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WEB SPECIAL

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Disaster Reduction and the human cost of disaster IRIN Web special



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1. Introduction - Natural disasters – a heavy price to pay



Damaged grain silos and sand covered cropland caused by a Missouri river flood, USA. Credit: Charlie Rahn/NRCS

Natural disasters are happening more often, and having an ever more dramatic impact on the world in terms of both their human and economic costs.

While the number of lives lost has declined in the past 20 years - 800,000 people died from natural disasters in the 1990s, compared with 2 million in the 1970s - the number of people affected has risen. Over the past decade, the total affected by natural disasters has tripled to 2 billion.

According to the UN's Bureau for Crisis Prevention and Recovery, some 75 percent of the world's population live in areas that have been affected at least once by either an earthquake, a tropical cyclone, flooding or drought between 1980 and 2000.

"The tsunami [of December 2004] has come at a time when the world is ready for a new look and a new focus for disaster reduction. We can no longer do business as usual," Peter Walker, director of the Feinstein International Famine Centre at Tufts University, told IRIN.

"Economies are not changing as fast as climate," he added.

In December's tsunami in the Indian Ocean, an estimated 250,000-300,000 people were killed or are still missing, while millions of lives have been upturned, socially and economically, by its impact.

The International Federation of the Red Cross and Red Crescent Societies, which publishes a World Disasters Report annually, calculates that from 1994 to 1998, reported disasters averaged 428 per year. From 1999 to 2003, this figure shot up by two-thirds to an average of 707 natural disasters each year. The biggest rise occurred in developing countries, which suffered an increase of 142 percent.

In 2003, there were approximately 700 natural disasters, which killed an estimated 75,000 people and caused about US \$65 billion worth of damage, according to a 2004 report by Munich Re, an international insurance company.

Increased frequency: a changing environment

Since 1988, the Centre for Research on the Epidemiology of Disasters has kept a worldwide emergency database of disasters, called EMDAT. This contains essential information about over 14,000 disasters in the world, dating from 1900, up to the present day.

Natural disasters are divided into three specific

groups: hydro-meteorological (or weather-related), geophysical and biological. See links for detailed definitions.

EMDAT's data shows that, over the past decade, the number of natural and technological disasters has risen sharply. Both hydro-meteorological and geophysical disasters have become more common, becoming 68 percent and 62 percent respectively more frequent over the decade. This reflects longer-term trends.

Weather-related disasters still outnumber geophysical disasters by nine to one over the past decade, according to the Federation's analysis, while floods are the most-reported natural disasters in Africa, Asia and Europe. Storms with high winds are most frequent in the Americas and Oceania.



The earthquake in Kobe 1995 ripped through the city's infrastructure leaving thousands dead and starting huge fires. Credit: IRIN/Kobe Conference

The factors most often blamed for the increase in natural disasters are environmental degradation, climate change, population growth (in particular, unplanned urban growth), and the negative results of economic globalisation.

According to Walker, the world has not yet realised the importance of including disaster-reduction strategies in government policy. He told IRIN: "Adaptation to climate change is crucial. For example, there has been a 20 percent increase in severe storms recently. Disasters [as a sector] have suffered from being kept in a niche. Disasters have failed development."

Poor hardest hit when disaster strikes

Disasters are closely linked to poverty; they can wipe out decades of development in a matter of hours, in a manner that rarely happens in richer countries.

The UN's Rapid Environmental Assessment of the impact of the December 2004 tsunami noted: "Disproportionately many of the victims of this disaster were poor people who depended on ecosystem services and natural resources for their livelihoods."

Poor people in developing countries are particularly vulnerable to disasters because of where they live. Research shows that they are more likely to occupy dangerous locations, such as flood plains, river banks, steep slopes, reclaimed land and highly populated settlements of flimsy shanty homes.

Munich Re's annual review of natural catastrophes in 2003 said that the earthquake that devastated

Bam in Iran in December of that year killed more than 40,000 people mainly because their housing was not designed to handle a major tremor.

"Traditional buildings of mud brick and heavy roofing are particularly unsafe when earthquakes strike," the report stated.

A comparison of the impact of natural disasters in industrialised countries compared with developing countries mirror the same vulnerabilities and inequalities that are both the result and cause of unequal global development.

For many development strategists, and critics of globalisation, the vulnerability of the poor in the face of natural disasters is symptomatic of the poverty cycle that forces poorer communities (and nations) into a downward spiral of destitution.

Anthony Spalton of the Federation's Disaster Preparedness and Response Department told IRIN, "Only recently have we as a sector better understood the relationship between disasters and the erosion of development gains."

Figures compiled by the World Bank show that between 1990 and 2000, natural disasters resulted in damages constituting between 2 percent and 15 percent of an affected country's annual GDP.



Physical mitigation measures not only protect houses and land at risk - they are symbols of the priority local communities and authorities place on reducing disaster risks. Credit: Knud Falk/Danish Red Cross

Europe is not immune to the high economic costs of disaster either. The cost of environmental disasters in Europe is currently \$11.4 billion a year and rising, according to the European Environment Agency's 2003 assessment.

Didier J. Cherpitel, former secretary-general of the International Federation of Red Cross and Red Crescent Societies said, in the organisation's 2002 Disaster Report, "Disasters are first and foremost a major threat to development, and specifically to the development of the poorest and most marginalised people in the world - [disasters] ensure they stay poor."

For many development strategists, and critics of globalisation, the vulnerability of the poor in the face of natural disasters is symptomatic of the poverty cycle that forces poorer communities (and nations) into a downward spiral of destitution. Their plight is compounded by their inability to mitigate the impacts of the disasters they suffer.

Commenting on how ill-equipped poor countries are to recover from disasters, Anthony Spalton of the Federation's Disaster Preparedness and Response Department told IRIN, "Only recently have we as a sector better understood the relationship between disasters and the erosion of development gains."

The unequal burden of financial costs

According to the Federation's 2004 World Disasters Report, the economic cost of natural disasters has rocketed in recent years. Statistics show that the impacts vary considerably according to the level of human development attained in the countries where disasters strike.

In the past two decades alone, economic losses from natural disasters have multiplied five-fold to \$629 billion. Annual losses from weather-related events have increased in real terms from an estimated \$3.9 billion in the 1950s to \$63 billion in the 1990s, according to the report.

Economically industrialised countries tend to experience higher losses in dollar terms, but the impact as a proportion of the gross domestic product (GDP) is lower. For developing countries, disasters can cause serious setbacks to economic and social development.

According to the Federation's analysis, disasters in industrialised countries have inflicted an average of \$318 million of damage per event - over 11 times higher than the \$28 million per disaster in developing countries. This is hardly surprising when the expensive infrastructure of rich countries is taken into account, but the overall impact on the economies of rich countries is, in most cases, negligible.

GDP losses for individual events can be even more devastating: in Honduras in 1998, Hurricane Mitch caused losses equal to a staggering 41 percent of GDP. In terms of the government's annual tax revenue, the losses amounted to 292 percent.

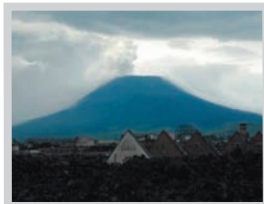
In specific areas, a natural disaster's impact can be even higher. In Aceh, Indonesia, the total estimate of damage and losses from the tsunami, according to the UN's Rapid Environmental Assessment, was \$4.45 billion - nearly 97 percent of Aceh's GDP.

Disasters therefore have serious consequences at every level: for the economy of the nation, for the affected community and for individual households. For every disaster recorded in developing countries there are thousands of stories of personal tragedy, where livelihoods of the vulnerable poor have been wiped out in moments. Whether they are fishermen, shopkeepers, farmers or labourers, a disaster may not only destroy their homes and local facilities, but also their tools, assets, clients, environments and wherewithal to survive. In the case of the 2004 tsunami, millions were affected.

Avoidable deaths?

Despite the increased number of disasters, statistics compiled by the International Federation of the Red Cross and Red Crescent Societies show that average annual death tolls have dropped from over 75,000 per year (1994 to 1998) to 59,000 per year (1999 to 2003)

indicating that to some degree mitigation and early warning provisions may be having an impact. Some argue it is the changing profile of natural disasters which affects the numbers of deaths.



A smoking Mt. Nyiragongo looms large over the city of Goma in eastern DRC, with damage from the January 2002 lava flows in foreground (taken November 2002). Credit: IRIN

Droughts and famines have proved the deadliest natural disasters worldwide in recent years, accounting for at least 275,000 deaths since 1994 - nearly half the total. However, the current estimate of 250,000 to 300,000 dead

and missing from the 2004 tsunami illustrates how a single natural disaster - in this case caused by an underwater earthquake - can hugely eclipse the annual average in minutes.

The impact of disasters in terms of casualties also varies enormously depending on the level of development in the country concerned. During the past decade, disasters in industrialised countries killed an average of 44 people per event, while disasters in developing countries killed an average of 300 people each.

From 1994 to 2003, deaths per reported disaster were on average seven times higher in countries of low development than in highly developed countries. These figures say nothing of the impact on communities who have to care for and live with those maimed and rendered disabled by a disaster.

Medical and emergency-assistance facilities available in rich and poor countries are vastly different. In many countries, where the health system is barely functioning or grossly under-resourced, the assistance given to victims of disasters may be non-existent or minimal, which results in many more deaths and injuries. In some cases, secondary health-consequences, such as the spread of disease, may also claim lives due to dysfunctional emergency health-services following a disaster.

In many industrialised countries, early-warning systems can mitigate loss of human life, as they trigger stand-by emergency services in advance of natural disasters. When countries lack the resources or organisation for early-warning mechanisms, casualties are inevitably greater.

Opportunities and inequalities in recovery

Because natural disasters hit poor people the hardest, implementing effective disaster-recovery programmes, if they are well-targeted, may be an effective means of reducing poverty, according to reports by the ProVention Consortium - an international network of public, private, non-governmental and academic organisations dedicated to reducing the impact of disasters in developing countries.

Recovery assistance can not only restore the economic stability that existed prior to the disaster, but can surpass a country's previous, often unsustainable, survival systems. Increasingly, development agencies, banks and governments see an opportunity to offer more sustainable, organised alternatives when implementing recovery programmes for communities.

A chance to change arises, as does the opportunity to avoid a development path where further natural or technological disasters are likely. These opportunities, however, are often not taken due to lack of vision, planning or resources.

In most industrialised countries, property and life are insured against loss or destruction. This allows for a faster recovery, which helps individuals and communities - as well as the country as a whole - to minimise the economic and social damage caused by a disaster. Of course, most of those affected by natural disasters are not insured against loss or damage, as they struggle against the odds merely to survive.

According to Munich Re's 2004 report, of the 700 natural disasters that took place that year, insured losses accounted for only \$15.8 billion of the \$65 billion damage.



Flooded house on sea shore during advance of Hurricane Ivan. A flooded house stands on the sea shore of Playa Cana, in the Province of Pinar del Rio, as Hurricane Ivan advances near the western part of Cuba, September 13, 2004. Credit: REUTERS/Henry Romero/courtesy of IFRC

For poorer countries, disasters represent serious setbacks in terms of any meagre economical advances. Recovery is slow or impossible due to an absence of any mechanism of insurance or government recovery-programme. In addition, any reconstruction, or repeat investment, that

follows a disaster will invariably divert funds away from development programmes to emergency relief and recovery.

Preparation is the key to mitigation

Investment in preparedness pays. Investing in strategies to mitigate the impact of disasters is not only compassionate, and a government responsibility, but it also makes economic sense.

"Progress in the meteorological and hydrological sciences shows that the impacts of natural hazards can be reduced through prevention and preparedness," Michel Jarraud, secretary-general of World Meteorological Organisation, stated in March 2004.

The World Bank and the US Geological Survey estimate that economic losses worldwide from natural disasters in the 1990s could have been reduced by \$280 billion if \$40 billion had been invested in preventive measures.

While the wisdom of hindsight is powerful, in a world of competing and scarce resources \$40 billion is no small amount to invest in preventive measures – against disasters which optimistic government officials may prefer to bet will not take place.

In China, the World Bank estimated that the \$3.15 billion spent on flood control over the past four decades of the 20th century averted losses of about \$12 billion.

A study focusing on the potential benefits of mitigation in Jamaica and Dominica showed that, in specific cases, investing in mitigation would have resulted in big gains. In relation to infrastructure like ports and schools, the benefits – calculated as ‘avoided losses’ in the event of a natural disasters – would have been between two to four times the value of the investment.

Better satellite forecasting and early-warning systems may be partly responsible for less people dying from hydro-meteorological disasters. The acceptance of disaster-preparedness, where international financial institutions, national governments and large development agencies see mitigation strategies as an important part of their work, is now recognised as crucial by experts on disaster-risk reduction.



Locals flee the swarms of locusts that invaded Senegal in August 2004. What started as a nuisance in 2004 developed into a natural disaster causing widespread food deficit in western Africa in 2005. Credit: IRIN

However, the real key to mitigating loss of human life lies in community preparedness and education about risk reduction. “Had we invested in risk reduction before, the damage that the tsunami has done to achieving the Millennium Development Goals would be far less,”

Spalton told IRIN at the World Conference on Disaster Reduction in Kobe, Japan, in January 2005.

“One of the main reasons we are here [Kobe] is to see that [investment in risk reduction] become reality. For governments to come up with cash and resources, for investment in local, regional and national disaster-mitigation and preparedness,” Spalton explained.

Salvano Briceno, head of the International Strategy for Disaster Reduction, told IRIN he was optimistic about change: “The world has advanced enormously since the Yokohama conference [on disaster reduction in 1994]. There is now a high awareness of vulnerability and natural disasters and the higher frequency of disasters.

“We have an increased knowledge of disasters caused by environmental degradation and global warming in particular, which is resulting in a rise in sea levels. There is no doubt that disaster reduction is more relevant; although there is more awareness, there is also more vulnerability, so it is a double-edged sword.”

Despite Briceno’s optimism, it remains to be seen whether international finance institutions, banks, governments and development agencies will rise to the challenges presented to them by the increasing number and severity of natural disasters. To what extent will the lessons learnt from the recent tsunami, and the resolutions of the Kobe world conference, be implemented to reduce the pain and loss disasters cause throughout the world?

Perhaps more relevantly, questions remain concerning the estimated 2 billion people affected by natural disasters in the past decade: what quality of life can they hope to recover, and will their development reduce or increase the chances of future disaster?

2. Features

Humanitarian emergencies caused by natural disasters



Forest Fires are another form of natural disaster but which can also cause millions of dollars of damage and destroy homes in a few hours or days. Credit: WMO

Gusti Agung Wesaka Puja, Indonesia's director of human rights, humanitarian and socio-cultural affairs, was visibly shaken when he described to IRIN his country's initial reaction to the tsunami on the morning of 26 December 2004. "We were all immediately

in a state of shock. So very shocked by this calamity beyond imagination," he said.

Puja described how thousands of police and military personnel also were killed as the wave swept through Aceh, washing away helicopters, vehicles, weapons and whole barracks. "They just disappeared," he said, "and we were all scrambling to help the survivors. Even on the first day lines and lines of trucks were waiting at Jakarta airport with assistance - so much spontaneous reaction from ordinary people. On the second day, the prayers were attended by everyone - Christians, Muslims and Buddhists."



POLLUTION: Years of poorly regulated emissions from modern industry have contributed to climate change and less predictable weather patterns. Experts say the main cause of increased natural disasters is climate change. Credit: UN Library

Individual natural disasters often create humanitarian emergencies that are discrete in size and affect a limited number of people. To some degree, we allow ourselves to become immune to the persistence of natural disasters and the steady toll

of destruction they wreak on lives and livelihoods around the world.

Nevertheless, the global death toll caused by natural disasters is surprisingly high - and for every death there are usually many others who have had their homes, livelihoods and communities destroyed before their eyes.

For many it has taken the tragedy - and the drama - of the Indian Ocean tsunami at the end of 2004 to reawaken an appreciation of the nature's ability to create wide-scale humanitarian emergencies.

The accumulated impact of natural disasters over the last 10 years, according to the International Federation of Red Cross and Red Crescent Societies (IFRC), has resulted in an average of 211 million people being directly affected each year, which is approximately five times more than those who are affected by conflict.

According to the same report, more than 650,000 people were killed by natural disasters during the past decade - and more than 90 percent of those who lost

their lives did so in droughts, windstorms and floods. These figures preceded the 2004 tsunami, which has now been estimated to have killed almost 300,000 people in 12 affected countries.

The last decade has seen a marked increase in the occurrence of natural disasters along with exposure to greater levels of loss of life, property and material damage. The lives of tens of thousands of civilians are at risk each time an earthquake, hurricane or other natural disaster occurs, particularly in poor countries with less developed infrastructures, high population densities and inadequate emergency preparedness.



DROUGHT: Cracked earth from lack of water and baked from the heat of the sun forms a pattern in the Nature Reserve of Popenguine, Senegal. Credit: Evan Schneider/UN Library

Many countries and regions that are vulnerable to natural disasters are poorly prepared to respond, according to the US government's National Intelligence Council. While outlining global trends and projections for humanitarian emergencies, the

organisation cited natural disasters as the primary cause of humanitarian crises.

The report said that Bangladesh and India are among the most disaster-prone countries in the world. A major cyclone hits the eastern shore of India every two to eight years. The 1999 cyclone was the country's worst natural disaster of the 20th century, and the 2001 flooding in Orissa was the most serious in 50 years.

The Caribbean islands, Colombia, Peru and Central America also are especially vulnerable to major natural disasters, while Eritrea, Ethiopia, Mozambique, Somalia, Sudan and Tanzania are identified as particularly vulnerable to drought and floods.



Wang Huai Min sits on a make-shift raft that he uses to visit his submerged house, just behind him. Wang now lives on a dyke with his family of six. He did not have time to salvage any of his belongings, and now relies on emergency assistance. Asked if he plans to rebuild his home, he replied: "With what should I build a new house?" Credit: Thorir Gudmundsson/International Federation

According to the IFRC World Disasters Report 2001, an average of 255 natural disasters occurred throughout the world each year from 1991 to 2000. From 2000 to 2003, this figure almost tripled to an average of 707 natural disasters per year. The biggest rise occurred in developing countries, which suffered an increase of 142 percent.

In 2003, there were approximately 700 natural disasters, which killed an estimated 75,000 people. What-

ever the figures are for 2004, they will be massively compounded by the single event of the tsunami at the end of that year.

The number of geophysical disasters during the last decade - volcanoes and earthquakes - remained fairly steady, but the number of hydro-meteorological disasters, including droughts, windstorms and floods, has more than doubled since 1996.

Droughts are more prone to cause sustained and long-term suffering and social dislocation as starving communities are uprooted in their search for food. The casualties of drought are also less obvious when compared with earthquakes or tsunamis, where the cause of death is clear.

Where droughts occur, people die not only of malnutrition but also of hunger-related diseases, and the whole issue of good or bad governance comes into play. The severity of drought has a socio-political dimension as well, and the humanitarian repercussions often depend on whether a government's response either impedes or encourages drought recovery and food relief.

Impoverished and densely populated countries in East and Southeast Asia are at especially high risk of natural disasters. China experiences big floods every year. Indonesia, North Korea, the Philippines and Vietnam experienced more than 120 major typhoons, earthquakes and floods during the 1990s.



Damage to a bridge, caused by rain-induced floods in Hargeysa, Somaliland. Credit: IRIN

prone rivers and fault lines.

Most of the populations living in these disaster-prone areas are poor and lack sufficient housing, infrastructure and services that can mitigate the impact of a disaster. Recent attempts to house growing populations have resulted in a surfeit of substandard housing in flood-prone and geologically unstable areas, increasing the likelihood of massive casualties in the event of a major natural disaster.

The environment where humanitarian action takes place is evolving rapidly and continually poses new challenges to the humanitarian community. There is increasing human vulnerability in crisis situations - both in what aid agencies call complex emergencies (45 million in need of life-saving assistance in 2003) and in natural disasters (200 million affected in 2003).

According to the UN Office for the Coordination of

Humanitarian Affairs (OCHA), the transition from humanitarian to development-led response in the context of complex emergencies is critical as peace is consolidated and the demand for humanitarian programmes increases (e.g., in Angola, Burundi, Cote d'Ivoire, Sudan). Poorly managed transitions can jeopardize the peace dividend as well as protract dependency and weaken state institutions, thereby threatening realisation of the Millennium Development Goals (MDGs).



Excessive snow-fall can also become a humanitarian emergency as communities become isolated and cut off from supplies as they did in Afghanistan in early 2005: here snow clearance assistance in Kyrgyzstan. Credit: Kyrgyz Emergency Ministry

The same is true, however, for major disasters, which in a matter of a few seconds or minutes can devastate areas and erode years of development work that contribute to the achievement of MDGs. The transition from conventional emergency response and immediate recovery

to reconstruction and improved development objectives is of great importance and was the subject of numerous debates and presentations at the World Disaster Reduction Conference in Kobe, Japan, in January 2005.

In spite of the repercussions in both the humanitarian and development sectors, the world still has not come to grips with how to manage and mitigate natural disasters.

In spite of the repercussions in both the humanitarian and development sectors, the world still has not come to grips with how to manage and mitigate natural disasters.

"Instead of a separate pillar of disaster-risk-reduction projects, these projects must be integrated into development," Johan Kieft, a programme leader with the international nongovernmental organisation CARE in Indonesia told IRIN. "Particularly in disaster-prone countries, risk reduction has to be integrated into development. In Indonesia we have to start working on risk reduction in relation to tsunamis now because we know enough to know that another will come sometime."

Another dominant theme throughout the Kobe conference and in current literature on disaster management, is the frustration expressed by field workers and those implementing or responding to natural disasters, who say that unless the issues are pushed "up-stream" and incorporated into all development planning and investment decisions, natural disasters will continue to be the major cause of humanitarian crises worldwide.

The special case of Mega-cities



Megacities are exposed not only to natural hazards but also and above all to technological risks, environmental hazards, and terrorist attacks. Credit: Munich Re

At 7:17 a.m. on 19 September 1985, an earthquake struck Mexico City - the largest city in the Americas and the second largest in the world, after Tokyo. It lasted a minute and a half, and measured 8.1 on the Richter scale.

More than 9,500 lives were lost, and about \$4 billion of damage occurred in a city where approximately 26 million people live today. Over 400 buildings collapsed and seven times that were seriously damaged. More than 100,000

people were left homeless.

Natural disasters are more destructive when they strike large cities, given the growing trend of high urban-population densities. In addition, increasing numbers of people living in informal, unsafe settlements make ever-larger cities more vulnerable to naturally occurring hazards.

However, preventing – or limiting - the damage caused by earthquakes, floods and fires requires that urban-disaster mitigation be tailored to the specific risks that urban settlements face. Construction needs to be regulated and safety standards enforced – especially with informal housing, which is the fastest-growing type of human settlement.

Ensuring that slums are not hardest-hit, let alone exposed in the first place, requires that serious urban-governance issues be tackled, namely the decentralisation of decision-making.

As urbanisation accelerates, and cities expand endlessly, the adoption of urban disaster-risk reduction strategies is literally becoming a matter of life and death.

The “mega-city” trend

Urbanisation, the exodus from rural areas to cities, will be a major demographic phenomenon of the 21st century, according to experts.

Whereas in 1950 only about 30 percent of the world’s population lived in cities, the United Nations Human Settlements Programme (UN-HABITAT) currently puts that figure at 50 percent. It is expected to rise to more than 60 percent by 2030.

The trend of urbanisation is both accelerating and irreversible. UN-HABITAT forecasts that, “over the next two

decades, 90 percent of population growth in developing countries will be urban.” This unprecedented explosion of municipal communities poses unique challenges to city planners in terms of disaster-risk reduction policies.

Mega-cities, a term coined in the 1970s by the United Nations to define urban settlements of eight million inhabitants or more, are particularly at risk. Currently, 280 million people live in at least 25 mega-cities across the world, three-quarters of which are located in the developing world. This figure is expected to rise to 350 million by 2015.

Of the 15 largest mega-cities, only four are located in highly industrialised countries: Tokyo, New York, Los Angeles, and Osaka-Kobe-Kyoto. The overwhelming majority of mega-cities are located in developing countries, and include such gigantic conurbations as São Paulo (17.9 million inhabitants in 2000), Delhi (14.1 million), and Manila (13.9 million).

Paradoxically, repeated natural disasters in rural areas are a major factor driving populations to cities. But most of today’s mega-cities are built in areas where earthquakes, floods, landslides and other natural disasters are most likely to happen.

The greater the density, the greater the vulnerability

Natural disasters in mega-cities are likely to cause large numbers of casualties because of the high demographic density in urban areas. Many of the casualties when a natural hazard – a flood, earthquake or fire - strikes a mega-city are due to the collapsing of buildings and other infrastructure which were designed for large numbers of residents.

In January 1995, the Great Hanshin-Awaji earthquake, which struck the Japanese city of Kobe, home to 1.5 million residents, cost more than US\$ 100 billion. The density of the city’s settlements and population not only caused high human casualties – more than 6,000 died – but was also a major impediment to rescue and relief operations attempting to access victims. Infrastructure supplying water, electricity and gas was destroyed, further impeding response efforts.

High concentrations of people and buildings mean that even moderate disasters can lead to heavy human losses.

Esteban León, disaster-management specialist for UN-HABITAT, thinks prevention is the answer. “Numbers of inhabitants are not the problem - you can have cities with high concentrations of people and avoid high casualties when disaster strikes. That is due to effective prevention,” he explained to IRIN.

“No one can prevent natural phenomena from hap-

pening. Think of trying to prevent the rain from falling. What you can do is prevent it from becoming a disaster – you won't get wet if you thought of carrying an umbrella," he added.

The danger of poverty

Unfortunately, most mega-cities are located in developing countries, with few financial or human resources to allocate to natural-disaster-risk reduction. The lack of urban-planning capacity often explains additional urban risk factors, such as badly designed or poorly constructed buildings and infrastructure.

The quality of housing construction and infrastructure is therefore essential to reducing disaster vulnerability in urban environments.



Hydro-meteorological natural disasters are more frequent than even: visiting disproportionately higher damage on poorer communities more than developed countries where risk reduction and early warning measure exists and where property is insured. Credit: AFP

This is the main reason why natural disasters disproportionately affect the poor. Poorer sections of urban populations often live in high-risk locations, such as steep or unstable hillsides and unclaimed terrain, which are especially prone to natural hazards. The poor build

cheap, reside in the most unsafe settlements, and are the first at risk.

Bam makes a good example of this. The earthquake which struck the Iranian town, home to around 200,000 people, on 26 December 2003, demolished approximately 25,000 houses, according to UN figures.

Most houses in the region were built with mud bricks – not earthquake-resistant reinforced concrete – accounting for the extreme vulnerability of the settlement to seismic activity.

According to the US Geological Survey, the earthquake measured 6.7 on the Richter scale and lasted 20 seconds. Local reports estimated that between 70 percent and 80 percent of the town's buildings were destroyed.

More than 42,000 of Bam's residents were killed. Although no mega-city, the proportion of fatalities compared to total population (more than one-fifth) is a reminder of what can happen when hazards hit populous, underdeveloped areas.

Regulating construction

UN-HABITAT defines disaster mitigation as "sustained actions to reduce or eliminate the impacts and risks associated with natural and human-caused disasters."

In the case of urban settlements, this means first and foremost creating and adopting adequate construction regulations.

Construction codes must specify proper building materials and procedures. Land-tenure codes must ensure residents have an interest in making their settlement safer, and that they are included in disaster-management efforts.

Building regulations must be effectively enforced, to ensure builders and suppliers are accountable by these standards. But enforcement of such norms is often limited by corruption and a lack of trained personnel.

Risk education

Most city dwellers are not conscious of the risk of natural hazards they face, or how to prevent them. Raising awareness among potential disaster victims is essential.

This is especially true for the masses of rural migrants recently arrived in unfamiliar cities, and for, again, the poor, who have received less education.

The perception of what constitutes risk varies from country to country, and urbanisation weakens traditional coping mechanisms. Inter-personal links, family ties and village solidarity, which are relied upon in times of hardship in rural areas, disappear in the big cities. The hazards faced in cities are also different from the ones rural inhabitants are used to.

Disaster-risk awareness can be incorporated into school curriculums, as well as the agendas of residents' associations and community-based organisations.

Disaster-management experts often regret the fact that media coverage of disasters essentially focuses on post-impact relief and response, and rarely on preventive measures.

Preventing disasters requires timely and accurate dissemination of information resulting from real-time hazard-data collection. Early-warning systems must be accessible to all.

Technologies like "geocoding", used by private insurance companies to underwrite disaster insurance premiums in cities, convert addresses into geographical longitudes and latitudes, and make a risk assessment for that area. This allows critical areas to be identified within mega-cities, and risk management to be improved.

However, despite the fact that some of the tools used by the private sector to assess vulnerabilities could significantly reduce the risk of disasters, private insurance tends to be the prerogative of highly developed countries.

Microfinance is already a feature of disaster-risk reduction initiatives in some rural areas, allowing farmers to pool resources to get insurance coverage. It has, however, hardly spread to the urban context. Public-private partnerships could also contribute to hedging

urban risks, by bringing together finance and governance experience.

Political decision-makers should also be targeted by sensitisation efforts. León deplores current approaches in the field, as illustrated by recent efforts to assist victims of the December 2004 tsunami that left millions homeless.

"Donors do not prioritise shelters and long-term infrastructure when responding to emergencies," he said. "The funding goes to water, sanitation and food-relief efforts, but not to building proper, disaster-resistant shelters," he added.

Decentralising relief efforts

Decentralising disaster-risk reduction initiatives down to local urban authorities is essential for accurate and timely monitoring, as well as for disaster prevention and response.



Urban agglomerations like Tokyo and Mexico city and many others are highly complex major risks, which present the inhabitants, politicians and the insurance industry with huge challenges.

Local communities and civil society are the first line of disaster management. A participatory approach is crucial in defining disaster-risk reduction policies and actions. Local residents and their representatives should lobby governments for improved

safety conditions – they hold central and local institutions accountable.

A strong and vibrant civil society is therefore the cornerstone of disaster-risk reduction strategies.

Central governments can help local decision-makers build capacity. But some things can only be carried out effectively at a local level: creating strong commitment to alleviate disasters; enforcing building and planning regulations; and implementing prevention and response schemes.

South Africa's National Disaster Management Act of 2002 clearly defines the roles of actors at national, municipal and regional levels. Even though it states that "the primary responsibility for disaster management in South Africa rests with the government", it ensures that "local government is also empowered to deal with a number of functions that are closely related to disaster management".

Decentralising disaster management is essential. Governments come and go, but institutional memory – the assimilation of best practices and lessons learned from past experience – must be reinforced to face irregular, but recurrent, hazards.

Slums: first exposed, hardest hit, least helped

In the majority of cases, migrants who move to cities in

search of safety and livelihoods will end up in informal and unsafe settlements.

UN-HABITAT figures for 2004 show that a quarter of the world's urban population does not have adequate housing.

More than 900 million people across the globe live in slums, which the agency defines as "contiguous settlement[s] where the inhabitants are characterised as having inadequate housing and basic services. A slum is often not recognised and addressed by the public authorities as an integral or equal part of the city."

Wild, unregulated urbanisation stretches a city's capacity to minimise residents' exposure to disasters before they happen, and to assuage the effects of hazards after they occur.

Poor planning, bad and illegal construction practices and ecological exploitation of the environment are additional vulnerabilities that threaten slum dwellers.

Poor households often have no choice but to "build cheap", and are therefore the first at risk in the event of a catastrophe.

Communities residing in "marginal settlements" have little incentive to invest in housing standards, given that they do not have secure tenure. Why spend scarce financial resources on upgrading a home you can never own?

Most slum residents are not legally entitled to settle where they do. When disaster-risk reduction strategies exist, they rarely apply to illegal tenures.

Mumbai, India, is a mega-city of more than 20 million people. Over 90 percent of its inhabitants squat in informal settlements, and construction standards specify seismic norms for government buildings only. Private housing – even legal – is not subject to earthquake-resistant construction norms.

In some instances, urban governance can be an additional agent of disaster, as slum dwellers face higher chances of being evicted from their settlement if they improve its safety, because they have made it more valuable.

Impediments to disaster-risk reduction

Poor governance, such as bad city-planning and weak public institutions, increases urban vulnerability to natural hazards.

Many developing countries do not have permanent agencies or facilities for disaster-risk reduction. They are, however, often the most exposed to natural disasters. Africa, for instance, is the continent that experiences the most rapid urban growth.

More generally, governments tend to emphasise

short-term results. A widespread culture of prevention is lacking. In a context where public resources are scarce, disaster-management decisions and actions are often influenced by political considerations, regardless of real-life vulnerabilities.

According to León, "disaster prevention is more than actions, it's a process, a way of thinking that has to be acquired."

Institutional culture may be the first obstacle to the implementation of effective disaster-risk reduction strategies in mega-cities. But mindsets change slowly, and old habits die hard.

Bridging disaster-risk reduction and development



Damaged boats waiting for repair work in the village of Ban Naem Khem in Thailand after the December 2004 tsunami. Many people who relied on boats for their livelihoods, such as fishermen, have lost not only their boats but also their homes. Credit: Yoshi Shimizu/International Federation

After Hurricane Mitch struck Honduras in 1998, causing the death of an estimated 7,000 people and the disappearance of another 8,300, President Carlos Flores declared, "We lost in 72 hours what [has] taken more than 50 years to build, bit by bit."

The Honduran losses are only one example amid hundreds of natural disasters that affect populations all over the world, again and again. According to UN figures, in the past 10 years more than 200 million people have been affected by natural disasters each year – a figure that is seven times greater than the number of those affected by conflict.

According to a statement by the relief organisation Tearfund, "Ninety-eight percent of those killed and affected by natural disasters come from developing countries, underlining the link between poverty and vulnerability to disaster."

A country's level of development has a direct impact on the damage natural hazards inflict on populations. Less-developed countries suffer most, as they are more frequently hit and more severely affected. Their weak infrastructure and limited capacity for prevention makes them more vulnerable than wealthy, industrialised nations.

In fact, developing countries are usually more severely affected by disasters of lesser magnitude. For example, the American coastline in Florida is hit year after year by hurricanes, but in spite of their vulnerability to tropical storms, communities are able to bounce back rather quickly, thanks to a stable infrastructure, early preparation for disaster, and immediate response to damage.

For this reason, relief and development organisations are looking at ways to work together to provide immediate help to vulnerable populations after a natural disaster while at the same time looking towards the

future. Disaster-risk reduction – the prevention and mitigation of populations' vulnerabilities to natural hazards – is what experts describe as the "missing link" between emergency relief operations and long-term development policies.

However, once the emergency phase of disaster response is over and reconstruction starts, most strategies aim at restoring a society's pre-disaster state. Infrastructure is rebuilt as it stood before the earthquake, flood or tsunami.

Reconstruction rarely makes communities more resilient to natural hazards, and victims are often unable to safeguard developmental achievements from future catastrophes.

From response to anticipation

Humanitarian-aid organisations have come to realise that emergency relief is only part of the response to natural hazards.

Mohammed Qazilbash directs CARE International's operations in the refugee camp of Daadab, in north-eastern Kenya, an arid region regularly affected by severe droughts. "Communities have their own coping mechanisms. Aid intervenes only when these are exhausted," he explained. The charity assists refugees with food and equipment when disaster strikes, which is almost every year.

But CARE also tries to prepare vulnerable populations before they are hit. The organisation trains households and communities to harvest and extract water from surface and under-surface water tables, in order to be better prepared for the recurrent dry spells.

Qazilbash explained the need to move beyond simple response and to anticipate disasters and their humanitarian toll. "We need to be seen as agents of change, and not only as pure, hardcore humanitarian agents. We try to provide a bridge to development initiatives," he said.

CARE's aim is to ensure that when the next dry season comes in Daadab, refugees will be able to fend for

themselves. Their livelihoods will have been made sustainable.



After December 2003's massive earthquake hit Bam, the relief and recovery process depended on traditional social networks. Credit: Christopher Black/International Federation

Development programmes that anticipate hardship minimise the need for emergency response further down the road. Without them, "millions of people will never escape the poverty trap, as with each new flood, drought or cyclone, precious gains

being made in poverty eradication are [...] swept away," according to Tearfund.

The impact of disasters is being felt globally as an eroding force, damaging years of development progress in some areas. The 26 December 2004 tsunami, for example, wiped out decades of developmental accomplishments in seconds, destroying schools, clinics, power plants and harbours essential to residents' livelihoods.

Post-disaster operations, an opportunity to reduce vulnerability

For years, development experts and field workers have emphasized that in spite of the tremendous destruction these disasters bring, post-disaster operations are an opportunity to make societies more resilient to the impact of future natural hazards.

Post-disaster recovery is an opportunity to go beyond the simple restoration of pre-existing livelihoods and infrastructure. It is a chance to implement better development policies by incorporating disaster-risk reduction strategies.

Kenneth Westgate, Regional Disaster Reduction Adviser for Africa with the UN's Bureau for Crisis Prevention and Recovery (UNDP - BCPR), explains the irony of post-disaster development and how for many affected communities the focus on well-considered development strategy only takes place after a tragedy has struck. "Relief assumes that disaster has occurred. In other words, we tend to start thinking about longer-term issues only after disaster has occurred. That is supposed to be the window of opportunity."

But the opportunity is rarely seized. After disasters strike, emergency shelters must be provided to victims as quickly as possible. This means buildings and infrastructure are often rebuilt in haste, using the same weak materials, until the next hazard flattens them once more.

The earthquake that struck the Iranian city of Bam on 26 December 2003 cost 30,000 lives and left more than 150,000 people homeless, according to local estimates. To provide shelters to residents in the dead of winter, houses were quickly rebuilt using traditional mud-bricks, a weak material hardly resistant to any

hazard, let alone powerful earthquakes.

"Relief to recovery to development is frequently relief ... to when the money runs out," adds Westgate.

The price tag of relief

Emergency response to disasters traditionally drains the major part of humanitarian funding. Westgate explained that a big-picture approach is difficult because donor funds for relief and donor funds for development are administered separately. "Relief is not enabled by the same people who enable development," he said. "There are some capacity issues here."

In 2004, agencies and governments spent at least US \$4.5 billion on emergency relief operations, according to the UN Office for Coordination of Humanitarian Affairs' (OCHA) global financial tracking system (FTS).

Figures for contributions allocated to natural disasters – for both prevention and response – during the same period amounted to \$567 million only, or roughly 12 percent of the total monitored by FTS. The figures are symptomatic of the financial and policy divide between relief, reconstruction and development. Natural disasters rarely make it to the top of donors' funding agendas.



The impact a drought has on livestock can severely set back economic stability and development in rural communities. The drought in parts of Somalia in early 2005 caused widespread livestock death. Credit: IRIN

Shelters and housing are a recurring example. Esteban León, Disaster Management Specialist for Habitat, the UN's human settlement program, explains: "donors do not prioritise shelters and other long-term programs in an emergency."

Sustainable shelters, an essential part of development strategies, are often overlooked during relief operations. "There will be funding available for food and water, for instance, but not for resistant shelters," adds León.

Reconstruction is often pointless if the underlying causes of the devastation – whether weak constructions, unplanned urbanisation, or unprepared populations -- are not addressed.

"Insuring development"

The World Conference on Natural Disaster Reduction held in Yokohama, Japan, in May 1994, stated that "disasters are the unresolved consequences of development choices that governments, private organisations and individuals make every day."

According to Feng Min Kan, who heads the UN's International Strategy for Disaster Reduction (ISDR) for Africa, "there has been a recent realisation that disaster-risk reduction is essential to making development sustainable."

The ISDR defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”

Therefore, says Kan, “disaster-risk reduction acts as an ‘insurance policy’ for sustainable development and the Millennium Development Goals,” Kan adds. Bracing for disaster will help ensure that developmental progress is safeguarded against sudden destruction.

Similarly, the UNDP-BCPR describes disaster-risk reduction as an ongoing concern that should span the entire relief-to-development continuum, and not only provide a “bridge” between emergency response and sustainable development.

Disaster-risk reduction, pillar of development sustainability

The Johannesburg Declaration on Sustainable Development, adopted by the UN in September 2002, reaffirms the need to place particular focus on natural disasters as a “severe threats to the sustainable development of our people.”

“Disaster-risk reduction impacts all areas of development: governance, poverty reduction, the environment. ... It is the link between relief and development,” says Kan. “Africa, for instance, has an opportunity to mainstream disaster-risk reduction into the relief-to-development continuum.”

Following the global impetus, the African Union and its developmental partners (including the African Development Bank) have adopted continent-wide Guidelines, a Strategy, and Recommendations compiled by the African Union and for their use.

On a policy level, this means that national governments are enticed to incorporate disaster-risk reduction measures in the much-cited PRSP frameworks that describe national policies and programmes aimed at achieving sustainable development.

“Every aspect of disaster and disaster risk is a development concern, from the mechanisms needed to ensure that the impact of disaster is reduced to the programmes that try to ensure that disaster risks are reduced over the long term,” concludes Westgate.

Disaster-risk reduction policies must permeate international assistance, whether emergency relief or long-term development, in order to preserve developing countries’ progress.

Responding to disasters – volunteers and immediate relief



Volunteers of the Sri Lanka Red Cross Society assist in the distribution of relief assistance in the Galle region following the devastating tsunami of December 2004. Credit: Till Mayer/International Federation

When an earthquake struck the city of Kobe, Japan, on 17 January 1995 - causing thousands of fatalities and extensive damage - more than a million volunteers arrived spontaneously from all over Japan to help survivors rebuild.

Despite a growing capacity for rapid mobilisation of international, professional rescue teams, it is often the disaster victims themselves who offer immediate, front-line support to their own affected communities. Local residents are pivotal in disaster-response operations, providing what would amount to billions of dollars’ worth of manpower. And their voluntary contributions often go unacknowledged.

Volunteers - the first wave

“Volunteers form the first line of response in the aftermath of any disaster,” Ramanathan Balakrishnan, of UN Volunteers, an agency that mobilizes international volunteers to support sustainable development, told IRIN in Kenya.

The same was true in Thailand, Sri Lanka and Indonesia after the December 2004 tsunami, where the outpouring of instantaneous help was massive. Thousands of locals and foreign tourists on site freely devoted days and weeks to assisting the official relief effort.

When disaster strikes - whether the emergency-response systems are improvised by the victims themselves or directed by professionals - volunteers are there.

The first 24 hours after a disaster strikes are the most critical, as it is still possible to save lives, especially in the case of earthquakes.

The two most significant roles for volunteers in the recovery phase are technical cooperation and com-

munity mobilisation: assisting rescue teams with equipment or gaining access to disaster areas, and working with the non-technical aspects of coordinating communities; helping people organise themselves, offering comfort, assisting distribution of assistance and letting people know where to go for different emergency services.

Evacuating flood or fire victims, searching for people trapped in rubble or removing bodies are part of the challenging tasks volunteers face in the immediate aftermath of disaster. Despite the damage to infrastructure and equipment, volunteers often provide for victims' initial needs such as first aid, medicine and food, often from their own meagre resources.

"In Sri Lanka alone," said Balakrishnan, "around 300,000 volunteers contributed to the immediate relief efforts. The valuation of this effort could well exceed millions of dollars."

There is an intangible value to volunteer efforts as well. "Besides the economic contribution, the social contribution that the volunteers make in the aftermath of the disasters through demonstrating attributes of sacrifice, dedication, commitment to fellow human beings is far more than the economic contribution itself," Balakrishnan explained.

Worldwide mobilisation



Thai Red Cross volunteers prepare meals for people living in the camp for displaced people in Ban Muang district in Thailand. Many of these volunteers have come from central Thailand to the damaged west coast to help the tsunami victims. Credit: Yoshi Shimizu/International Federation

Even though extensive early-warning systems throughout the globe provide data as to where disasters are most likely to occur, it is virtually impossible to predict exactly when or where they will strike.

There are hundreds of specialised agencies with disaster-reduction and disaster-response initiatives worldwide. The inter-agency International Strategy for Disaster Reduction (ISDR) has catalogued the various agencies, which include numerous national and international organisations that work with communities and volunteers. These range from scientific-research bodies that measure and respond to climate change and meteorological impact to general poverty-reduction NGOs that work to reduce vulnerability to disaster.

Some emergency-relief NGOs have established quick-response systems, which allow them to mobilise and transport professional resources over huge distances in record time. The medical NGO Médecins Sans Frontières (MSF) uses its "Kit 10,000" - a ready-made, pre-packed unit that contains the necessary equipment to provide emergency medical relief to 10,000 disaster victims. The kit can be shipped in cargo planes within hours of MSF's decision to respond.

Many of the larger, international NGOs now have similar kits for urgent disaster response. Specialised agencies in the UN and the Red Cross that deal with refugees and emergencies have developed considerable stand-by capacity as well.

The UN has established a team of disaster-management professionals through its Disaster Assessment and Coordination Unit (UNDAC), which is on permanent stand-by and can be deployed to disaster sites within 24 hours of a disaster striking. UNDAC teams carry out rapid assessments, prioritise needs and support national authorities in coordinating international relief.

Despite efforts to respond speedily to natural disasters, there are inevitably logistical, administrative or financial issues that slow down the response time. Geography, climate and absence of infrastructure also cause delays. For example, the recent tsunami destroyed roads and bridges in Indonesia, which prevented access to remote areas and forced all assistance to be brought in by air.

Global organisations with designated volunteer networks, assisted by the increasing ease in international communication technology, are now able to mobilise response at unprecedented speed. Steve Penny, the disaster-management coordinator for the International Federation of the Red Cross and Red Crescent Societies described as "fantastic tools" the combined forces of the Internet, databases and satellite communication, which enable local branch offices staffed by volunteers to make disasters known globally within minutes.

The work of the Red Cross

Developing networks of civilian nonpaid workers that reach from capital cities down to the most remote villages is a challenge few can meet. Certain religious associations and unions have networks with a strong rural reach in discrete regions of the world, but of all volunteer-centred organizations, the IFRC is the largest and most systematic. It has regarded volunteering as the very heart of the Federation since its inception in 1863.

According to its own data, IFRC claims to have a staggering 97 million members in the Red Cross / Red Crescent Movement worldwide, of whom an estimated 20 million are volunteers.

Anthony Spalton, senior officer at the Disaster Preparedness/Disaster Response Department of IFRC, Geneva, explained to IRIN, "What we need to do is invest in local response. In Bangladesh in the 1970s, where repeated flooding from cyclones was causing a lot of disruption, the Federation invested heavily in early-warning, developing a system where volunteers on bikes go around warning people when a cyclone is about to hit."

Spalton continued: "It is the local people who are

important. In Bam [2003 earthquake], it was the local people who mattered. By the time the first international SAR [search and rescue] teams came, the locals had already done first-line relief."

Community mobilisation

Emergency-response operations need to be community-based to be effective, experts stress. Regular interaction with the vulnerable communities and local authorities is needed, not only during the response period but as immediate help evolves into recovery and rehabilitation.



Volunteers have come from all over the world to the tsunami-affected areas of the Phang Nga region of Thailand to help clean up the debris and houses. Credit: Yoshi Shimizu/International Federation

UN Special Envoy for Tsunami Recovery Bill Clinton met in May 2005 with leading humanitarian agencies based in the UK for talks on how to speed up delivery of aid to the hardest-hit survivors of the 26 December tragedy. Echoing the approach widely insisted upon by

most agencies working with affected communities, Mr Clinton said, "As we transition from relief to recovery it is imperative that local communities participate in the decision-making process and that the needs of families, and especially children, are at the heart of the recovery agenda."

Recovery efforts are more successful when they are accepted and owned by the victims themselves. "The community needs to be actively involved in the recovery planning, as well as the implementation of the plan. Mobilising the community for their participation in the recovery process is a key role of foreign volunteers," Balakrishnan told IRIN.

The involvement of the community in response efforts is essential to its ability to process the psychological aspects of a catastrophe. It is the best manner of caring for survivors' mental health.

Dr. Claude de Ville de Goyet, of the World Health Organisation, wrote that "often overlooked is the unintended social consequence of the precipitous and unceremonious disposal of corpses. It constitutes just one more severe blow to the affected population, depriving them of their human right to honour the dead with a proper identification and burial." Untrained volunteers and relief workers from outside the affected culture may inadvertently offend the very people they are assisting.

Habitat, the UN's agency in charge of human settlements, also advocates civil empowerment and social mobilisation in post-disaster contexts. The agency regards community involvement as an important channel for awareness and for preventing and mitigating conflicts and crises in the aftermath of disaster. The recovery phase following disaster can offer a unique

opportunity to revisit past practices and rewrite policies concerning town planning or building standards.

Good intentions are not enough - managing disaster volunteers

During an emergency, volunteers face many organisational challenges, the least of which is not coordinating relief efforts amid chaos, grief and confusion. Organisation is essential to assisting survivors appropriately. Despite a willingness to give a hand to the needy, well-intentioned but untrained volunteers who arrive on a disaster site can obstruct salvage efforts.

The relief organisation CARE International states in its explanation of its work that, "in the face of such tragedy, many people want to put their skills and compassion to use at the site of the disaster." CARE, however, distinguishes that "well-intentioned foreigners, lacking technical skills, disaster experience and familiarity with the local culture and language, can seriously complicate relief efforts."

Volunteers helping victims in disaster areas run the risk of becoming victims themselves, as infrastructure crumbles, after-shock waves follow earthquakes and "opportunistic catastrophes" such as fires and landslides add to the dangers. The recruiting, engagement and training of volunteers is therefore a key part of disaster response.

It seems goodwill alone does not ensure appropriate disaster response. Suzanne H. Brooks, director of the Centre for International Disaster Information (CIDI), told IRIN, "Most well-intentioned volunteers without prior disaster-relief experience are rarely accepted for international relief efforts."

However, Ramanathan Balakrishnan noted, "Every volunteer has a role to play in any disaster. Depending on the skill levels, it could range from the clearing of debris, providing medical and logistics support, counselling the affected, coordinating the dissemination of information, offering IT support."

Disaster Reduction: Changes since the Kobe conference and the tsunami



Japan considers itself a world leader in earthquake analysis and disaster mitigation having learnt from the devastating earthquake that devastated Kobe in 1995. Credit: IRIN/Kobe Conference

During the opening of the World Disaster Reduction Conference this year in Kobe, Japan, UN Under-Secretary General Jan Egeland quoted a Japanese proverb: "Vision without action is a daydream: Action without vision is a nightmare." His statement was

a wake-up call to the attendees, whose mission was to agree upon a framework for reducing the frequency and impact of disaster worldwide.

The Indian Ocean tsunami of December 2004 was a powerful indication that natural disasters are having a far higher impact on human life today than ever before. The earthquake and subsequent lethal waves struck only two weeks before the conference, and helped galvanise international attention on risk reduction, a topic that had languished low on the global agenda for years.

Many attending the conference - held every decade - hoped that disaster-risk reduction finally would receive the sort of attention that invigorated other global campaigns, such as the eradication of landmines and the battle against HIV/AIDS. Three months after the conference, however, experts claim that while Kobe represented a shift in the right direction, the questions now are whether the political momentum can be sustained, and whether stakeholders - especially major development actors such as the World Bank and other international financial institutions - would heed the call to action.

Egeland, in reference to those killed by natural disasters, closed his introduction by saying, "The best way to honour the dead is to protect the living. Good intentions must be turned into concrete action."

Kobe: One step forward?

Peter Walker, director of the Feinstein International Famine Center at Tufts University in the US, said that the Kobe conference was far more "considered" than the Yokohama conference 10 years earlier.

"Yokohama was thrown together and was really a wish-list and largely irrelevant to governments attending. The Kobe agreement was more considered. It hangs together and is relevant, although the language is more careful than one would like," while explaining the content of the conference's outcome document.

Walker - a veteran of the politics and implementation of disaster reduction - felt there still were major shortcomings in the final document. The most glaring relates to climate change, which was only included in

the Kobe agreement after intensive lobbying against the US stand. Climate change is seen as a key issue by most scientists and observers who research and design mitigation programmes for natural disasters.

Some participants at the conference also expressed disappointment that little mention had been made of the Millennium Development Goals or of bad development practices as a contributor to disasters. "The ability to reach out to civil society and the business community was also a missed opportunity," said Walker, who maintained that the framework had been "couched as a state-driven process."

Amid the government delegations and donors at the week-long conference, there were also numerous civil-society representatives and delegates from international NGOs, who stressed the importance of community awareness and community involvement in mitigation initiatives. Various presenters emphasised that global or regional strategies that involve high-tech communication and scientific modelling are in the end not as effective as lifesaving mitigation that builds local capacity and knowledge.



A mobile earthquake simulator at the Kobe conference lets people feel what its like to experience an earth tremor. Credit: IRIN

Many analysts agreed that the major weakness of the outcome of the Kobe conference relates to the lack of clearly defined goals for the next 10 years. "The [final] report alludes to the possibility of targets, but does not set them," said Walker.

Fenella Frost, disaster-reduction adviser for the UK's Department for International Development (DFID), agreed that specific targets would have been better, but she also told IRIN that the outcome document from Kobe did offer a useful benchmark.

"It was a good initial step in putting down five areas that member states should focus on and take forward," she said. While the language was vague, the outcome document has called for progress in sharing expertise, raising awareness of disaster reduction globally and following up on agreements arising from the Yokohama and Johannesburg conferences.

Despite the weaknesses, Walker considered that when put into a historical context the Kobe conference was nonetheless a "great step forward".

Tsunami effect - A double-edged sword?

The challenge now facing risk-reduction activists is how to manage the heightened political interest generated by the tsunami disaster. David Peppiatt, head of the Provention Consortium, told IRIN that the political

interest in risk reduction was welcome, but there was a risk that the policies would be misguided and skewed by the December 2004 tsunami. Peppiatt told IRIN that the tsunami was a rare event, and that international policy and dialogue should not be shaped and driven by one event.

"One issue that has been tsunami-driven is the focus on high-impact, low-frequency events, when in fact the high-frequency, low-impact events cause as much, if not more, damage over the long term," he said, citing concern over a number of initiatives proposed since Kobe that focus uniquely on early warning and natural hazards.

"But equally - we don't want to lose that attention," he added. Former US President Bill Clinton's offer to spend one-third of his time on tsunami disaster response was a "great opportunity" for keeping risk reduction on the agenda, Peppiatt said.

Real progress would depend on whether this newfound attention would lead to the desired changes. "We need to stay on track and galvanise the massive investments made in the West for the benefit of developing countries," he said.



Mangled remains still litter the streets of Bam - one year on from the quake. Credit: IRIN

Peppiatt, as the manager of the Provention Consortium secretariat - a global coalition of governments, international organisations, academic institutions, the private sector and civil society aiming to reduce the impact of disaster on

developing countries - was concerned that the development perspective had been lost at Kobe. Representation was mainly from the disaster-preparedness and emergency-response communities, but development actors, such as the World Bank, "held the key to making significant inroads into the disaster-risk reduction agenda."

Development actors hold the key...

The final outcome document agreed upon at Kobe - the "Hyogo Framework for Action for 2005-2015" - aims for a "substantial reduction of disaster losses, in lives and in assets of communities and countries" in the next decade. There are three strategic goals to achieve this, of which the first two - integrating disaster-risk reduction into development policies and building institutional capacity - primarily concern development actors.

Unfortunately, disaster-risk reduction has never been seen as a development priority, said Peppiatt, who maintained that great progress could be made if development actors integrated risk reduction in their work as a non-negotiable element.

Many presenters and participants at the Kobe confer-

ence spoke of disaster reduction as an isolated pillar of theory and intervention that did not neatly fall into conventional categories of intervention such as emergency, humanitarian or development. Numerous speakers and agency chiefs spoke of the need for disaster reduction to be built into development strategies and be fully recognized as part of any serious investment or financing of development. Compelling arguments of compassion but also economy were offered when the cost of reconstruction may be between 10 or 100 times the value of what was destroyed by a natural disaster.

"A lot of current development configures or prefigures risk, contributing to greater vulnerability. The solution is to introduce risk-reduction approaches into policy that avoid development practice contributing to making communities even more vulnerable. This was not addressed at Kobe. Humanitarians are not the only community whose approach we need to change," Peppiatt told IRIN. He was referring to the need for international financing institutions, governments and major donors to understand the importance of incorporating disaster reduction into every stage of development.

Where's the leadership?

Another challenge was the lack of recognized leadership in the field. Analysts agreed that left to their own devices, governments were unlikely to promote and implement risk-reduction agendas in developing countries.

"The fact is that alongside military spending, taxation, health and other services, disaster reduction is not a big issue," said Walker, who did not expect individual member states to take the lead. Nor was it clear that the International Strategy for Disaster Reduction (ISDR) could pave the way.

Walker explained the limitations faced by the inter-agency secretariat under the authority of the UN Under-Secretary General for Humanitarian Affairs. "There's a lot of discussion on the future of ISDR. In my view, the ISDR needs to remember that it's a secretariat. It should be there to empower states to make progress and prick their conscience when they go off track. Basically, it needs to understand that its role is to encourage those countries to progress the Hyogo agreement," Walker told IRIN.

There were areas where an immediate difference could be made. The ISDR could set out a template of targets by which state actors could be held accountable, said Walker. This would provide a basis for discussion.

From a donor perspective, Frost agreed that "without an agency being proactive and keeping tabs on member states, the issue was liable to fall by the wayside." Despite the ISDR budget for early-warning activities having doubled since Kobe, many donors were not putting resources into disaster-reduction "architecture", she said.

In the absence of this “political buy-in”, it was difficult to see where innovation and leadership would emerge. “Civil society doesn’t have the clout or the single voice to move this on a global level. Elements of civil society are very active, but we’re not going to get the sort of momentum that is needed to press this issue ahead,” said Peppiatt.



Natural Disasters come in many forms: The vast locust invasion of western Africa is devastating crops in over ten countries causing food deficit crises and malnutrition. Governments and the international community were slow to respond to the initial early warning of these swarms in 2003 when effective mitigation was viable.
Credit: FAO

The manager of Provention Consortium did not see the ISDR as a catalyst. “There is a lot happening outside of the ISDR process. The UN is a key actor, but not the only actor. That reality needs to be recognized within the UN system. There is a huge amount of activity happening outside of the inter-state process,” he explained to IRIN.

Where to now?

Peppiatt considered that progress over the next 10 years would depend on how effectively the benefits of disaster mitigation were conveyed to stakeholders, especially development actors. These were long-term efforts, such as building technical expertise and introducing working policies and capacity in developing countries to incorporate risk reduction.

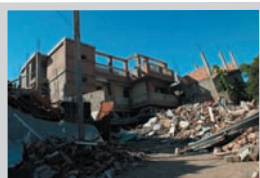
“It doesn’t happen overnight. We need to convince the developing countries to focus on things that do not produce overnight benefits. This is always hard as it doesn’t produce immediate results,” he said.

Peppiatt was encouraged by evidence that development banks were taking risk reduction more seriously. A newly released World Bank report on global hot-spots, which apparently reflects the views of senior World Bank officials in Washington, called for risk reduction to be built into programme planning. At the conference, a recorded message from the then-president of the World Bank, James Wolfensohn, told participants that the institution was totally committed to avoidance of damage and preservation of life, emphasizing that “we are sure in the World Bank that work on prevention is of critical importance.” This is a view that was echoed throughout the Kobe conference.

But it takes a while for ideas to become mainstream, and frontline agencies must wait until the day that governmental stakeholders and donors decide that disaster-risk reduction is indispensable to mainstream development. The Kobe conference put the arguments forward and brought that day much closer.

“Good development should be about reduced risk. If it’s increasing risk, then there is something fundamentally wrong – yet this is what has often happened to date. Policies are taking shape, but the challenge is to turn this into action. But at least we’re talking the right language,” said Peppiatt.

Strategies for disaster prevention – A chronology of international response



In Reghaia, Algeria, where in May 2003 an earthquake caused a 10-storey apartment block to collapse killing more than 300 people.
Credit: Chris Black/International Federation

Figures from the Emergency Events Database (EMDAT), a project that compiles disaster statistics to enhance preparedness, show that natural disasters are not only more frequent now, but they also impact the lives of more people than ever.

Climate change has been directly linked to natural catastrophes, resulting in more common hydro-meteorological disasters than ever recorded. In the December 2004 tsunami in the Indian Ocean, an estimated 250,000 to 300,000 people were killed or are still missing, while millions of lives have been upturned,

socially and economically, by its impact.

Both hydro-meteorological and geophysical disasters have grown more common, becoming 68 percent and 62 percent respectively more frequent over the last decade, according to EMDAT’s figures. This reflects longer-term trends.

According to Feng Min Kan, who directs the International Strategy for Disaster Reduction (ISDR) for Africa, a UN agency that coordinates African governments’ disaster risk reduction (DRR) initiatives and advocates DRR policies, the notion that the impact of natural disasters can be reduced or mitigated is relatively recent.

“The 1970s witnessed a growing sense that disaster risks can actually be reduced. In the 1980s, the

damage caused by natural disasters increased dramatically. This is what led to the adoption of the International Decade for Natural Disaster Reduction during the 1990s," Kan told IRIN.

In 1989, the UN General Assembly proclaimed the coming decade - 1 January 1990 to 1 January 2000 - the International Decade for Natural Disaster Reduction (IDNDR). Its goal was to provide a disaster-reduction "roadmap" for the international community.



Damage caused by rain-induced floods in Hargeysa, Somaliland. Credit: IRIN

This global campaign, launched under the aegis of the UN, aimed at sensitising national authorities to the importance of DRR. The UN defines DRR as a conceptual framework to "minimize vulnerabilities and disaster risks throughout a society." DRR strategies

include measures to avoid, mitigate or prepare for natural disasters.

Civil society also was involved in the campaign. The International Federation of the Red Cross (IFRC), which is made up of national societies in most nations of the world, has long been an active member of the movement. It has consistently provided the UN and governments with information and experience collected from the ground during its disaster-response operations.

The Red Cross and Red Crescent societies - who often are the first to respond to catastrophes - focus on operations at the community level, which enables them to identify and share good practices through their networks. The IFRC documents the scale of and response to disasters in their "World Disasters Report", which they publish annually.

The IDNDR aimed to increase the capacity of countries - especially developing ones - to respond to disasters, notably by emphasising early warning systems. It promoted the adoption of appropriate guidelines and strategies and the dissemination of knowledge for the assessment, prediction and mitigation of natural disasters.

As members of the secretariat, governments were called upon to formulate national disaster-mitigation programmes, to participate in concerted international actions - such as the regional pooling of resources to create disaster monitoring and follow-up mechanisms - and to increase general public awareness of disaster risk.

The IDNDR secretariat was required to facilitate and coordinate national efforts, particularly through the establishment of a scientific and technical committee, which developed overall programmes to be taken into account in bilateral and multilateral cooperation.

This plan was conceived as an international DRR blueprint emphasising awareness and capacity building at a national and local level and advocated incorporating DRR strategies into national law. It also recommended the establishment of regional centres for disaster reduction and prevention, focusing especially on vulnerable developing countries.

Evaluations conducted during the decade emphasised the need for regional coordination and response through regional groupings. In Africa, for instance, this led to discussions between African environmental and foreign affairs ministers and members of the then-Organisation of African Unity (now the African Union). This culminated in the Nairobi Declaration on Natural Disaster Reduction, which was adopted at the conclusion of the IDNDR UN Environment Program (UNEP) meeting for Africa in May 1999.

Concurrently, NGOs' awareness of the importance of DRR in fulfilling their mandate increased during the 1990s. International relief organisations also involved in development, such as Oxfam, Care and Save the Children, launched disaster-mitigation programmes and incorporated disaster prevention in their operations.



A man surveys the damage to his damaged home in Bam. Credit: IRIN

Civil society often casts a sceptical eye on governmental policy discussions and conceptual debates, repeatedly emphasising that disaster reduction first and foremost must be community focused and address needs at the grassroots level. Many NGOs pushed for less advocacy and meetings, and more concrete, on-the-ground programmes.

The Geneva Forum reaffirmed that "vulnerability [to disasters] can be reduced, [which] makes disaster reduction not a random choice but a moral imperative," and subsequently recommended necessary institutional arrangements for the UN's DRR activities. It recognised the need for an interagency task force for natural disaster reduction.

Feng Min Kan, director of ISDR Africa, told IRIN, "The 1999 wrap-up meeting of the decade in Geneva was the opportunity for governments to propose a successor to it, the International Strategy for Disaster Reduction (ISDR), which the General Assembly approved in 2000."

The ISDR's report "A Safer World for the Twenty-First Century: Risk and Disaster Reduction" was developed as a framework for future DRR activities within the UN system. According to the report presented by Secretary-General Kofi Annan to the General Assembly, "The main objectives of the Strategy are: (a) to enable

communities to become resilient to [...] hazards[...]; and (b) to proceed from protection against hazards to the management of risk, by integrating risk prevention strategies into sustainable development activities.”



The tsunami that struck in late December 2004 was a clear call to international agencies to translate much-discussed mitigation and prevention strategies into action. Credit: IRIN

The ISDR secretariat, based in Geneva since 2001, was set up as an interagency task force to serve as the main UN forum for devising DRR strategies and policies. It was charged with identifying gaps in existing DRR policies and programmes and coordinating UN agen-

cies involved in DRR. This continues to be one of its central objectives.

The ISDR was to be achieved along four main lines: increasing public awareness, obtaining commitment from public authorities, stimulating interdisciplinary partnerships and improving scientific knowledge of the causes of disasters.

From awareness to implementation? – Preparing for Kobe 2005

Looking back on the UN’s DRR activities up to 2004, Kofi Annan reported to the UN General Assembly that “the ISDR secretariat has increasingly served as a reference centre and information clearing house on DRR issues, involving governments and expert organisations.”

While the ISDR had developed a policy framework for guiding and monitoring DRR initiatives, there was a growing sentiment that “progress [in the field of DRR] is still seriously handicapped by a lack of systematic implementation,” said Annan.

Tearfund, a relief and development agency, summed up many NGOs’ perception of government policy concerning disasters in a briefing published in preparation for the World Disaster Reduction Conference

in January 2005 in Kobe, Japan: “There was a time when we did not know where disasters would strike. But today we know which countries are most disaster prone. Flooding in Bangladesh and drought in Ethiopia are hardly a surprise.”

Tearfund, like many other relief organisations, stressed the importance of implementing DRR and called for more operations, less paper: “It is both indefensible and illogical not to help communities prepare for disasters, when very often thousands of lives could be saved by even the simplest of measures.”

Just three weeks before the conference, a devastating tsunami struck Asia and parts of Eastern Africa, killing over 300,000 people and washing away billions of dollars worth of property.

“The tsunami raised interest in the Kobe Conference,” said Kan. “However, it also hijacked discussions of many other topics.”



Whole villages can be enveloped and destroyed by sudden floods as this village in Madagascar in 2004, forcing people to flee and forcing governments and the international community to face natural disasters as a real threat to the MDGs. Credit: Conseil National de Secours

Instead of focusing on the implementation of long-term DRR strategies as a means of safeguarding sustainable development, attendees - and the rest of the world - rolled up their sleeves and formulated plans for providing immediate response and relief to millions of tsunami victims as well as early

warning plans to prevent a repeat of December 2004.

The tsunami may have stolen the spotlight from DRR during the Kobe conference, but at the same time it was a striking example of the impact of natural disaster - and focused people on the moral imperative to do everything possible to minimise vulnerability around the world.

3. Reports

ERITREA: Drought a major cause of hardship



A young man ploughs his fields with a couple of oxen and single furrow plough. Eritrea has suffered from reduced rainfall in the past few years, and water tables have dropped by several metres all over the country. This photo was taken May 2005 just south of Adi Keih in southern Eritrea. Credit: IRIN

Of all the natural disasters that strike communities and environments, a drought can be the most devastating. If it develops into a full-blown famine or forces people to leave their homes or become dependent on external food aid, drought becomes a humanitarian crisis.

and its preparations to strengthen defences on the border.

The 1998-2000 Ethiopian-Eritrean border war, which was fought mostly in Eritrean territory, killed between 70,000 and 100,000 people and displaced almost one-third of Eritrea's population.

It also left behind an unpleasant legacy of mines and battered infrastructure throughout the border region, and especially in Eritrea's most fertile region in the southwest.

Unlike the more dramatic "acts of God", such as volcanoes, earthquakes or tsunamis, the full impact of a drought is more closely related to a country's ability to respond or mitigate the failure of rains. Fragile state structures, underdeveloped infrastructure, poor agricultural practices and issues of governance are as important in this equation as the absence of water itself.

Relations between the two countries have hardly improved since the end of the conflict. When they signed a peace agreement in December 2000, both countries agreed that an independent boundary commission would make a "final and binding" decision on where the border should be. But the Boundary Commission decision, produced in April 2002, was later rejected by Ethiopia.

Travelling around Eritrea today, one often finds young boys digging in dry river beds to find water for their bony animals, or a slow procession of donkeys and their owners carrying water home through the heat of the day.

Three years on, the position of both countries remains essentially the same: Ethiopia says it will demarcate the border but would like to negotiate first (although it appears unwilling to do so). Meanwhile, Eritrea refuses to compromise on an international agreement.

The water table throughout the country has dropped by several metres, relief workers and government officials say, thanks to a drought that has dragged on for years.

So, how has a border dispute affected Eritrea's rapidly declining food security?

"We have had very, very little rain, especially in the past three or four years," Ali Abdu, Eritrea's information minister, told IRIN. "Almost one-third of our population was attacked by that."

Some 2.3 million people in Eritrea, almost two-thirds of the population, depend on varying levels of food aid. And although 80 percent of the population is rural, the country only produced 85,000 mt of cereals in 2004 - just 15 percent of its annual requirement and 47 percent of its average harvest over the last twelve years.



A young boy gives water to his cattle from a hole dug into a dry river bed. Eritrea has suffered from reduced rainfall in the past few years, and water tables have dropped by several metres all over the country. Credit: IRIN

The most obvious impact is the redistribution of money and manpower: An estimated 300,000 people are currently serving in Eritrea's military instead of contributing to the country's economy. In addition, government sources said, the dispute has forced Eritrea to put a lot of its scarce resources

into military spending. Along with fuel shortages and rising prices of consumer goods, the already weak economy has declined.

One million Eritreans are likely to go hungry this year, unless donors can step up their food aid, a senior government official told IRIN in early May.

While it would be easy to pin the blame on long-term drought and the exhaustion of coping strategies, relief workers in Eritrea say these are not the only reasons for the country's precarious food-security situation.

"We are dealing with four years of consecutive drought," Yemane Gebremeskal, presidential advisor and chief government spokesman, told IRIN in an interview at his office. "This [drought] has eroded coping mechanisms and is putting severe pressure on the government. The overall security situation has also [had] an impact."

"Food security is more complicated than getting enough rain, or even producing enough food," said a relief worker who did not want to be named. He felt that the failure to produce adequate food crops since 1998 was also linked to Eritrea's conflict with Ethiopia

Following an assessment visit to Eritrea at the end of 2004, the UN World Food Programme (WFP) and the UN's Food and Agriculture Organization (FAO) said in a January 2005 report, "The shortage of labour was

observed everywhere.”

While their husbands serve in the military, women take on the responsibility of being head of the household. Because tradition frowns upon a woman working a plough, one-third of these women are forced to hire labourers to cultivate their land, compounding an already difficult situation.



Water shortages are a perennial problem in many parts of Eritrea. This man from the Afar tribe is collecting water near Idi, in Southern Red Sea zoba. However, this limited amount and poor quality of drinking water is severely affecting the health of his family and livestock. Credit: Eddy Posthuma de Boer/International Federation

“Due to continued critical shortage of labour, the wage rates this year have been observed to be very high [...] Since farmers cannot afford to pay such high wages [...] critical field operations such as weeding have generally been neglected,” said the WFP/FAO report.

“The absence of many young men for national mobilisation reduces the range of household income-earning opportunities and coping strategies, such as livestock raising and off-farm employment,” said the most recent report on Eritrea by the USAID-funded Famine Early Warning Systems Network (FEWS Net) at the end of April.

Farmers in the southwestern province of Gash-Barka, Eritrea’s main bread basket, told IRIN they could produce much more if their sons who were in the army could help them with irrigation and dam-building during the rainy season.

The government argues that soldiers work in state-run and private farms during the agricultural season, making up for manpower that otherwise would have been lost. Yemane also said that the military had constructed the water and drainage systems and houses in Asmara. “In a time of relative peace, 90 percent of the army works in the productive sectors,” he explained. “We have never lived in a situation where the army is simply a fighting force.”

It is worth pointing out that some of Eritrea’s most fertile land is within the Temporary Security Zone (TSZ), a 25-km wide demilitarised zone that runs along Eritrea’s southern boundary and is still patrolled by UN peacekeepers. The TSZ once accounted for a significant proportion of Eritrean food production, though precisely how much is impossible to say.

Roughly 50,000 Eritrean internally displaced persons (IDPs) are still living in camps away from the TSZ, unable to return to their ruined villages until the last of the mines have been cleared.

Eritrea’s borders with both Ethiopia and Sudan remain officially closed while tensions in the region persist. The border with Sudan was closed in late 2002, with both sides accusing each other of supporting armed opposition in the other’s territory.

The border closures have affected the agricultural sector in two significant ways, by limiting grazing areas and by restricting access to markets.

Pastoralists can no longer follow rains across national boundaries. Regional tensions have severely limited the coping strategies of pastoralists, who were once the powerhouse of Eritrean agriculture. The government has been encouraging pastoralists to settle, but adaptation has not been easy, sources say.

“We have not had a census for a long time, but pastoralism is still a very important sector,” a source said. “Normally, if they move, they go in search of pasture. But now very few are moving because of the closed borders. So the pressure on forage is worse than ever before,” he added.

The closed borders have also blocked a key supply of food, driving food prices higher.

“The loss of access to Ethiopian and Sudanese food markets, on which Eritrea traditionally depended for about one-third of its primary food supply, may have contributed to the current escalation of food grains prices in Eritrea,” said the FEWS Net report.



It is not only human beings that are suffering as a result of the drought. Tens of thousands of animals have also perished. In Hashishai, this weakened camel waits for water. The coping mechanisms of the population have been severely reduced, as sick or dead livestock provides little in the way of income. Credit: Eddy Posthuma de Boer/International Federation

Food-security experts prioritise the distribution of food aid to the most vulnerable groups, but Eritrean custom dictates that those groups who receive food aid share it. This tradition of sharing compromises the targeting somewhat: As a result, malnutrition in Eritrea is high - and lingering. But starvation,

said relief workers, is rare.

The Ministry of Agriculture was unavailable to comment, but the government supports irrigation schemes, the livestock sector in general, and the distribution of food and seeds. In a situation of poor food security, however, a constant tension always exists between agricultural development and short-term food distribution. Seeds distributed for planting are sometimes eaten instead.

For the long term, food security in Eritrea will not depend solely on the weather. Drought is a problem that persists in this semi-arid country, but other factors - like good governance and economic stability - play an important role.

“The problem is not just to produce food, but also to earn enough money so that people can afford to eat,” said an aid worker.

KENYA: Grassroots disaster-prevention in western Kenya



Floods in Western Kenya, March 2003.
Credit: Tony Mwangi/ Kenya Red Cross Society

A 1999 study commissioned by the United Nations Secretariat for the International Decade for Natural Disaster Reduction (IDNDR) described sub-Saharan Africa's vulnerability to natural hazards in the following terms:

"The situation in most countries on the African continent continues to deteriorate at an alarming rate, and the objectives of the United Nations General Assembly resolution establishing the IDNDR are not being met.

"Disasters are not increasing because of the increase in the frequency of hazards, but because of the increasing vulnerability to hazards."

This assessment can be applied to Kenya, particularly its western region.

Flood season

Twice a year, as the rainy seasons draw near, Kenyans across the country gaze expectantly at the sky in the hope of generous showers that will fertilise the land most of them subsist on.

But in Kenya's western provinces, the rains are dreaded.

Every year, the region that stretches from the eastern banks of Lake Victoria to the 2,000 m-high escarpment of the Nandi Hills is flooded. Properties and livelihoods are drowned, and deadly waterborne diseases such as malaria, bilharzia, cholera, dysentery and typhoid are spread.

To cope with this recurrent natural disaster, the Kenyan Red Cross Society (KRC) has launched a province-wide campaign to prevent damage to people and property.

Despite a debilitating lack of means, crushing poverty, and one of the highest incidences of HIV/AIDS in the country, some farmers have successfully resisted the rising waters of the long rains, which drench the region each spring.

Man-made erosion, nature's disaster

In the province of Nyanza, regular flooding began in 1985. The ever-growing population has put unprecedented strain on the environment. Trees have been felled to make firewood, houses and utensils, and overgrazing by herds has accelerated soil erosion, clearing the way for gushing streams that form in the plains during each rainy season.

Man's ecological footprint – increased soil erosion – has turned against him by making farmlands more prone to flooding, in a region where floods were once exceptional.

Every year in April rain pours down the Nandi Hills into the plains of Nyanza, running through the rising rivers that feed Lake Victoria, the world's second largest freshwater lake. The luxuriant swamps gradually become clogged, and the rivers overflow to flood the fields. At the same time, the lake expands to engulf arable lands.

In 2004, a single week of rain was enough to cause floods that wreaked havoc on 10,000 residents, according to Philimon Majwa, coordinator of the KRC branch in Kisumu, the provincial capital.

Entire fields of cassava [a staple food crop] were turned to swamps, cattle drowned, huts were washed away, and the few concrete buildings of the region were inundated.

Those who lose their meagre belongings every spring are too poor to afford insurance schemes to cover their losses.

Isaac Adede, a geography teacher and Red Cross volunteer in Awasi, a village located in the Nyando district flood plains, has tried to convince victims of the floods to relocate to less vulnerable grounds. "But they won't leave - after each flood they come back. They say they can't leave their land, where ancestors and family members are laid to rest," he told IRIN.

Talking about the weather

The KRC has been training local communities to prevent and respond to floods for two years. "Until our leaders realise we must act at the community level, we'll face the same problems every year," Majwa explained.

Red Cross volunteers have been teaching villagers that cutting down trees increases the risk of flooding. According to Majwa, the poor level of education in the region explains the lack of awareness of the risks that erosion presents.

In addition, the KRC has also been training residents to be efficient first-line responders to disaster by teaching them first aid, as well as hygiene practices. "The main advantage of the Red Cross is our structure: our network of volunteers goes right down to the community level," said Majwa.

Raising local residents' awareness is crucial, as prevention is the only possible mitigation for natural disasters of this magnitude.

Fighting torrents with shovels

To keep their settlements from being flooded, communities have no choice but to prepare for the waters that inevitably come each year.



Kenyan government excavator enlarging river beds before the March 2003 rains in Nyanza Province. Credit: IRIN

Pointing at what looked like a series of black veins on a hydrological map of the Nyando plains, Adede explained the preventive strategy.

Soil in the region is mostly clay, preventing absorption by the subterranean water tables.

But proper drainage of the excess precipitation into the lake must be ensured. This is done by draining existing waterways and enlarging riverbeds, so that water runs all the way to the lake.

A process of de-silting must be repeated after each flood, as rushing water shifts the soil and builds up banks that tamper with the flow. Despite visible efforts, the government has insufficient machinery and means to carry out sufficient de-silting.

Buildings and plots of lands must be protected from the rising tide. Residents dig trenches and build dams around their plots, some extending for hundreds of metres. When the flooding starts, most residents take up shelter on fortified school compounds, some of which are accessed by elevated footbridges made of rough wood planks.

Such operations require either heavy machinery, or intensive labour. Both are hard to come by in the region. The local government is cash-strapped, while residents are poor and struggle to cope with disease.

How disease and poverty help hazards

According to a recent report by the Society for International Development on Inequality in Kenya, the province of Nyanza is the region hardest-hit by HIV/AIDS.

"Even though AIDS is a disaster in itself, it is also a contributor to [the impact of] natural disasters," Majwa told IRIN. The virus wipes out the workforce in its prime, leaving elders and youngsters to carry out the demanding physical tasks of digging ditches and building dams.

Poverty is also a factor. The material means to take preventive measures are often lacking. As a result, food-for-work schemes have been carried out by local authorities, providing meals to residents who spend a day labouring.

But this is rarely enough. "Last year, the government provided food on three occasions, for about a day's work each time," said Adede.

Despite the enormity of the task, some preventive

operations do succeed.

Saving Badalangi

Badalangi, a region in Western province, north of Nyanza, borders the upper part of Lake Victoria. It has flooded consistently every spring since 1969, due to man-made erosion and deforestation.

Kenya's government started building dykes in 1981, according to Ali Husseyn, who volunteers at the local branch of the Red Cross. But they broke repeatedly, unable to prevent millions of cubic metres of water gushing in from local tributaries to Lake Victoria and flooding fields.

In 2003, the floods were so severe that they caused 21,000 residents to be displaced and sheltered in temporary camps, Husseyn recounted.

Settlements in the region consist of tiny huts, made of mud stacked on fragile wooden frames and covered by a thatched roof. The floods wash them away instantly.



Floods in Western Kenya, March 2003. Credit: Tony Mwangi/Kenya Red Cross Society

However, the following year the government dispatched army troops and the National Youth Service, a community-support government organisation, to help locals erect higher, more robust dykes.

The scheme was a success. In the spring of 2004, the inevitable floods did not reach the fields.

However, the dykes must be constantly monitored and maintained.

Elias Nyongesa, a farmer from the village of Igingo, has participated in the year-long effort to uphold the flood-resistant obstacles. "When the floods come, if the dykes break, we have no alternative but to go to the IDP camp," he said.

Villagers therefore reinforce dykes and ditches under the direction of village committees. Trees are planted along the edges to hold the soil in place. The fast-growing eucalyptus tree, which reaches a satisfactory height in five years, is a favourite. Papyrus is sown between the dykes and the threatening rivers, as it absorbs a high volume of water and breaks the velocity of the streams' overflow.

But even if the villagers were willing to relocate to higher ground, out of the reach of the floods, the government rarely provides plots to re-accommodate entire villages.

And so, as the rains come, season after season, the wretched urban slums of nearby Kisumu seem increasingly attractive to those who have nothing left to lose.

KENYA: Dearth of resources, poor planning expose many to effects of drought



Droughts also can have a devastating effect on livestock. For most rural pastoralists it is their final insurance and back up wealth in times of hardship. The loss of livestock takes many years to restock with minimal if any external assistance. Credit: IRIN

Kenya, like several other countries in the Horn of Africa region, is frequently affected by drought, and populations in the country's arid and semi-arid areas bear the brunt of food insecurity, water shortages and livestock loss.

Drought is a recurrent natural disaster whose

humanitarian impact is no less devastating than other, more sudden disasters like floods or earthquakes. But because drought is more of a process than an event – with a subtle beginning and a severity that builds gradually over time – it is often overlooked as a disaster. According to the International Federation of the Red Cross and Red Crescent Societies (IFCR) annual World Disasters Report, drought causes more deaths than any other natural disaster.

Drought is difficult for experts and emergency-response actors to deal with because its impact and severity are often determined by a wide range of elements beyond their control. Issues of governance, equitable food distribution and logistics of food transport to marginalised areas come into play, as well as the need for long-term mitigation strategies.

Throughout history, many regions of the world have experienced drought, with varying degrees of impact. Drought is a natural disaster that without proper management triggers other, man-made tragedies like famine, widespread displacement and death. Because of this, preparation for and response to drought is more complex and politically charged than other natural disasters.

In April, the UN World Food Programme (WFP) said that up to two million Kenyans, most of them residents of arid or semi-arid regions of the country, will need food assistance this year.

Over 80 percent of Kenya's landmass is arid or semi-arid and receives low and unevenly distributed rainfall, according to the Arid Lands Resource Management Project (ALRMP), a department within the Office of the President tasked with reducing vulnerability among residents of drought-prone areas.

Despite low precipitation levels and recurrent droughts, development experts say that with better planning and increased resource allocation to the agriculture sector Kenya has the capacity to rid itself of food insecurity.

"The strategies that have been used have not been focusing on sustainable mechanisms of ensuring that there is food security continuously," said Lawrence

Mwagwabi, programme development coordinator with ActionAid Kenya.

"Kenya has 660,000 ha of irrigable land, yet year in, year out we talk about rain failure and inability to produce. The reality is that if we irrigated these 660,000 ha, then there is definitely a possibility of addressing the food-security situation," he explained.

Mwagwabi said that there was also a tendency in Kenya to rely too much on maize and neglect traditional drought-resistant crops.

The provision of relief food over long periods tends to create a cycle of dependency among the affected communities, he added, especially if they repeatedly suffer from the effects of drought.

"We have created some form of dependency: Communities that have been continuously exposed to food relief have actually ended up depending on food relief and not exploiting any other opportunities within their own environment to sustain themselves," said Mwagwabi.

He thinks the best way for the government to support communities that frequently depend in food aid is to improve their coping mechanisms.

"The good thing is that we have a lot of expertise that has not been tapped. We have all these NGOs doing a lot of beautiful work on the ground, but where is the synergy?" asked Mwagwabi. "I think that government needs to look into how all these people can be brought together - even the farmers - to try to look at mechanisms that we can exploit.

"When I was working in Malindi, an area that has been exposed to a lot of relief food, we had a discussion with the community and looked at the situation they were experiencing and the opportunities that were available to address the food-security issues. We started with a very small project, tapping water from the Galana [River] and irrigating the land around that river, and the result was actually very exciting. That year [2002] we were actually able to contain the food [shortage] situation," said Mwagwabi.

Communities and the government should learn from these small success stories and develop "a strategy that can really ensure that we have food on a day-to-day basis, rather than saying we wait until we start asking for pledges from friendly countries," he said.

This past February, in a bid to address the problem of food insecurity, the Kenyan government collaborated with donors and launched a plan to improve agricultural production. Implementation of the programme included making quality seeds available to farmers, maintaining soil fertility, improving small-scale water-management projects and strengthening farmers'

advisory services.

"It is unacceptable that so long after our independence we are unable to produce enough food for all our people," President Mwai Kibaki said during the launch of the plan on 22 February.

The president said that an economic-recovery programme for the arid and semi-arid areas of the north and the northeast, where livestock production accounted for about 90 percent of employment and family incomes had also been drafted.

The plan focused on increasing pastoral-livestock production by providing water, establishing disease-free zones, improving breeding services and promoting an efficient, private-sector-led marketing system, he said.

Mwagawbi said that the government needed to make sure that there were sufficient resources to fund the implementation of the new food-security policies.

"I think there has been much talk and less action, possibly due to the lack of resources," he said. "The ministry of agriculture has not been given the prominence it deserves. I see frustration at all levels, and I think that is because they [agriculture officials] see that they cannot do much. There is a bit of apathy," he added.

"A lot of political will is needed and commitment is required. Tana River alone can actually feed the country if we use the river well," said Mwagawbi.

Since 1996, the government also has been implementing the Arid Lands Resource Management Project (ALRMP), which is aimed at improving food security in the drier regions of the country.

But even some of the project's officials acknowledge that their efforts have been concentrated more on reacting to the effects of drought than on addressing long-term food security: "Our impact is seen more when there is a breakdown [in food availability] than when things are normal," said Salim Shabani, a drought-management officer with ALRMP.

He said that ALRMP's mandate included early warning, the drafting of intervention programmes during times of drought and the preparation of long-term strategies to help communities in drought-prone districts prepare for emergencies.

"We try to build the capacity of the people so that they can take care of themselves. We develop water [sources], we encourage crop production, we support health [facilities]," said Shabani.

An ALRMP document cites as one of its success stories a project started in 1997 among the fishing communities that live along the shores of Lake Turkana in northern Kenya, a region considered one of the most food insecure in the country.

Some 7,000 people involved in the fishing industry formed groups of 20 and were provided with fishing equipment. They were also taught methods of drying and processing fish, while others learned how to make and repair boats and nets.

Annual fish output rose from 4,000 mt to 8,000 mt in five years, and under-five child malnutrition rates decreased significantly because of the abundant availability of a fish diet rich in protein, according to an ALRMP document.

Not all drought-mitigation efforts, however, are successful. According to a senior disaster-management official with an international NGO, many government-run programmes have not been effective largely because of what he called a "top-bottom" approach to planning.

"Unless you plan proactively from bottom to top, then you are not addressing the issues affecting the communities," said the official, who asked not to be named. "That is one signal I have personally from my experience with the government," he added.

"You have to plan with the community, get them to know their own risks, build their capacity and then develop a proposal jointly with them, implement the proposal with them, evaluate the project with them.

"Top-bottom bureaucracy is a problem. You may be given a project which at the end of the day is not of any significance to the reality on the ground," he added.

Once again, the issues of governance and land management, mitigation strategies and political will are crucial factors that determine whether drought will trigger a humanitarian crisis.

4. Interviews

Interview with Sálvano Briceño, director of the International Strategy for Disaster Reduction



Salvano Briceño, Head of ISDR at the Kobe Conference, with Yvette Stevens of OCHA. Credit: IRIN

The International Strategy for Disaster Reduction (ISDR) is a UN inter-agency secretariat and task force under the authority of the under-secretary-general for humanitarian affairs.

January's World Conference for Disaster Reduction, in the Japanese city of Kobe, was hosted jointly by the ISDR and Japan's government. Briceño took a moment to talk to IRIN in Kobe about his optimism concerning the event.

QUESTION: What evidence is there that Kobe will be different from Yokohama ten years ago?

ANSWER: The world has advanced enormously since the Yokohama conference. There's a higher awareness of vulnerability and natural disasters, and the higher frequency of disasters. More people are affected by disasters, and the disasters in themselves have a greater social and economic impact.

More people are now living in the wrong place, or in places where they have an increased vulnerability. [There is] the issue of mega-cities, environmental degradation and unplanned urban growth. We have an increased knowledge of disasters caused by environmental degradation and global warming in particular, which is resulting in a rise in sea levels.

There is no doubt that disaster reduction is more relevant; although there is more awareness, there is also more vulnerability, so it is a double-edged sword.

Q: To what extent is disaster risk-reduction (DRR) and preparedness a separate pillar that stands between development and humanitarian/emergency efforts?

A: Disaster reduction in the wider sense deals with prevention, mitigation and awareness. It is very related to development and the environmental, agricultural and health sector[s]. In all sectors there is a need for raising the issues of disaster reduction.

At the same time it needs to be linked with humanitarian work. It is in between both, and for some humanitarians it is at the core, whilst for others it isn't, but I think the situation is changing rapidly. Some aspects of disaster reduction are close to development and others are close to humanitarian concerns.

Q: What evidence is there that international financial institutions (IFIs) are willing to deal with DRR more than most institutions?

A: IFIs have been involved in different ways. The biggest, the World Bank, has been working on disaster reduction for many years. The smaller banks have been very active, for example, the Andean Development Bank, because of El Niño [a climate change in the Pacific Ocean]. Very sophisticated models have been developed.

Also the IADB [Inter-American Development Bank] in the Caribbean has been very advanced and effective after Hurricane Mitch. They are all developing stronger programmes in relation to DRR.

Q: In terms of mitigation, aren't most effective solutions extremely low-tech and community-based?

A: It is not that simple. There is a need for considerable organisation. When considering smaller communities, simple solutions may work, but in mega-cities, the solutions are far harder.

The tsunami was different because it hit a very wide area; this is unusual for disasters.

But it is true, education is for us the single most important activity; disaster reduction is in its essence about education. Then, secondly, it is about organisation and planning.

It is not possible for a conference of this size to come up with concrete methods or guidelines for mitigation generally. The differences between countries are very considerable. But what we need as a secretariat [ISDR] is to have a mandate. This we have.

This conference will take it forward and allow governments to agree to commit to do more. We as an inter-agency secretariat at the ISDR will then bring in the different agencies and, using the various structures in place, we will take the commitments forward through different mechanisms.

Interview with Anthony Spalton, senior officer at the Disaster Preparedness. IFRC

Interview with Anthony Spalton, senior officer at the Disaster Preparedness / Response Department of the International Federation of the Red Cross and Red Crescent Societies

Anthony Spalton has worked in East Africa and South-East Asia with the Federation and different British NGOs for 25 years.

At the World Conference on Disaster Reduction in Kobe, Japan, in January 2005 he spoke to IRIN about the importance of prevention strategies to mitigate the devastation caused by the increasing number of natural disasters. Here are excerpts from that interview:

QUESTION: How real is the separation of finance for disaster mitigation or prevention from the finance for development or emergencies?

ANSWER: Very real. All too often we find ourselves in situations with generous amounts of finance to deal with the aftermath of disasters, but we're skimping around for modest amounts for preparedness and recovery. The ratio being used is about seven to one in terms of what may be available for emergenc[ies] in contrast to preparedness.

One of the main reasons we are here [Kobe] is to see that become reality. For governments to come up with cash and resources, for investment in local, regional and national disaster mitigation and preparedness.

We [the Federation] are an international organisation, principally humanitarian, and a lot of our work involves investment in the membership of the Red Cross and Red Crescent societies, who are auxiliaries to national government. There is lots of overlap with what we do and with developing civil society.

Q: How important are grassroots structures in dealing with disaster-risk reduction (DRR)?

A: An example illustrating this was given this week during the conference. In India, one individual, who learnt through a TV programme about the relationship between tsunamis and earthquakes, used his bike to go around the coastal area and warn people and save thousands of lives.

It is the local people who are important. In Bam, it was the local people who mattered. By the time the first international SAR [search and rescue] teams came, the locals had already done first-line relief.

What we need to do is invest in local response. In Bangladesh in the 1970s, where repeated flooding from cyclones was causing a lot of disruption, the Federation invested heavily in early-warning, developing a system where volunteers on bikes [go] around warning people when a cyclone is about to hit.

Also we have been using village theatre and building on traditional practices.

Q: To what extent are we all trying to defy nature through disaster-reduction intervention?

A: A natural hazard does not have to result in a disaster. If people can go to higher ground, in the case of a tsunami, death is averted. Hazards will always exist.

The number of disasters is increasing in the world, but the number of deaths is decreasing. It is all about vulnerability, and the answer lies in people rather than technology.

Q: Some delegates have already suggested that this conference is another talk-shop, and that we know no more than we did 20 years ago. How is this conference any different?

A: It is easy to be sceptical, but certainly the Red Cross has been able to influence the outcome documents in Geneva in preparation for this conference - also through local Red Cross societies working with governments.

We are hoping to see governments working towards targets and goals. Donors are coming forward with ideas to set up international-recovery platforms amongst others, and if we don't move forward on issues such as these after this conference, it will be a sad day for the international community.

Q: Is the tsunami - and particularly the deaths of westerners in this disaster - somewhat fortuitous for the urgency/relevance of this conference?

A: Of course the tsunami has been very timely in terms of this conference and it has been a wake-up call for

everyone in the international community. Had we invested in risk reduction before, the damage that the tsunami has done to achieving the Millennium Development Goals would be far less.

One thing that is vital is that risk assessment is a significant element in any recovery programme. Often people are re-housed after a disaster on marginal land, for example, and this can actually increase people's vulnerability.

In other situations, highly vulnerable conditions within mega-cities can be created by providing the poor with structurally unsound housing.

Q: To what extent is disaster-risk reduction a priority for the Federation?

A: In the Federation, DRR is a major priority. In our organisation it is a huge and significant part of what we do.

But, because it falls between the humanitarian and development sectors, it is therefore under-resourced and under-valued as a whole. Only recently have we as a sector better understood the relationship between disasters and the erosion of development gains.

Interview with Peter Walker, director of the Feinstein International Famine Centre



Peter Walker. Credit: Tufts University

Interview with Peter Walker, director of the Feinstein International Famine Centre. at Tufts University.

For many years, Peter Walker has worked on issues relating to natural disasters, including international strategic policy on mitigation, prevention and response.

Much of his work has been in collaboration with international NGOs and the International Federation of the Red Cross and Red Crescent Societies.

Walker is associated with the so-called group of 'radical geographers' who, at January's World Conference on Disaster Reduction in Kobe, Japan, sought to present an alternative approach. He spoke to IRIN about his beliefs:

QUESTION: To what extent is the finance for development de-linked from the multilateral funding of disaster prevention?

ANSWER: There is basically nobody at the conference from the development community or corporate sector, so there is a real disconnect[ion] between economic development, political development [and] trade development [fundraisers] – they don't see disaster as part of their portfolio.

The real issue, that results in whether disaster reduction works or not, is good governance.

Q: Do you think the Kobe conference is too ambitious - expecting nation states to agree on measures for disaster reduction?

A: Unless we address the real underlying issues, we will make no progress. We have to start chipping at the block. Once communities get involved, we can start to measure the reduction in risk.

There is an example of community veterinarians in sub-Saharan Africa – they are linked into the government process. The results of having community-based vets reducing rinderpest [a virulent cattle plague] ultimately means export of livestock increases. There is a direct linkage between community involvement, risk reduction and increased export sales.

The corporate sector understands this, but the development sector is still behind. The challenge sometimes is to create an alternative approach, especially [for] countries more affected by natural disasters.

Like AIDS, the initial response to natural disasters is technical, but later the process of community involvement takes place. Good governance is at the core of disaster reduction and people are beginning to see this. The real challenge is institutional change, of taking the normal development process in countries and to stop being blind. This is the future of effective disaster reduction.

Q: What are the most important changes globally that affect disaster reduction?

A: Climate change, sea-levels [rising and] the development of most mega-cities along coastal areas - the highest population growth is in cities and shanty towns.

Economies are not changing as fast as climate. Adaptation to climate change is crucial. For example, there has been a 20 percent increase in severe storms recently.

Disasters have suffered from being kept in a niche. Disasters have failed development.

Q: Why should addressing disasters be an international responsibility, and not just a national responsibility?

A: Three points here: firstly, economic concerns, which affect the community or urban centre but also have global consequences. For example, the creation of shanty towns is linked to decisions made in the corporate sector and raises issues of social responsibility.

Secondly, many of the issues concerning disasters are not natural. For example, slowing down climate change is totally an international issue in relation to CO2 [carbon dioxide].

Thirdly, we must recognise the shared sense of humanity – in that sense disaster reduction is a global concern.

Q: People are calling for an urgent increase in the priority of disaster-risk reduction, but are the deaths caused by natural disasters preventable, or a priority, in comparison with other causes of death such as HIV/AIDS etc?

A: What are preventable deaths? Many of the deaths caused by a disaster are preventable through relatively easy measures. Anti-earthquake building stipulations for example.

Deaths from natural disasters are the tip of the iceberg. What they tell you is the nature of development in the communities affected. There is a whole secondary tranche of deaths from issues related to disasters - whether they be work-related, disease, suicide - which may be caused by something like the tsunami, but will never be in the statistics. The statistics are therefore unreliable.

Government stability is also at stake when disasters strike; governments cannot afford a high death-rate from disasters.

Q: Some delegates have already made statements suggesting that Kobe could be another talk-shop, and that we know no more than we did 20 years ago. How is this conference any different?

A: The only difference will be if it forces government[s] to set serious targets around risk reduction. Good words [only] this time will be morally unacceptable.

The Drafting Committee is already saying that they cannot avoid dealing with the issues in a more preventative way. People who never think about disasters are now being challenged by it and thinking about targets. NGOs are pushing for specific targets with clear benchmarks, but this may not be realistic.

What we do need is the mainstreaming of natural disasters, and the development of indicators of success.

Q: Has the tragic event of the tsunami so close to the start of the conference been somewhat fortuitous for the urgency/relevance of this conference?

A: The tsunami has opened a window of opportunity. The worldwide reaction has been both compassionate and angry, so it has given us a window of potential pressure as well. We cannot treat the conference as if the tsunami did not happen – the questions raised are not just about our compassion but why were so many people affected.

The pressure is now on to have real targets and benchmarks, and an agency to monitor them: whether it is ISDR [UN International Strategy for Disaster Reduction] or another agency.

Q: Are we entering a new era for disaster-reduction intervention?

A: The tsunami has come at a time when the world is ready for a new look and a new focus for disaster reduction. We can no longer do business as usual. It is also exposing new aspects.

People say that Aceh is now like a street fair of Asian agencies and civil society [organisations] helping out with the massive influx of displaced. Maybe there will be a new generation of aid agencies as a result.

We cannot do a King Canute; we cannot stop the water. But we can work on issues of mitigation and insurance, and improved back-up and provision for those affected. If we cannot stop tsunamis, then the question is, what to do for mitigation?

This brings us to the issue of good governance. Risk management is about managing the risk, not wishing the risk away.

5. Other

Definitions and distinctions

What Is a Disaster?

There are different definitions of the word “disaster”, but for clarity in this report on disasters with humanitarian implications, the term is defined as an event that has occurred unexpectedly with destructive consequences.

A disaster is a sudden, calamitous event that seriously disrupts the functioning of a community or society and causes human, material, economic or environmental losses that exceed the community’s or society’s ability to cope using its own resources. Though often caused by nature, disasters can have human origins. The combination of hazards, vulnerability and inability to reduce the potential negative consequences of risk results in disaster.

For a disaster to be entered into the database of the UN’s International Strategy for Disaster Reduction (ISDR), at least one of the following criteria must be met:

- a report of 10 or more people killed
- a report of 100 people affected
- a declaration of a state of emergency by the relevant government
- a request by the national government for international assistance

Natural Disasters

The following events can be classified as natural disasters:

- Flooding: Significant rise of water level in a stream, lake, reservoir or coastal region.
- Storms: Wind with a speed between 48 and 55 knots.
- Hurricanes: Large-scale, closed-circulation system in the atmosphere above the western Atlantic with low barometric pressure and strong winds that rotate clockwise in the southern hemisphere and counterclockwise in the northern hemisphere. Hurricanes are cyclones of tropical origin with wind speeds of at least 118 kph. A hurricane is a large, rotating storm where the winds move around a relatively calm centre called the “eye”. Usually, a hurricane lasts several days. These storms are known as “typhoons” in the western Pacific, “cyclones” in the Indian Ocean and “baguios” in the Philippines.
- Volcanic eruptions: An event caused by acidic lava that flows only a short distance before cooling and solidifying. The build-up of material blocks the vent, which raises the pressure and results in a series of violent blasts where pyroclastic material is ejected.
- Droughts: A naturally occurring phenomenon that occurs when precipitation is significantly below normal levels, causing water levels to drop and vegetation to die. This extended period of dry weather usually lasts longer than expected and leads to significant losses (crop damage, water-supply shortage) in a community.
- Landslides: In general, all varieties of slope movement under the influence of gravity. More strictly, the term refers to down-slope movement of rock and/or earth masses along one or several slide surfaces.

Natural disasters can be divided into three specific groups: hydrometeorological disasters, geophysical disasters and biological disasters.

Hydrometeorological disasters are natural processes or phenomena of atmospheric, hydrological or oceanographic nature that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. These include floods and wave surges, storms, landslides, avalanches, and droughts and related disasters (extreme temperatures and forest/scrub fires).

Geophysical disasters are natural earth processes or phenomena that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. These include earthquakes, tsunamis and volcanic eruptions.

Biological disasters are processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic microorganisms, toxins and bioactive substances, which may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. These include epidemics and insect infestations.

Human Disasters

- Fire: Any fire occurring in vegetation areas, regardless of ignition sources, damages or benefits.
- Death/poor health/general sickness: over and beyond expectation and directly due to a particular external cause of causes.
- Contamination of food products or water or the environment that result in deaths or injuries.
- War/conflict/terrorism. Armed conflict is defined as a political conflict in which armed combat involves the armed forces of at least one state (or one or more armed factions seeking to gain control of all or part of the state), and in which at least 1,000 people have been killed by the fighting during the course of the conflict.
- Workplace violence where the cause of the injuries and/or deaths is directly linked to the working environment of those affected.

Technical Disasters

Danger originating from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities, which may cause loss of life or injury, property damage, social and economic disruption or environmental degradation.

Technical disasters include:

- Power cuts and communication failure.
- Explosions involving domestic, industrial and nonindustrial buildings or structures.
- Oil spills and chemical spills. An accidental release occurring during the production, transportation or handling of hazardous chemical substances.
- Nuclear-reactor failures, chemical mishaps.
- Breakdown of computer networks.
- Gas leaks.
- Poisoning of atmosphere or water courses due to industrial sources.
- Cooling/heating/ventilation system failure.

According to ISDR, technical disasters can be classified in three groups: industrial accidents, transport accidents and miscellaneous accidents.

Industrial accidents include chemical spills, collapses of industrial infrastructures, explosions, fires, gas leaks, poisoning and radiation.

Transport accidents include air, rail, road and water transport.

Miscellaneous accidents include the collapse of domestic and nonindustrial structures, explosions and fires.

GLOSSARY

Affected people

People who require immediate assistance during a period of emergency.

Building codes

Ordinances and regulations to control the design, construction, materials, alteration and occupancy of any structure. Building codes ensure human safety and welfare and include both technical and functional standards.

Climate change

The climate of a place or region has changed if there is a statistically significant difference in the measurements of either the mean state or variability of the climate in a place or region over an extended period of time, typically decades or longer.

Coping capacity

The means by which people or organisations use available resources and abilities to face adequately, but in extremis, adverse consequences following a disaster.

Damage assessment

The determination of the extent of physical damage to buildings and man-made structures. Two types of damage assessment are normally carried out: The first evaluates the gross damage to a community determines the level and cost of necessary reconstruction. The second is a detailed, post-disaster, structural analysis of typical buildings to determine the causes of failure and devise methods for modifying the structures so that reconstructed buildings are safer.

Disaster plans

A set of arrangements for preventing, mitigating, preparing for, responding to and recovering from a disaster. A formal record of disaster-management roles, responsibilities, strategies, systems and arrangements.

Disaster response

Activities that occur in the aftermath of a disaster to assist victims and to rehabilitate or reconstruct the physical structures of the community.

Disaster-risk reduction

The conceptual framework of elements aimed at minimising the vulnerabilities and disaster risks throughout a society, avoiding (prevention) or limiting (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development.

Disaster-risk management

The systematic process of using administrative decisions, organisations, operational skills and capacities to implement policies, strategies and coping capacities of a community to lessen the impact of natural hazards and related environmental and technological disasters. This comprises all forms of activities, including structural and non-structural measures to avoid (prevention) or to limit (mitigation and preparedness) the adverse effects of hazards.

Disaster spectrum

A means of visualizing disasters, showing how pre-disaster and post-disaster activities relate to each other.

Early warning

The provision of timely and effective information through identified institutions that allows individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for an effective response.

El Niño-Southern Oscillation (ENSO)

A complex interaction of the tropical Pacific Ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many parts of the world, often with significant impacts, such as altered marine habitats, rainfall changes, floods, droughts and changes in storm patterns.

Emergency

A sudden and usually unforeseen event that calls for immediate measures to minimise its adverse consequences. An emergency occurs after a disaster when an immediate response is required and local capacity is insufficient to address and manage traumatic events. Emergencies may involve deaths, injuries, displacement of people, disease, disability, food insecurity, damage or loss of infrastructure, weakened or destroyed public administration and reduced public safety and security. In disaster-affected countries, these situations often occur simultaneously, straining domestic capacity and disrupting economic and social activity.

Emergency management

Also referred to as disaster management. The organisation and management of resources, roles, and responsibilities to deal with all aspects of emergencies, including preparedness, response and rehabilitation. Emergency management uses plans, structures and predetermined arrangements to coordinate the efforts of governments, voluntary and private agencies and other organisations to deal effectively with the entire spectrum of emergency needs.

Environmental degradation

Processes induced by human behaviour and activities (sometimes combined with natural hazards) that damage the natural-resource base or adversely alter natural processes or ecosystems. Potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards. Examples include land degradation, deforestation, desertification, wild-land fires, biodiversity loss, climate change, sea-level rise, ozone depletion and land, water and air pollution.

Geographic information systems (GIS)

Analysis that combines relational databases with spatial interpretation and outputs, often in the form of maps. A more elaborate definition is that of spatially referenced computer programmes that capture, store, evaluate, integrate, analyse and display data about the earth.

Hazard

A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or man-made (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterised by its location, intensity, frequency and probability.

Land-use planning

Branch of physical and socioeconomic planning that determines the means and assesses the values or limitations of various options in which land is to be utilised, taking into account the corresponding effects on different segments of the population or interests of a community.

Mitigation

Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.

Natural Hazards

Natural processes or phenomena occurring in the biosphere that may constitute a damaging event. Natural hazards can be classified according to their geological, hydrometeorological or biological origins.

Preparedness

Activities and measures taken in advance to ensure an effective response to hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.

Prevention

Activities that prevent a natural phenomenon or a potential hazard from having harmful effects on either persons or property. Disaster prevention includes such activities as cloud-seeding to control meteorological patterns, the construction of dams or dikes to prevent flooding and attempts to reduce tectonic tension by such measures as pumping water into earthquake faults.

Reconstruction

Actions taken to re-establish a community after a period of rehabilitation following a disaster. Actions include construction of permanent housing, full restoration of services and complete resumption of the pre-disaster state.

Relief

The provision of assistance or intervention during or immediately following a disaster to meet the life-preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term or protracted duration.

Resilience - resilient

The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing, in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organising itself to increase its capacity for learning from past disasters and improving risk-reduction measures.

Risk

The relative degree of probability that a hazardous event will occur. The probability of harmful consequences or expected losses (deaths, injuries, property, livelihoods, disruption of economic activity or environmental damage) resulting from interactions between natural or human-induced hazards and vulnerable conditions. Based on mathematical calculations, risk is the product of hazard and vulnerability. Conventionally, risk is expressed by the notation Risk = Hazards x Vulnerability. Some disciplines also include the concept of exposure to refer particularly to the physical aspects of vulnerability.

Risk Reduction

Selective applications of appropriate techniques and management principles to reduce either the likelihood of an occurrence or its consequences, or both.

Risk assessment/analysis

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that could pose a potential threat of harm to people, property, livelihoods and the environment on which they depend.

Sustainable development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development is based on socio-cultural development, political stability and decorum, economic growth and ecosystem protection, all of which relate to disaster-risk reduction.

Technological Hazards

Danger associated with technological or industrial accidents, infrastructure failures or certain human activities that may cause loss of life or injury, property damage, social and economic disruption or environmental degradation. Sometimes referred to as anthropogenic hazards. Examples include industrial pollution, nuclear release and radioactivity, toxic waste, dam failure, transport and industrial or technological accidents (explosions, fires, spills).

Vulnerability

A condition wherein human settlements or buildings are threatened by virtue of their proximity to a hazard, the quality of their construction, or both. Degree of loss (from 0 percent to 100 percent) resulting from a potential damaging phenomenon.

SOURCES from which this section has summarised these definitions and the glossary.

BizHelp24

http://www.bizhelp24.com/small_business/disaster_recovery.shtml

Center for Disaster Management and Humanitarian Assistance (CDMHA)

<http://www.cdmha.org/definitions.htm>

Centre for Research on the Epidemiology of Disasters (CRED)

<http://www.cred.be/docs/cedat/definitionforCE-DAT.pdf>

Emergency Events Database (EM-DAT)

<http://www.em-dat.net/glossary.htm>

IDRM International Institute for Disaster Risk Management

<http://www.idrmhome.org/Glossary.pdf>

Natural and Environment Disaster Information Exchange System

<http://nedies.jrc.it/index.asp?ID=82>

United Nations International Strategy for Disaster Reduction (ISDR) "Living with Risk: A global review of disaster reduction initiatives," 2004. Internationally accepted glossary of basic terms related to disaster management.

<http://www.unisdr.org/unisdr/glossaire.htm>

<http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>

United Nations Department of Humanitarian Affairs (UNDHA).

Internationally Agreed Glossary of Basic Terms Related to Disaster Management, Geneva, December 1992.

United Nations Environment Program (UNEP). Glossary on environmental terms

<http://www.nyo.unep.org/action/ap1.htm>

Links & References

Regional Organisations

Drought Monitoring Centres (DMCs)

<http://www.meteo.go.ke/>

Based in Harare, Zimbabwe's capital, and Nairobi, Kenya's capital, the DMCs for eastern and southern Africa survey drought and other climatic conditions. They study the intensity, geographical extent, duration and impact of extreme weather on agricultural production and help formulate appropriate strategies for combating anticipated adverse effects.



Intergovernmental Authority on Development (IGAD)

<http://www.igad.org/>

The member governments of IGAD - Djibouti, Eritrea, Ethiopia, Kenya, Somalia, Sudan and Uganda - coordinate development activities and pool resources to promote economic cooperation, political stability, food security and environmental protection in east Africa.



Southern Africa Development Community (SADC)

<http://www.sadc.int/>

Based in Gaborone, Botswana, SADC's main role is to eradicate poverty in southern Africa by defining regional priorities and mobilising resources and maximising the impact of regional projects.



National Organisations

African Union (AU) / Union Africaine

<http://www.africa-union.org/>

Africa's principal organisation for the advancement of socioeconomic integration on the continent, the AU aims to promote greater unity and solidarity between African countries and peoples. The AU is the successor to the Organisation of African Unity, launched in South Africa in July 2002.



Center for Disease Control and Prevention (CDC)

<http://www.cdc.gov/>

CDC is the lead federal agency in the US for promoting health and safety at home and abroad. Based in Atlanta, Georgia, CDC serves as a national (USA) and international focus for developing and applying measures to prevent and control disease and promote environmental health and health education activities.

German Agency for Technical Cooperation / Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)

<http://www.gtz.de/>

GTZ is an organisation run by the German government that supports development projects in over 120 partner countries. It aims to improve the living conditions and perspectives of people in developing and transition countries.



Indian Famine Commission

<http://wrmin.nic.in/policy/>

The widespread suffering caused by successive famines in India during the closing decades of the 19th century led to the establishment of a series of famine commissions. The first commission was appointed in 1878, and its programmes are the basis upon which famine codes were promulgated from 1883 onwards. The second famine commission was set up after the drought of 1896-1897 and recommended that "among the measures that may be adopted for giving India direct protection from drought, the first place must unquestionably be assigned to works of irrigation".

Office for Foreign Disaster Assistance (OFDA)

<http://www.usaid.gov/>

USAID is an independent federal government agency in the US that supports economic growth, agriculture, trade, global health, democracy, conflict prevention and humanitarian assistance in countries around the world.



Pacific Tsunami Warning Centre (PTWC), Hawaii

<http://www.prh.noaa.gov/pr/ptwc>

The PTWC provides warnings about tsunamis to most countries in the Pacific Basin, as well as to Hawaii, Alaska, the west coast of the US, and other US interests in the Pacific.



Turkana Drought Contingency Planning Unit (TDCPU), Kenya

The TDCPU was established in 1987 and operates at the sub-national level, serving the Turkana district in northern Kenya. The organisation, which is run by local government, provides early warning data and analysis of drought conditions in the region to decision-makers.

NGOs

CARE International

<http://www.careinternational.org.uk/>

CARE is an independent humanitarian organisation working in over 70 countries to end world poverty. Its mission is to stimulate change by strengthening capacity for self-help, influencing policy decisions at all levels, providing economic opportunity, addressing discrimination in all its forms, and delivering relief in emergencies to individuals and families in the poorest communities in the world.

**Catholic Relief Services (CRS)**

<http://www.catholicrelief.org/>

Founded in 1943, CRS is the relief and development agency of the United States Conference of Catholic Bishops. CRS operates in over 80 countries and provides direct aid to the poor and disadvantaged. Its primary activities include peace-building, HIV/AIDS awareness, assistance for the self-employed poor, and education.

**Concern Worldwide**

http://www.concern.ie/news/dec_africa.htm

The mission of Concern Worldwide is to enable poor people to achieve major improvements in their lives. It works with the poor and with local and international partners who share its vision to create just and peaceful societies where the poor can exercise their fundamental rights.

International Relief Teams

<http://www.irteams.org/>

International Relief Teams is an international, nonprofit relief organization dedicated to organising volunteer teams to provide medical and nonmedical assistance to the victims of disaster and profound poverty worldwide.

**OXFAM, United Kingdom**

<http://www.oxfam.org.uk/>

Oxfam works on development programmes and humanitarian response and lobbies for policy changes at the national and global levels. Their campaigns aim at mobilizing public opinion to find lasting solutions to poverty, suffering and injustice.

**Save the Children Fund, United Kingdom (SCF-UK)**

<http://www.oneworld.org/scf>

SCF-UK is the leading UK charity working to create a better world for children world-wide.

Tearfund

<http://www.tearfund.org/>

Tearfund is a Christian organisation that supports initiatives aimed at development and capacity-building, disaster preparedness and mitigation, children at risk and public health, including HIV/AIDS.

**World Vision International (WVI)**

<http://www.wvi.org/home.shtml>

World Vision is an international Christian relief and development organisation working to promote the well-being of all people, especially children, through emergency relief, education, health care, economic development and promotion of justice. In 2002, World Vision offered material, emotional, social and spiritual support to 85 million people in 96 countries.

Others

Benfield Hazard Research Centre

<http://www.benfieldhrc.org/>

BHRC is an academic hazard-research centre based at University College London. It is multidisciplinary and comprised of three groups: Geological Hazards, Meteorological Hazards & Seasonal Forecasting and Disaster Studies & Management. It offers training programmes, academic programmes and research and consultancy services for natural-disaster risk mitigation.

**Center for International Disaster Information**

<http://www.cidi.org/>

CIDI, which operates under a grant from the USAID's Office of Foreign Disaster Assistance, has handled hundreds of thousands of public inquiries related to international emergencies.

**Center for Hazards and Risk Research, Lamont-Doherty Earth Observatory of Columbia University, New York, US**

<http://www.ldeo.columbia.edu/chrr/>

The mission of the centre is to advance the predictive science of natural and environmental hazards and the integrate science with hazard-risk assessment and risk management.

Disaster Management Facility, World Bank, Washington, D.C.

<http://www.worldbank.org/dmf/>

The World Bank's Disaster Management Facility aims to reduce human suffering and economic losses caused by natural and technological disasters. Recognizing that disaster prevention and mitigation are integral parts of development, the organisation provides technical support to World Bank operations, promotes capacity-building and establishes partnerships within the international and scientific communities at work on disaster issues.

International Committee of the Red Cross (ICRC)

<http://www.icrc.org/>

ICRC is an impartial, neutral and independent organisation whose exclusively humanitarian mission is to protect the lives and dignity of victims of war and internal violence and to provide them with assistance. It directs and coordinates the international relief activities of the Red Cross and Red Crescent Movement in situations of conflict. It also endeavours to prevent suffering by promoting and strengthening humanitarian law and universal humanitarian principles.

**International Federation of Red Cross and Red Crescent Societies (IFRC)**

<http://www.ifrc.org/>

IFRC is the world's largest humanitarian organisation, providing assistance without discrimination as to nationality, race, religious beliefs, class or political opinions.

Munich Re, Germany

<http://www.munichre.com/>

Munich Re is a world leader in reinsurance, and it has also strategically strengthened its business with strong involvement in primary insurance and in asset management. It offers a range of special services, including risk management, industrial insurance and alternative risk transfer. In its biannual publication *Topics*, Munich Re experts look at current natural disasters throughout the world and address topics and trends in the insurance industry. *Topics* also presents new Munich Re products and services, as well as a world map of natural catastrophes.

**Megacities 2000 Foundation, Netherlands**

<http://www.megacities.nl/>

The Megacities 2000 Foundation in the Netherlands is a direct result of an initiative taken by UNESCO, which asked the International Academy of Architecture (IAA) to focus attention on the problems of explosively growing megalopolises. The foundation was created in December 1994.

**Oxford Center for Disaster Studies (OCDS), UK**

OCDS is one of the leading organisations in consultancy, training and research in the field of disaster management and protection.

Potsdam Institute for Climate Impact Research (PIK), Potsdam, Germany

<http://www.pik-potsdam.de/>

The growing need among decision-makers to be informed about the consequences of global climate change inspired the founding of PIK in 1992.

**UN Agencies****International Strategy for Disaster Reduction (ISDR)**

<http://www.unisdr.org/>

The ISDR is the UN agency that promotes the coordination of disaster-reduction activities in the socioeconomic, humanitarian and development fields. It also supports policy integration by facilitating links and synergies between these sectors. ISDR serves as an international clearinghouse of information on disaster reduction, develops awareness campaigns and produces articles, journals and other promotional materials related to disaster reduction.

**Office for the Coordination of Humanitarian Affairs (OCHA)**

<http://ochaonline.un.org/>

In December 1991, the General Assembly of the UN adopted Resolution 46/182 [<http://www.un.org/Docs/journal/asp/ws.asp?m=A/RES/46/182>], which was designed to strengthen the UN's response to both complex emergencies and natural disasters. As part of the Secretary-General's programme of reform, the Department of Humanitarian Affairs was reorganised into the Office for the Coordination of Humanitarian Affairs in 1998.

**United Nations Disaster Assessment and Coordination (UNDAC)**

The UNDAC team is a stand-by group of disaster-management professionals who are nominated and funded by member governments, OCHA, UNDP and operational humanitarian UN agencies such as the World Food Programme, UNICEF and WHO. The conduct immediate assessments and evaluations following disasters and assist the UN design relevant response.

United Nations Development Programme UNDP - BCPR<http://www.undp.org/bcpr/disred/>

The Bureau for Crisis Prevention and Recovery (BCPR) helps UNDP country offices set up and provide a quicker and more effective response for natural-disaster reduction, justice- and security-sector reform, small arms reduction, disarmament and demobilization, mine action, conflict prevention and peace-building and recovery.

**United Nations Human Settlements Programme (UN-HABITAT)**<http://www.unhabitat.org/programmes/rdmu>

UN-HABITAT is mandated through the Habitat Agenda to take the lead in disaster mitigation and post-disaster rehabilitation capabilities in human settlements.

**United Nations Environment Programme (UNEP)**<http://www.unep.org/>

UNEP was established in 1972 as the voice for the environment within the UN system. UNEP acts as a catalyst, advocate, educator and facilitator, promoting the appropriate use and sustainable development of the global environment.

**World Meteorological Organization (WMO)**<http://www.wmo.ch/index-en.html>

The WMO is an intergovernmental organisation with a membership of 187 member states and territories. It is the descendent of the International Meteorological Organization (IMO), which was founded in 1873. In 1950, WMO became the specialized agency of the UN for meteorology (weather and climate), operational hydrology and related geophysical sciences.



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