basin news

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Disaster Prevention and Mitigation

Contents

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Publisher and correspondence address for general issues:
SKAT
Swiss Centre for Development Cooperation in Technology and Management
Vadianstrasse 42
CH-9000 St.Gallen, Switzerland
Telephone: +41 (0)71 228 54 54
Telefax: +41 (0)71 228 54 55

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Cover Photo: Teaching local masons earthquake-resistant construction after the 1976 earthquake in Guatemala. (Photo: K. Rhyner)

Editorial

Disaster prevention: Are we really trying?

'Disaster prevention' is the latest development buzzword. Finally our professional and political élite have started to realize that we might be able to ***prevent*** instead of ***repair***. After Hurricane David hit the Dominican Republic in 1979 we tried to talk about it, first in the National Emergency Committee in Santo Domingo, later with European charities that were funding reconstruction projects. Nobody was prepared to listen; all our initiatives were rejected. Almost 20 years later, the term suddenly became fashionable.

Some years ago the buzzword was 'sustainable'. It took the dictionaries several years to come up with a definition, meanwhile politicians and development workers learned quickly to build this 'codeword' into all their speeches and papers, at least once per page. The same thing seems to be happening to disaster prevention, while sustainable has found its way into the dictionary and is slowly disappearing from speeches and papers.

What are disasters?

They are 'Calamitous events, especially ones causing great damage or hardship', according to the Random House Dictionary, 'An occurrence inflicting widespread destruction and distress', according to another. These definitions seem to point towards earthquakes, floods, and wars. Many philosophers believe that the term should be interpreted in a wider sense, to include the slow degeneration of natural and social environments. Disasters do not hit all areas and nations with the same intensity and regularity, and some sections of the population have more ways and means to avoid disasters. Ultimately, disasters are the ***consequences*** of calamitous events, ones that 'cause great damage and hardship, and widespread destruction and distress'.

So should we try to prevent the conditions that lead to disasters, or should we try to prepare ourselves for recovery?

Should we insist on making cars safe and curbing drunken driving - the causes of traffic accidents - or concentrate on equipping hospitals better to treat the injuried?

The permanent disaster of extreme poverty is without doubt the main disaster that humanity should be preventing. As much as a third of the world's population is part of this calamity and this figure is growing. At international conferences Northern governments periodically promise more support and better trade conditions for the South, but the results are generally as disappointing as the behaviour of many Southern governments towards their own population.

Yet it is obvious that no serious action is being taken to eliminate extreme poverty. In the fields of housing, sanitation, and infrastructure there is no solution in sight to the ever-growing slums, squatter settlements, and rural areas lacking basic services. Preventing disasters here would need economic, social, and cultural changes that seem unlikely to happen for decades. The Namibian architect Kerry McNamara thinks that often planning strategies themselves have led to disaster and he believes that 'housing is a process, not a product'. He sees hope in the 'ingenuity of the poor to survive', and supporting them should provide plenty of work for all of us!

It is so-called 'natural disasters' that capture the public's attention on a large scale, and they bring out the best in many people. Innumerable examples exist of poor villagers in El Salvador, India, and other places who, after an earthquake, collected

We are busy creating our disasters.
(Equipo Maiz, Salvador)

food and clothing and brought them to the victims, often hundreds of kilometres away. In Europe great sums are collected from the public by different organizations.

Looking in more detail at these 'disasters', however, it seems that nature is selecting her victims mainly from among the poor. Some people and groups of people are better prepared for 'calamitous events' than others. It is mainly people living in a state of 'permanent disaster' who are most vulnerable to earthquakes, floods, hurricanes, droughts, and storms.

Millions of people live on the outskirts of Southern cities in shacks that are unable to withstand strong winds or floods, and many apparently solid buildings will collapse in an earthquake. Deficient water systems might be the cause of an epidemic after a drought or flood. There is a direct correlation between the social and economic status of the people living in one area and their ability to recover from a calamitous event. The better off live in relatively safe houses on the best sites with good infrastructure, while poorer people live with a higher risk. Otto Ruskulis analyses this phenomena in more detail and recommends better planning and implementation controls in urban building.

This leads to the question of how many of these 'natural disasters' are actually man made? Hundreds of people died in an earthquake in El Salvador last year, mainly because a speculative developer built a middle-class housing project on a hillside that was widely considered unsafe. A municipal decision to stop the project was overruled at national level, and during the quake the deforested hill with houses still under construction slid down and buried the sleeping neighbours.

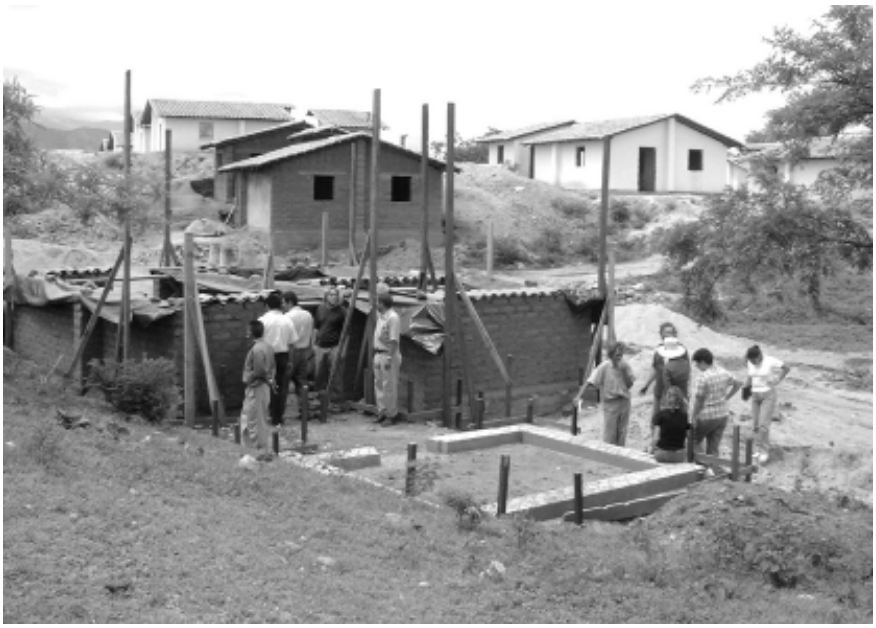
After the 1999 earthquakes in Turkey there was much discussion about the illegal shortcuts taken by construction companies that had weakened buildings and caused the death of thousands. Which was the real disaster, the earthquake or the immoral behaviour of greedy speculative builders?

Is prevention possible?

When Hurricane Mitch hit Central America in late 1998, most people in the rural areas of Nicaragua and Honduras were unaware of its approach, while at the same time international news agencies were broadcasting the development of this extraordinarily strong storm on an hourly basis. The Nicaraguan president decided 'not to alarm' his population and they were surprised when the winds and torrential rains hit them. Thousands lost their lives, and tens of thousands lost all their belongings in the many landslides, floods, and ravaging rivers.

This is in stark contrast to the situation in Cuba, where an integrated prevention systems has been established and is put into practice whenever a situation calls for it. In 1998, just a few weeks before Mitch, Hurricane George hit most of the island, from one end to the other. In its 700km path it caused damage to agriculture and to houses, but only three people were killed. Before that it had passed 200km over the neighbouring Dominican Republic, leaving behind a death toll in the hundreds and thousands of homeless people. Gilberto Quevedo, head of CIDEM in Santa Clara, explains in an interview why the same hurricane, at similar intensities, caused so much less damage in Cuba. While he stresses that safe buildings and efficient water-runoff systems are important, social organization and political will are key for prevention. In the Dominican Republic people would not abandon their endangered homes because they were afraid of looting by the army, while in Cuba more than half a million people were successfully evacuated in November 2001 for Hurricane Michelle.

Prevention is not an easy task, it never was and it never will be. Fridolin Rast tells the interesting story of how in a Swiss mountain valley disaster preparedness was tackled more than a hundred years ago. The problems were similar to those experienced by Nicaraguan mountain villagers during Mitch or Dominicans during



Good quality clay houses and a nice urban design in Nicaragua.

"Disaster prevention" semble être le dernier mot à la mode dans le domaine du développement. Devrions-nous essayer d'éviter les conditions menant à la catastrophe plutôt que d'essayer de nous y préparer ? Dans la prévention des catastrophes, les solutions techniques sont un facteur important, mais la volonté politique, la stabilité sociale, et la participation personnelle du public en sont les éléments décisifs.

La "prevención de desastres" parece ser la última palabra de moda. Entonces, ¿debemos tratar de evitar las condiciones que llevan a los desastres o tratar de prepararnos para ellos? Las soluciones técnicas son un importante factor en la prevención de desastres, pero la voluntad política, la estabilidad social y la participación personal del público son ingredientes decisivos.

Is this the future in El Salvador, or just bad taste?

How can the Hondurans in this settlement live with dignity when every storm turns their streets into rivers?

George. The difficulties were the same as today: lack of funds and the immense task of taming the local river. It is impressive to see in those old pictures how gigantic boulders were built into walls, all by hand.

Whenever a disaster occurs people try to rebuild their home. Sometimes they receive help from the outside, most often they do not. Despite the generous donations from many people around the world, there is no chance that all the families who live at risk from disaster will receive direct help. Many organizations and charities are trying to combine reconstruction with development. Habitat for Humanity is one of the large ones and, interestingly enough, they do not just engage themselves after an emergency, but recognize the victims of the permanent disaster of poverty as potential beneficiaries. Mario Flores tells us about their approach in Central America.

Mondal Hakim reports how in Bangladesh they have started to consciously use micro-concrete roofing tiles as an agent of development, while actually working in disaster relief.

While many organizations are interested in combining reconstruction and development work, balancing those concepts is not always easy. The drive to build strong houses that will withstand the next calamity may lead to solutions that could actually be detrimental to development. Externally financed projects tend to introduce into a community standards and technologies that cannot be maintained by the villagers themselves. A group of families 'receives' houses that are unaffordable to the rest of the community, and impossible for their own children to copy. This not only disrupts the social life of a village, it may also actually be detrimental to housing standards in the long run.

Over the years we have seen in many rural communities in Latin America that the emphasis on cement-based construction has not only caused social pressure to build up against clay construction, but has actually lowered standards. Young men who try to learn the building trade will only build with cement, and when confronted with a clay building they either do not know the tricks of the trade, or they try to convince the houseowner to invest in concrete. Thousands of unfinished concrete block houses in the South are testimony to this. It is a simple fact that a considerable part of the world's poor can only build a decent and solid house in one way – by using the very material under their feet, which they can convert into walls without spending money. Their scant funds can go into building a roof, which is usually the most expensive part of a simple dwelling. Generally speaking, it is the lack of comprehensive education of the tradesmen that causes many people to spend money unwisely on concrete columns and steel bars in places where they do not have any protective function.

Most reconstruction projects pretend to promote 'self help' and talk about local production and local materials. It is disturbing to see how few of them are able to push their ideas through. The perceived need to speed up construction and improve the strength of the houses most

FOR the people, WITH the people ...

... IN SPITE OF or AGAINST the people (Alfredo Martirena)

Growing urban poverty: A permanent disaster situation

The role of the architect in planning for transformation

often leads to the use of inappropriate methods. In fact they often displace local artisanal production of materials. We have an interesting study from the recent disasters that struck India from Zeenat Niazi of Development Alternatives.

Javier Quinonez from Guatemala looks back 24 years on an investigation of a clay brick (adobe) reconstruction project in an earthquake-prone area after the devastating 1976 earthquake. He recommends projects of this type, and emphasizes the need for additional education support for the public. In recent years, at least in Central America, there has been an engaged discussion among professionals over the use of clay and, even after the series of strong earthquakes in El Salvador, several projects are using adobe. Unfortunately, European project workers often ognore both science and the villagers' knowledge ond traditions and invent their own, often inappropriate, solutions.

So is disaster prevention a technical question?

No! Technical solutions are an important factor in disaster prevention, but political will, social stability, and the personal involvement of many people are the decisive ingredients.

In the last issue of ***basin news*** Eduardo Camero asked why most reconstruction projects are ugly. He made a strong statement in favour of attractive architecture and intelligent urban planning. All too often we come across reconstruction projects where social disaster within the community looks pre-programmed.

Recently I came across a small reconstruction project in Honduras where an organization had built a number of houses 'out in the green', next to the main road. The layout consisted of three straight roads, with rows of small double houses on each side. The roads went up and down a hillside, meeting at the lowest point. A few days later, a seasonal storm converted the streets into rivers and a group of houses were flooded, and one villager drowned when he wanted to cross the street. ***We say we are trying to prevent disaster, but it seems we are not trying very hard.***

Kurt Rhyner is the founder of the Grupo Sofonias, Schatzgutstr. 9, 8750 Glarus, Switzerland. E-mail: sofonias@compuserve.com

The characteristics and realities of 'underdevelopment' in the South are a potential permanent disaster based on increasing population. According to some sources, by 2040 world population could be around 10 billion, 90 per cent of whom will be living in poverty or will be destitute. How can an architect apply his professional skills to help prevent this disaster?

I believe that the essence of applying our skills in such a context is that we are ***planning for transformation***.

We are planning to transform the lives of under-resourced people from the existing undesirable condition to a better condition. We have to apply our professional skills, guided by our duty of care, to uplift the poor. People, communities, children growing up – all have natural potential. This potential unfolds over time in a supportive and enabling environment, until their potential is fulfilled. This has to do with the development of values and attitudes, in addition to the availability of resources that people need to realize this innate potential. No one is given these essential qualities or values, such as commitment, willingness, self-reliance, honesty, or the capacity for hard work. These qualities must be developed before they can be used in later life.

To develop better leg muscles, one has to exercise daily, regularly, over a long period of time. A strong muscle cannot be given to a person, but every muscle they have has the potential to become strong through the efforts of that person – and nobody else!

Should planning strategies offer handouts, easy access to finance, housing that is perceived to be free, direct subsides, etc.? It is natural that people will take advantage of such offers and become ever more dependent. If allowed to continue, this process will make citizens more of a 'liability' in social and economic planning initiatives, and will undermine the efforts of planners, who try to promote social, economic, and political discipline. The prevailing culture of non-payment for housing loans and services in Southern Africa is a typical example of what can go wrong.

It is therefore important in our integrated planning policies to encourage a thriving informal sector economy in urban areas as this is the socio-economic environment that provides the 'enabling' structures for new immigrants to develop the resources they need for stability in an urban area. Appropriately planned housing strategies must respond to the realities of this fragile socio-economic environment.

A socio-economic journey

There is a continuous circular migration pattern involving people living in rural areas at subsistence level moving to urban areas and then migrating back to the rural areas if they lose their foothold in the city. The average pattern involves three round trips of about six months before stabilizing in the urban area. Each time the person

Quel est le rôle de l'architecte dans un monde susceptible d'atteindre les dix milliards d'habitants, d'ici l'an 2040, et principalement dans les zones urbaines ? L'architecte doit aussi bien maîtriser la planification qu'être conscient que la clé du succès est dans un environnement propice à des options appropriées et abordables.

¿Cuál es el rol del arquitecto en un mundo que para el 2040 puede llegar a tener 10 billones de personas en zonas urbanas? El arquitecto debe también entender sobre planeamiento y saber que la llave del éxito es un ambiente adecuado que provea opciones apropiadas y accesibles.

Reconstructing adobe houses in Baja Verapaz, Guatemala

Bad workmanship – thick layers of plaster in this case – are often the real cause of failure in an earthquake.

Natural disasters tend to capture the public's attention, but little is learned from successful reconstruction experiences. One reconstruction project in Guatemala that began after the devastating earthquake of 4 February, 1976 has withstood the test of time and several strong earth tremors.

After the earthquake, which killed some 24,000 people and destroyed more than 250,000 houses, clay construction was branded unsafe and the government was considering a ban on 'adobe', the traditional clay construction technology widely used in Guatemala.

This project concentrated on the Department of Baja Verapaz, a hard-hit area in the centre of the country, somewhat off the beaten track, and where no other agency was supporting reconstruction. It was a practical education programme aiming to demonstrate that adobe houses could be secure while keeping costs within the reach of the poor. A team of adobe-builders was trained, and they helped people in dozens of outlying villages and small towns to build 150 houses.

In a nutshell, it was sustainable reconstruction that concentrated on building examples of earthquake-resistant houses that were affordable to the general public.

The project was initiated and totally financed by Caritas Switzerland. The major beneficiaries were 150 poor families who had lost their homes in the earthquake, plus the 18 masons who learned a new trade, several of whom later worked as village masons, bringing benefits to more poor families who then had affordable and safe homes.

The project was based entirely on popular participation. The 'new' ideas about building with adobe but improving the technique and workmanship did not arouse much enthusiasm at the beginning though, so a careful and slow build-up of confidence was needed. Through this process a deep commitment to the project was developed by many of the beneficiaries, and all the organizational decisions were taken in a management group composed of beneficiaries and masons, with the project manager the only 'outsider' included.

Theoretical education is a must for safer construction.

Now, 24 years later, Caritas Switzerland and Grupo Sofonias have financed an evaluation of the project, which was conducted by an engineering professor from the national university together with three undergraduates in Architecture and Civil Engineering.

The evaluation after 24 years

The evaluation team visited 43 of the 150 houses built by the project in urban Salamá, San Jerónimo, and San Miguel as well as in outlying villages of those three municipalities. They concentrated on the:

- social impact of the project;
- physical state of the buildings after 23 or 24 years of use; and
- potential to repeat this type of project in other earthquake-prone areas.

The technical evaluation compared the results to the instructions given in the technical manual that had been produced by Caritas Guatemala in 1976.[1] This manual has been widely used as a reference in many adobe projects throughout Latin America, and was based on a UN-sponsored investigation after the 1970 earthquake in Peru.[2]

The social impact

In the interviews, many of the homeowners said that the project had helped to unite the community and that neigh-

bourly relationships were improved through the project. A high proportion – 72 per cent – of the surveyed houses are still owned by the original beneficiaries. Many said that they were afraid of adobe after the earthquake, but today they feel comfortable and happy in their adobe house, and only 7 per cent would prefer another technology. Many young people living nearby spontaneously asked to be considered for a similar project in the future.

Only a few people have needed to add to their houses, and they have generally used the same materials and techniques as the original house. It was also noted that the technology used has been copied by neighbours. Only one house is abandoned; it was destroyed by a torrent during Hurricane Mitch.

The state of the houses

The technical evaluation found mostly positive results, but also some negative points.

The foundations were all built of cyclope concrete (stones embedded in lime-cement-sand mortar). They are generally in a good state, however some have been partly eroded by water, which indicates a lack of maintenance. One was seriously damaged by tree roots.

There was always a first layer of cyclope concrete on top of the foundations, so that the adobe did not touch the ground. This generally serves its purpose, although in some cases the adobe was still affected by humidity. (It has to be noted, however, that the evaluation was done in the rainy season.)

Twenty-four years and a few earth tremors later there are no damages.

Some adobe walls show wear and tear, The evaluation team concluded that it is possible to build houses with traditional clay technologies in seismic zones, if the necessary improvements are made. It is strongly recommended that such projects be planned and organized in harmony with the culture and traditions of the local people and surrounding landscape, as well as with traditional architectural practise.

Conclusions and recommendations

- The 24-year-old houses are generally in good condition. The differences between them are mainly a result of maintenance and different locations.
- From an architectural point of view the project is a success. There is good social integration combined with a consideration of the local culture and environment.
- The structures have behaved well under horizontal movements. The project area is in a seismic zone and the houses have withstood several tremors of considerable force, including the recent earthquakes which devastated parts of neighbouring provinces in Salvador and Mexico.
- We would recommend the realization of this type of project, where local materials are used and a harmony with the identity of the communities is created. There must be an accompanying education programme for maintenance.
- All houses with existing damage are reparable. It is interesting that the level of maintenance does not differ in rural and urban environments. It is recommended that educational material about maintenance be prepared and included in future projects.
- Humidity is sometimes a problem, mainly in the houses without external plastering and especially the ones without gutters. Adequate plastering would certainly diminish certain health problems like the ***mal de chagas*** caused by insects. It is recommended that practitioners and professionals work together to determine good practice in plastering clay walls.

[1] 'Manual para la construcción de viviendas con adobe', Caritas de Guatemala

[2] Proyecto experimental de Viviendas (Ministerio de Vivienda – Naciones Unidas, 1971)

[3] Gabriel Pons, 'La tierra como material de construccion, June 2001

Working hard for a safe house.

The EcoSouth network considers this evaluation to be very important, as in neighbouring El Salvador a series of earthquakes recently caused much destruction and heated discussions about the safety of clay buildings are once again underway. This same procedure repeats itself time and time again, and time and time again clay buildings are declared to be the worst affected. That this is not necessarily the case is demonstrated by a census taken by the Salvadorian government after the disasters in January and February 2001: clay houses were ***not*** affected more than 'cement houses'.[3]

The fact is that for many poor people in the South clay is their ***only*** chance of building a decent house.

Most publications about 'earthquake-

La réputation de la construction en terre a souffert ces derniers temps, mais ce n'est pas une fatalité. Les travaux de reconstruction effectués au Guatemala laissent conclure qu'il est bel et bien possible, dans des zones séismiques, de construire des maisons avec des technologies traditionnelles en terre, si les améliorations nécessaires y sont apportées. De tels projets doivent être préparés et organisés en harmonie avec la culture et les traditions des autochtones et du paysage environnant, ainsi qu'avec les pratiques architecturales traditionnelles.

La reputación de los edificios de arcilla ha sufrido en los últimos tiempos, pero esto no debería ser así. El trabajo de reconstrucción en Guatemala concluyó que es posible construir casas con tecnologías tradicionales de arcilla en zonas sísmicas, si se hacen las mejoras necesarias. Tales proyectos necesitan ser planeados y organizados en armonía con la cultura y las tradiciones de la gente local y el paisaje circundante, como también la práctica de la arquitectura tradicional.

Working and learning together how to built correctly to prevent damage.

Education saves lives

resistant buildings' propagate 'improvements' that are either unproven, costly, or both. The authors of this project believe that it is deficient workmanship and disregard of basic construction principles that cause the majority of failures in adobe buildings, so the project concentrated on improving those deficiencies through practical and theoretical education, as well as by building houses that are replicable for most local people without outside financing.

This project was financed by Caritas Switzerland and implemented by Kurt Rhyner, later a founding member of Grupo Sofonias. The evaluation was co-financed by Caritas Switzerland and Grupo Sofonias and conducted by Eng. Javier Quiñonez, head of the engineering research centre at Universidad de San Carlos, Guatemala, together with Arch. Maria Cifuentes, Arch. Maria Escamilla, and Eng. Luis Palencia.
Eng. Javier Quiñonez (javierquinonez@hotmail.com), Kurt Rhyner (sofonias@compuserve.com)

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There are many books and pamphlets on clay construction, but not all of them are based on sound practical or scientific experiences and facts. It is equally important to take into account the social, economic and climatic circumstances in which you plan to use clay as a building material. There are excellent technical materials on rammed earth construction in Central Europe (Dachverband Lehm, www.dachverband-lehm.de) and on adobe for the southern US (Adobe Builders Network). A standard work on clay construction, including clay-cement mixtures, is ***Earth Construction,*** written by Hugo Houben of CRATerre and published by IT Publications, London (ISBN 1 85339 193 X). Those technologies are not likely to be appropriate for general use in the South, however, and the project in Guatemala worked with 'natural adobe'.

Building with clay at a popular level is as much a question of philosophy as of technology, and the major reference book on this, which should be read by anyone directing clay projects, is still ***Architecture for the Poor*** by Hassan Fathy (University of Chicago Press, ISBN 0 226 23916 0). The best technical overview is ***Building with Earth*** by John Norton (IT Publications, ISBN 1 85339 337 1). There are many practical manuals, like the one produced by Caritas Guatemala, which is out of print but will be republished by the EcoSouth network (www.ecosur.org), or ***Vivienda de ladrillos de adobe***, published by gate (www.gtz.de/basin), and based on the Caritas manual. ***La casa de adobe sismoresistente*** (ISBN 99923 25 16 X) published by Equipo Maiz in Salvador is also based on the same concepts.

Strange as it may seem, educating schoolchildren about natural disaster was for many years the 'odd man out' of the Vietnamese school curriculum, even though experience has shown that in this field information alone is grossly inadequate and only in-depth education of the population saves lives on a large scale. It is not enough to know that a typhoon or tropical storm is on its way; it is also vital to understand which preventive measures should be taken and which reflex actions will save lives and property.

In 1999, a disaster preparedness manual was drafted jointly by the International Federation, the Vietnamese Red Cross, and UNDP, with European Union funding. First tested in three of Viet Nam´s 60 provinces, it was distributed to children aged 9-12 years, together with a teacher´s guide and a useful little gadget: a plastic bag in which parents were invited to preserve their most precious documents in the event of flooding. The book was crammed with illustrations and the subjects covered ranged from the dangers of domestic fires to flash floods.

'The manual was well received, but we took into account the comments of the children and their teachers and we started again from scratch,' relates Ian Wilderspin, the International Federation´s disaster preparedness delegate in Hanoi. This time funding came from the American Red Cross. The new version, clearer and with colour pictures (as requested by the children), it was distributed during the 2000-01 academic year in seven central provinces. The target audience is some 2,000 teachers and 95,000 children in their fifth year of primary school. 'This will enable us to reach – counting the families – half a million people in the central provinces,' underlines John Geoghegan, head of the International Federation´s Hanoi delegation.

Although it is vital to train children, education goes far beyond this. The Vietnamese Red Cross is aware of the need for greater training of its own personnel – be they volunteers or paid staff. A relatively comprehensive manual is now available to them and this finally enables shortcomings due to language difficulties to be overcome: 'There is very little in Vietnamese,' notes Wilderspin. Regular training cycles are now being introduced, with the assistance of the International Federation. And Wilderspin is very hopeful that this training can gradually spread beyond the immediate circles of the Red Cross and of children. 'Red Cross trainees are now providing very practical guidelines to the commune authorities about the things to do or not to do in case of disaster,' he argues. 'We need to shift towards community-level preparedness.'

Source:

World Disaster Report 2001, International Federation of Red Cross and Red Crescent Societies.