37. For more information, see the Federation Reference Center for Psychosocial Support web site: http://psp.drk.dk/sw4172.asp
38. See web site: http://www.ineesite.org/standards/default.asp
39. ISDR and UNICEF: http://www.eird.org/fulltext/ABCDesastres/index.htm
40. See for example, Roger Hart, *Children's Participation*. London and Geneva: Earthscan and UNICEF, 1997, accessible at: http://www.unicef.org/publications/index_4380.html
41. For more information see: http://www.dri.ne.jp/e/index.html
42. For more information, see the Pacific Tsunami Museum website: http://www.tsunami.org/
43. SINAPROC Infantil http://www.proteccioncivil.gob.mx/infantil/index.htm
44. For more information, see also ActionAid's website: http://www.actionaid.org.uk/100262/participatory_vulnerability_analysis.html
45. For more information, see the Save the Children Canada website: http://www.savethechildren.ca/whatwedo/disaster.html
46. For more information, see the International Save the Children Alliance website at: http://www.savethechildren.net/alliance/what_we_do/emergency_new/tsunami_indian_ocean/new_pages/thailand.html
47. Additional information at web site for Plan International: http://www.plan-international.org/action/disasters/ and from the Plan home page: http://www.plan-international.org/
48. Additional information from Dr. Nick Hall.
49. For more information, see the Education International website on its tsunami relief program: http://www.eiie.org/tsunami/en/index.html
50. For more information on IFRC National Societies, contacts at: http://www.ifrc.org/address/index.asp
51. For more information on VCA, see IFRC web site at: http://www.ifrc.org/what/disasters/dp/planning/vca.asp
52. The author is very grateful to Xavier Castellanos of the IFRC for this summary.
53. For more information on UNDP BCPR/DRU: http://www.undp.org/bcpr/disred/index.htm
54. For more information on the Centre: http://www.hyogo.uncrd.or.jp/
55. For more information on EDUPLANhemisférico: http://www.oas.org/nhp/school_hemplan.html
56. For more information on SOPAC: http://www.sopac.org/tiki/tiki-index.php?page=homepage
57. For more information on the Asian Disaster Preparedness Center school earthquake preparedness program, see: http://www.adpc.net/AUDMP/aboutaudmp7.html
58. For more information on the Caribbean Disaster Mitigation Project, see: http://www.oas.org/CDMP/bulletin/school.htm
59. For more information on CDERA, see: http://www.cdera.org/
60. For example the MA courses in "risk science" at University of Montpellier (http://www.ema.fr/index.html?menus_outils/sommaire.html&menus_outils/menu_haut.html&infos_specialisation/i_special_dess-science.html)and "risk and crisis management" at University of Paris I (http://www.univ-paris1.fr/formation/arts_sciences_humaines/ufr08/lmd/masters/master_ggrc_gestion_globale_des_risques_et_des_crises_-_cindyniques/article383.html). All EU nations have similar courses of professional study.
61. University of the West Indies Geology for Natural Hazard Loss Reduction http://www.mona.uwi.edu/uds/index.html
62. The author thanks Dr. Allan Lavell of the FLACSO Secretariat, San Jose, Costa Rica for this valuable overview.
63. http://www.training.fema.gov/EMIWeb/edu/collegecrsbooks.asp
64. A notable exception is the excellent module on school maintenance produced by the IFRC in Latin America. See: http://www.cruzroja.org/desastres/redcamp/Provention/Modulos/Mantenimiento.pdf
65. For more information, see "An Education in Making Schools Safe." *Interagency Working Gender Working Group* January 2006: http://www.igwg.org/articles/safeschools.htm
66. After this tragedy, the Government of Tamil Nadu issues the following order: "After Kumbakonam fire tragedy, Hon'ble Chief Minister has ordered to take various safety measures to ensure the safety of all school buildings. A committee under the supervision of District Collector has been constituted in each

district to inspect all the schools which had thatched structures including midday meal centres and to ensure that the thatched structures are removed and replaced by non-flammable materials. Accordingly all the thatched structures have been removed. Besides this, the Government has taken various steps to ensure the safety of the children studying in schools. Government has prescribed obtaining No Objection Certificate from fire safety angle from the Station Officer, Fire and Rescue Services Department mandatory for all schools. Crash Training programmes on fire safety for school teachers have been organized." http://www.tn.gov.in/policynotes/pdf/school_education.pdf

67. For details, see Ilan Kelman, "Linked Cultures: Breaking out of the Disaster Management Rut," *U.N. Chronicle* http://www.un.org/Pubs/chronicle/2004/issue3/0304p42.asp

68. For more information, see BBC, "Kenya fire toll confusion," *BBC on-line* 28 March 2001 http://news.bbc.co.uk/1/hi/world/africa/1242888.stm

69. Dr. John Twigg, BHRC, University College London, personal communication via email, 5 April 2006; his contact: j.twigg@ucl.ac.uk

70. Additionally, on 8 November 2005, a reporter for the Christian Science Monitor reported new estimates that 10,000 schools were destroyed: David Montero, "The Pakistan Quake: Why 10,000 Schools Collapsed," *Christian Science Monitor*, 8 November 2005 http://www.csmonitor.com/2005/1108/p01s03-wosc.html . This article also cites UNICEF estimates of child mortality in the earthquake as higher than 17,000 and revises the estimate of total deaths to 80,000.

71. Queries about this unpublished research can be directed to Professor Ian Davis at Cranfield University, UK. *i.davis@n-oxford.demon.co.uk*

72. For more information, see the Disaster Risk Assessment Programme and the GRIP Initiative, http://www.undp.org/bcpr/disred/documents/wcdr/undppr180105_vr.pdf & http://www.proventionconsortium.org/projects/GRIP.htm

73. OECD, Lessons in Danger: School Safety and Security. Paris: OECD, 2004 http://www.oecdbookshop.org/oecd/display.asp?TAG=XVNL28XX59X868998N8KH3&CID=&LANG=EN&SF1=DI&ST1=5LMQCR2JCNMV

74. An incremental approach of strengthening in the source of the normal cycle of maintenance can further reduce the cost (see: World Institute for Disaster Risk Management http://www.drmonline.net/projects/rehabilitation.htm).

75. Government of Japan, Ministry of Foreign Affairs, "Assistance for Supporting 'Reducing the Vulnerability of School Children to Earthquakes Project' in the Asia-Pacific Region," 3 December 2004 http://www.mofa.go.jp/announce/announce/2004/12/1203-3.html

76. For more information, see: http://www.geohaz.org/

77. See: http://www.globalcorruptionreport.org/

78. For more information on the education aspects of the Millennium Development Goals see: http://ddp-ext.worldbank.org/ext/GMIS/gdmis.do?siteId=2&goalId=6&menuId=LNAV01GOAL2

79. The author is indebted to Djillali Benaour, who was first author of this section for a multi-author essay (Wisner et al., 2006).

80. The author is indebted to Amod Mani Dixit, Jitendra Kumar Bothara, and Ram Chandra Kandel, who were first authors of this section for a multi-author essay (Wisner et al., 2006).

81. The author thanks Omar Dario Cardona, who was first author of this section for a multi-author essay (Wisner et al., 2006).

82. Asociación Colombiana de Ingenieria Sismica, (1997); París, (1993).

83. The author is grateful to Marla Petal, who was first author on this part of a multi-authored essay (Wisner et al., 2006) and also to Professor Mustafa Erdik.

84. More information at the AFSC web site: http://www.afsc.org/middleeast/int/turkey.htm

85. For more information, see web site: http://www.quake06.org/ See also the EERI Northern California branch programme on school seismic safety: http://www.quake06.org/quake06/task_committees_school_safety.html

86. More information on COGSS is available at the web site: http://www.interragate.info/coggs/index.html Those interested in working with COGSS should contact Dr. Marla Petal (mpetal@imagins.com).

87. More information at the ReliefWeb site: http://www.reliefweb.int/rw/rwt.nsf/doc211?OpenForm

88. More information at the UN-DMTP web site: http://www.undmtp.org/

89. See also the UN-DMTP Training data base online at: http://www.undmtp.org/inventory/entryV2.html

90. See the ADPC Training site: http://www.adpc.net/general/adpc_trn.html

91. More information on the University of Wisconsin Disaster Management Centre at: http://dmc.engr.wisc.edu/

92. More information on WMO Training at:http://www.wmo.ch/index-en.html
93. More information on this training at the World Bank Institute web site: http://web.worldbank.org/WBSITE/EXTERNAL/WBI/WBIPROGRAMS/CMUDLP 0,,contentMDK:20667290~page PK:64156158~piPK:64152884~theSitePK:461754,00.html
94. More information on EMA at: http://www.ema.gov.au/agd/EMA/emaInternet.nsf/Page/EducationTraining
95. More information on ACDS at: http://acds.co.za/
96. More information on PAHO at: www.paho.org/
97. More information on RedR at: http://www.redr.org/
98. RedR training program at: http://www.redr.org/redr/training/programme.htm
99. More information on Sphere at: http://www.sphereproject.org/
100. More information on the Norwegian Refugee Council at: http://www.internal-displacement.org/
101. More information at: http://www.delnetitcilo.net/irpkobe
102. **For more information, contact the ILO Geneva HQ, Mr. Alfredo Lazarte (lazarte@ilo.org), or, at the International Training Centre of the ILO in Turin Italy, Mr. Angel L. Vidal (a.vidal@itcilo.org)**.
103. More information at: http://www.golfre.org/
104. More information at: http://www.proventionconsortium.org/files/tools_CRA/GN/VCA1999.pdf
105. **CRA**: see ProVention Consortium http://www.proventionconsortium.org/CRA_toolkit.htm ; **PVA**: see ActionAid, *Guide to PVA* http://www.actionaid.org/wps/content/documents/Action%20Aid%20Inernational.pdf and also see deeper background on ActionAid's participatory approach, *From Services to Rights* http://www.actionaid.org/wps/content/documents/Action%20Aid%20Inernational.pdf ; **VCA**: see IFRC web site: http://www.ifrc.org/what/disasters/dp/planning/vcaguidelines.asp
106. ProVention Consortium's manual collection can be found at: http://www.proventionconsortium.org/toolkit.htm
107. More information on ADPC and the AUDMP at: http://www.adpc.net/AUDMP/audmp.html
108. Personal communication via email from Krishna Vatsa with the author 13 March 2006; quoted by permission.
109. See the CARMA International web site: http://www.carma.com/research/CARMA%20Media%20Analysis%20-%20Western%20Media%20Coverage%20of%20Humanitarian%20Disasters.pdf
110. For more information, see web site : http://www.tyndallreport.com/
111. More information at: http://www.iwar.org.uk/news-archive/2005/06-14.htm and www.wmo.ch/disasters/downloads/PUBLIC_AWARENESS_workshop.doc
112. Several are listed in the CRID data base http://www.crid.or.cr/crid/CD_Educacion/multimedia.html
113. More information at *Nuestras Voces* site: http://www.vocesnuestras.org/
114. See: http://www.alertnet.org/
115. Main web site at: http://www.bbc.co.uk/ . Example of reporting at: http://news.bbc.co.uk/2/hi/science/nature/4074802.stm
116. More information on World Disaster Day 2005 at: http://www.unisdr.org/eng/public_aware/world_camp/2005/2005-iddr.htm
117. More information on make Poverty History at: http://www.makepovertyhistory.org/
118. See Communications Initiative web site at: http://www.comminit.com/index.html
119. The ten most frequently visited pages were: 1. Health belief model (detailed); 2. Health belief model; 3. Social cognitive theory; 4. Stages of change model; 5. Advantages and disadvantages of online learning; 6. Cultivation theory of mass media; 7. Health belief model (visual); 8. PRECEDE – PROCEED; 9. Social learning theory – or – Social cognitive theory; 10. Theory of planned behavior.
120. Personal communication via email, Dr. Allen Lavell.
121. These meetings were organized by IIASA-DPRI. For more information, see web site: http://www.iiasa.ac.at/Research/RMS/dpri2004/
122. See web site: http://nedies.jrc.it/index.asp?ID=78
123. For more information on the last report, see: *http://www.tsunamiresponsewatch.org/trw/2006/04/20/wto-report-upbeat-about-tourism-in-tsunami-hit-areas/*
124. The academic institutions are mixed in with others in a large "Directory of international, regional, national and specialized organizations," *Living with Risk*, 2004 edition, Vol. 2, pp. 9-67; while some are also highlighted in Vol. 1, Chapter 4, "Education and Training," pp. 236-252.

125. See Centre for Hazard and Risk Research, Earth Institute, Columbia University at: http://www.ldeo.columbia.edu/chrr/index.html

126. More information on FHRC Middlesex University at: http://www.fhrc.mdx.ac.uk/

127. More information about UN Costa Rica at: http://www.rsn.geologia.ucr.ac.cr/

128. More information about CGIAR at: http://www.cgiar.org/

129. More information about Karlsruhe University at: http://www.gknk.uni-karlsruhe.de/E.Projekte.shtml

130. More information about Dymset Bordeaux University at: http://www.ades.cnrs.fr/article.php3?id_article=5

131. More information about University of South Carolina at: http://archone.tamu.edu/hrrc/scope/index.shtml

132. More information about the DRC, University of Delaware, at: http://www.udel.edu/DRC/

133. More information about Texas A&M HRRC at: http://archone.tamu.edu/hrrc/scope/index.shtml

134. More information about the Battelle Institute at: http://www.pnl.gov/globalchange/projects/vul/

135, More information about SCARR at: http://www.kent.ac.uk/scarr/projects/projects.htm

136. More information about IIASA's RVP at: http://www.iiasa.ac.at/Research/RAV/index.html

137. More information about UNU EHS at: http://www.ehs.unu.edu/index.php?module=overview&cat=5&menu=18

138. More information about the Risk and Vulnerability program of SEI at: http://www.sei.se/risk/overview.html and http://www.sei.se/oxford/

139. More on the Centre for Disaster Studies, James Cook University at: http://www.tesag.jcu.edu.au/CDS/Pages/Researchopp.htm

140. More information on La Red at : http://www.desenredando.org/

141. More on the Insecurity Forum at http://www.insecurityforum.org/

142. More on the European Disaster and Social Crisis Research Network at: http://www.erc.gr/English/d&scrn/

143. More on SAHIMS at: http://www.sahims.net/doclibrary/Doc_centre_zim.asp

144. More on CRID at: http://www.crid.or.cr/crid/ing/index_ing.html

145. Natural Hazards Centre http://www.colorado.edu/hazards/

146. BHRC Disaster Gateway http://www.disasterreductiongateway.org/

147. More information on HEWS at: http://www.hewsweb.org/home_page/default.asp

148. For example, the energy awareness teaching in the Pacific Islands promoted by the SOPAC Community Lifelines Programme (the South Pacific Applied Geoscience Commission); more information at: http://www.sopac.org/tiki/tiki-index.php

149. Save the Children Canada http://www.savethechildren.ca/whatwedo/education.html

150. Donald MacLeod and Liz Ford, "Universities join forces for e-learning 'revolution'," *Guardian Weekly*, 31 March-6 April 2006, p. 32.

151. An excellent portal for participatory geographical information systems, including a lively and informative list-serve, is available at: http://www.iapad.org/participatory_gis.htm

152. For example, one expert, Dr. Ilan Kelman, interviewed for this review said of the board game "Riskland": "Dice are used; whereas we should be promoting the message that disaster risk reduction is not random, but is our choice. As well, in the version which I saw, the game is competitive, whereas we should be promoting cooperative games. In disaster risk reduction, either everyone wins or everyone loses — and one uncooperative individual can ruin it for everyone. A quick consultation with educators would reveal how to develop cooperative choice-based games for all ages … My feeling is that ISDR had a wonderful opportunity with the budget, support, and interest for a Riskland game, but the result is disappointing … making it competitive and chance-based. And now they are translating it into different languages. The principle of games and other child education tools is wonderful. But let's implement it properly with appropriate messages." (email correspondence, 7 March 2006).

153. Risk Frontiers http://www.riskfrontiers.com/ . The author is grateful to Dr. Ilan Kelman for this reference.

154. For more information about Book Aid International, see: http://www.bookaid.org/cms.cgi/site/index.htm

155. More information on ZENEB at: http://www.zeneb.uni-bayreuth.de/research%20in%20Africa.htm#Mozambique

156. Mayor's Conference on Early Warning http://www.ewc3.org/upload/downloads/FirstAnnouncement_Mayors_ConferenceonEW.pdf

157. More information on AURAN is available at: http://www.auranafrica.org/

158. A global assessment of early warning prepared at the request of the Secretary General of the United Nations took this approach. In all areas of knowledge management, not just early warning, one can learn a lot from the gaps they identified (ISDR/PPEW, 2006).

159. The *Global Survey of Early Warning Systems* report can be found on line at: http://www.ewc3.org/

160. One example is Schools-Helping-Schools promoted the East West Center http://education.eastwestcenter.org/asiapacificed/shs/shs3sindex.html

161. For more information see: http://www.actionaid.org/index.asp?page_id=974

162. Casa Alianza, at: http://www.hiltonfoundation.org/press/16-pdf3.pdf

163. http://www.unisdr.org/eng/mdgs-drr/national-reports/Russia-report.pdf , section 3.4

164. http://www.unisdr.org/eng/mdgs-drr/national-reports/UK-report.pdf , section 3.3.

165. http://www.unisdr.org/eng/mdgs-drr/national-reports/U-S-report.pdf , document produced by Sub-Committee on Disaster Reduction.

166. FEMA for Kids, for example, on hurricane http://www.fema.gov/kids/hupast.htm .

167. NASA http://kids.earth.nasa.gov/archive/hurricane/creation.html .

168. Two examples: ShakeZone http://www.kidzone.org/visit/shakezone_about-advisory.html and Quakefinder http://www.quakefinder.com/educational_outreach.htm (involving students in seismic research).

169. Pacific Tsunami Center links http://www.tsunami.org/links.htm & also advice to parents and other teaching children about tsunamis http://www.nasponline.org/crisisresources/tsunami.html .

170. CCSSO http://www.ccsso.org/whats_new/6907.cfm (updating information for students and teachers on hurricanes post-Katrina) & Miami Museum of Science http://www.miamisci.org/hurricane/survivors1.html & Florida State University http://garnet.acns.fsu.edu/~mdh6214/hurricane/index.htm

171. American Red Cross, http://www.redcross.org/disaster/masters/

172. TRAC for Kids, http://www.trac4la.com/trackids/kidshome.html

173. SkyDiary, http://skydiary.com/

174. http://www.unisdr.org/eng/mdgs-drr/national-reports/Bangladesh-report.pdf , section 3.3.

175. http://www.unisdr.org/eng/mdgs-drr/national-reports/Haiti-report.pdf , section 3.2.

176. Etude réalisée par le Dr Yolene Vaval Suréna, MPH pour le compte de l'Alliance pour la survie et le developpement de l'enfant/Konesan fanmi se lespwa Timoun.

177. Travaux de recherche d'élèves du Collège Catts Pressoir sont disponibles sur le site de l'école: www.cattspressoir.org .

178. http://www.unisdr.org/eng/mdgs-drr/national-reports/Nepal-report.pdf , section 3.3.

179. http://www.unisdr.org/eng/mdgs-drr/national-reports/Ghana-report.pdf , sections 3.2 and 3.3.

180. http://www.unisdr.org/eng/mdgs-drr/national-reports/kenya-report.pdf , section 3.3.

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