Environmental management for disaster reduction

Sálvano Briceño

The clean-up after the unprecedented tsunami that ravaged South Asia last month is still ongoing. In the weeks following this horrific human tragedy environmental concerns from widespread water pollution to the removal of debris and waste on a massive scale have all been too apparent.

While the strongest earthquake in decades and the devastating tsunamis that followed could have been less tragic if warning systems had been in place, it is increasingly clear that the negative effects of this and other kinds of natural disasters, could have been and can be lessened not only by the speed and efficiency of our relief efforts, but also by maintaining the proper environmental infrastructure. It is premature to draw final conclusions on the South Asia tsunami, but at an earlier tragedy in the Caribbean, where floods and mudslides caused by Hurricane Jeanne killed up to 1000 people in Haiti and left another 200,000 affected, demonstrated all too vividly how natural disasters differ depending on how the ground was “prepared for them.”

In Haiti, extensive deforestation left large hillsides bare, allowing rainwater to run off directly to the settlements at the bottom of the slopes. In neighboring Dominican Republic, hit by the same storm, there were many fewer victims to mourn, and part of the reason is that their hills are still covered by a protecting forest.

A similar disaster unfolded more recently when half a million people were affected by successive storms in the Philippines. As in Haiti, the destruction and loss of life wrought by the storms was made worse by deforestation in the hills above villages and towns. In response to the crisis, President Arroyo banned all commercial logging as resources rushed aid to wet and hungry survivors.

These two examples clearly show that taking care of our natural resources, and managing them wisely, not only assures that future generations will find better living conditions, but it reduces the risks that natural hazards pose to people today.

In this vein, and in close cooperation with our United Nations partners, UNEP’s goal is to reinforce the centrality of environmental concerns in disaster management, and to promote sound management of natural resources as a tool to prevent disasters or lessen their impacts on people, their homes and livelihoods.

Population growth, industrialisation and environmental abuse have opened a Pandora’s Box of catastrophes across the planet. From spectacular industrial accidents like Bhopal and Chernobyl to the horrors of drought in Africa and the extreme weather that battered Japan and the USA last year, the world is more and more aware of natural and man-made disasters. The question is: how to prevent them, and if they should nevertheless happen, how to respond. It is these questions that the Kobe World Conference on Disaster Reduction and the necessary follow-up will address.

This edition of the Environment Times illustrates the problems and challenges before us, showing many practical examples on how useful preventive actions can be taken. It lays out why we must think “environment” at every stage of disaster management, be it preparing, preventing, mitigating or reacting.

Today, we are sadly witnessing to a growing number of devastating hurricanes, typhoons, droughts and floods across the globe which as a result of climate change are set to become more frequent and violent. As last year’s horrific pictures from Haiti and the Philippines show, and with the almost incomprehensible scale of the South Asia disaster unfolding before us, it has become painstakingly clear that without the environment firmly in the equation there will be no long-term disaster risk reduction.

Dr. Salvano Briceño is the Executive Director of the United Nations Environment Programme.

All responsible for disaster reduction

Salvano Briceño

Over the past ten years the world has suffered an increasing number of “natural” disasters affecting more than 2.5 billion people, killing 45,800 and causing economic losses of about $600 billion. We may not necessarily be able to prevent natural hazards such as earthquakes, volcanic eruptions, hurricanes, floods and famines, but we can certainly act to prevent their disastrous effects on vulnerable communities.

The World Conference on Disaster Reduction (WCDR) coincides with the 10th anniversary of the great Hanshin-Awaji (Kobe) earthquake that claimed more than 6,000 lives and cost a stunning $880 billion. It is an opportunity to share experiences in disaster reduction practices such as environmental management and look at ways of reducing risk worldwide. The WCDR is a milestone event that will build on the findings of the review of the Yokohama Strategy adopted ten years ago. It will develop elements for an articulated programme for disaster risk reduction, addressing the obligations of the Johannesburg Conference Implementation, essential to achieving Millennium Development Goals.

Building disaster resilient communities means that disaster reduction is everyone’s responsibility. A disaster reduction strategy is a global challenge that involves communities, schools, the media, researchers, scientists, non-governmental organizations, various sections in governments and regional and international organizations including many agencies and programmes of the UN system. UNEP is the specialist programme in this field and at the International Strategy for Disaster Reduction Secretariat we are looking forward to closer collaboration with UNEP to follow up WCDR decisions and recommendations in order to strengthen environmental capacities in vulnerable countries and thus reduce risk and vulnerability while achieving sustainable development.

Salvano Briceño is the Director of the InterAgency Secretariat of the International Strategy on Disaster Reduction UNISDR (see also www.unisdr.org).
Hooligans in the Caribbean

The 2004 hurricane season was one of the worst ever. Does that prove climate change is disturbing hurricane patterns? How do political systems impact on people’s vulnerability? And what of the level of development? This year’s hurricanes showed how much social, economic and political factors impact the impact of natural phenomena. Poverty accounts for the most victims in natural disasters, witnessed the difference in Hurricane Jeanne’s toll in Haiti and the Dominican Republic. Similarly Ivan caused severe structural damage to buildings in Grenada but barely marked Cuba.

Widespread deforestation and urbanisation make the poorest countries even more vulnerable. As the Asian edition of Time magazine wrote, in its coverage of Winnie: “Had man not helped, a typhoon alone would not have caused such devastation.” It went on to focus on the devastating effects systematic logging had on mudslides and flooding.

In an effort to promote better long-term planning, the United Nations Development Programme early this year evaluated disaster preparedness in scores of nations. It showed Haiti was two times more likely to die in an equivalent storm than Dominicans. In the storms that hit last week in Grenada, flash floods occurred in just a few hours because upstream terrain has long since been stripped of forests and topsoil.

The magnitude of the destruction in Haiti and Grenada underscores the need for firmer nations to develop policies that will enable them to withstand these storms. And from the international development community, they deserve not just more aid, but smarter aid.

Julia Taft

Storm-tossed lessons

Julia Taft

From Trinidad to Tallahassee, Fla., tropical storms have ravaged the Caribbean basin, exacting a multibillion-dollar toll on housing, schools, hospitals, roads and sewage systems.

Most of the casualties were in Haiti. But almost no community escaped unscathed. In Grenada, half of the population is now homeless, the fumigated megamass flattened, the power plants wrecked. The tourism industry that was the island’s lifeline could take years to recover. Many other islands — including Tobago, Jamaica and Grand Cayman — also suffered.

The biggest killer in natural disasters is poverty. The same hurricane tides that flow houses in Florida sweep away entire neighborhoods in places like Gonaïves, Haiti. And while survivors need places to live, simple rebuilding their tin-roofed shacks in flood plains guarantees they will suffer again. Better planning, and more focused foreign aid, can help even poor nations reduce the loss of life and property from natural disasters.

Compare the consequences of the storms in the two countries that share the island of Hispaniola. In the Dominican Republic, which has invested in hurricane shelters and emergency evacuation networks, the death toll was fewer than 20, as compared to an estimated 2,300 in Haiti. And Cuba’s proven ability to survive hurricanes with few casualties — Ivan claimed no lives there because two million people were swiftly moved out of harm’s way — is a testament both to the value of disaster response planning and the need for it throughout the Caribbean.

According to climatologists, vulnerable coastal communities should be prepared for greater erosion and more severe floods in the future. Poor countries need help to rebuild and to better protect themselves against future such calamities. The United Nations started appealing last autumn for emergency humanitarian aid for Grenada and Haiti to provide food, temporary shelter and basic health care.

But long-term development assistance in the Caribbean from agencies like mine, as well as from donors like the United States, must focus on reducing the destructive impact of these storms. Virtually every school, road, hospital or housing settlement destroyed in Haiti by Hurricane Ivan or in Haiti by Hurricane Jeanne was financed with foreign assistance.

Reconstruction often occurs with such haste that countries end up with even greater exposure to future hurricanes. But housing developments can be sited and designed to avoid the worst damage.

In Haiti, the destruction of Hurricane Jeanne and Hurricane Ivan underscored the need for firmer nations to develop policies that will enable them to withstand these storms. And from the international development community, they deserve not just more aid, but smarter aid.

Richard Bauer

A finely tuned disaster-prevention program helped Cuba escape the worst of hurricanes Charley and Ivan. As Castro turned the fight against natural forces into an all-out military battle, the government attributed Cubans’ sense of solidarity and discipline to their revolution’s upbringing.

Cuba was ravaged by two hurricanes in close succession, leaving a trail of devastation in their wake. Around mid-August, Hurricane Charley left in its wake a trail of destruction. As the storm passed, it turned its power and winds on the Carolinas and Virginia, leaving behind a trail of death and destruction.

In the days preceding the storm, Castro turned his attention to Hurricane Ivan. He said he would “go shoulder to shoulder with his people”. He said he would “show the world what we are.”

In Haiti and Cuba, the response was remarkably different. In Cuba, the national television service, the Comandante Command Center, broadcast uninterrupted messages of safety, along with their domestic animals and belongings. Special troops harvested food, cleaned up and distributed food, and the electricity was cut at a precaution in the areas most at risk.

Neighbours and relatives showed enormous solidarity in offering lodgings to those living in the most precarious houses and flats. For those long and oppressive days, as Ivan threatened to strike Havana, life in the capital of a million souls had to be put to a standard. The public bus service was suspended, while shops and black markets were closed.

Children made the most of the break playing football or baseball on the deserted streets. Service was suspended, while shops and businesses were closed. In Havana, the ever-present camera.

“Havanan” breathes new life into the Cuban Revolution

Richard Bauer

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No strangers to hardship, Cubans hurried to build their homes, did not wait for the government to do it. Home would be built, it must be said, with blocks stolen from a state-run company. Instead of protecting his horse against the hurricane, however, he and his wife took down the wooden posts holding up the crumbling roof. Hoping that the winds would finish it off completely. That would put him on the priority list but when it came to asking for building material. But, as it happened, Ivan spared Havana, thwarting poor Carlos’ plan...

Richard Bauer

Tropical cyclone frequency

Average number of cyclones: (1980-2003)

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Tropical cyclones: paying a high price for environmental destruction

Pascal Peduzzi

Haiti did not need this. In 2004 alone floods claimed 2,665 victims in May, worth-noting that ousted President Aristide and Hurricane Jeanne killed 2,754 more. But to blame it all on bad luck or coincidence would be a mistake.

Tropical cyclones are certainly powerful atmospheric hazards causing heavy rain, high wind and sea surge, but the related disasters are not falling from the sky. Disasters are always the combination of a hazardous event and vulnerable population. There is no such thing as a "natural disaster". Otherwise how could we explain the range of casualties in various communities affected by the same event with comparable winds and rains? For instance the Dominican Republic and Haiti are located on the same island, but foamed claimed, respectively, less than twenty and over 700 victims. This was perhaps an exceptional event, but if we look at the statistics for 1980-2004 the death toll per inhabitant exposed to cyclones is on average 4.6 times higher in Haiti than in the Dominican Republic.

Does wealth explain such an enormous difference? The Dominican Republic is certainly a 4 times richer than its neighbour. What about development? After all a higher level of development means better help to access education, more resources to buy equipment and thus response capabilities, or build more robust homes. The United Nations Development Programme’s Human Development Index (HDI) – based on literacy, life expectancy and gross domestic product – is closely and inversely correlated with the proportion of people killed by hurricanes (see graph 1). The higher the HDI, the fewer are killed. Yet Cuba (with a 0.80 HDI value) has proportionally fewer casualties than the United States with (HDI of 0.95). The difference between Cuban preparations for cyclones and Florida’s “hurricane par- tie” may provide a partial explanation, but another hypothesis is emerging. Research has revealed an 85% correlation between the extent of deforestation and incidence of victims per exposed. Both variables follow the same trend with a tight fit, as shown in the graph. The Haitian part of the island of Hispaniola has low forest cover, compared with a high deforestation rate (97% of remaining forest). In comparison the Dominican Republic is much greener, with a high de- gree of forest coverage (28.4% in 2001) and no recent deforestation. Vegetation protects from winds and helps to stabilise the soil. Haiti’s bare soils offer much less resistance, which explains why landslides caused most of the casualties. Mangrove forests significantly reduce the impact of wave surge (see article on Vietnam on page 14-15). There are no mangroves in the Caribbean basin in the Dominican Republic. Most of the media cited the poor quality of the Haiti- tian environment as the main factor in the population’s vulnerability. This post-disaster consensus sounds like an indi- rect proof of environmental practice, as if tropical cyclones were the ultimate penalty for environmental destruction. But this introduces a notion of guilt. Did Haitians really have the choice?

Firewood and charcoal represent 70% of Haiti’s total energy supply. With an average monthly income of $50-50 people cannot afford to use gas stoves or other energy sources. Devastated ecosystems will also stop importing natural raw materials which deplete the environment of the poorest members of the community. Vulnerability to disasters is not only linked to environmental quality. Climate change is also playing a part. Political and economical leaders must make environmental protection a bigger priority than ever. They must understand that by de- stroying our forests and environment we are sowing the seeds of the next disaster.

Is climate change to blame for a deadly hurricane season in the Caribbean?

Solveig Olafsdottir

In August and September four devastat- ing hurricanes pounded North America and the Caribbean killing some 2,000 people and leaving more than 500,000 homeless. 2004 will go down in history as one of the most active and destructive hurricane seasons in the region – unless, as some scientists have already warned, it is the start of a trend brought on by global warming.

The International Federation of the Red Cross and Red Crescent Societies (IFRC) responded to these disasters by deploy- ing local, regional and international relief teams, and appealing for $5.5m to assist 150,000 victims in the six worst affected countries. Assistance targeted mainly Grenada and Haiti, where most of the devastation caused by hurricanes Ivan and Jeanne. International emergency companies estimate that the total insured losses for the 2004 North Atlantic hur- ricane season amount to $3.6bn.

In Grenada 40% of all buildings suffered structural damage as hurricane Ivan hit- tered the island. It destroyed most infra- structures too and it will take months before electricity and communication systems are restored throughout the country. Two-thirds of the island’s total population of 30,000 received emergency assistance. After lav- ing thousands of buildings in a category five hurricane, yet Cuba suf- fered only minor damage where the north- eastern part of the island was hit.

The floods caused by Hurricane Jeanne are thought to have killed some 2,700 people in Haiti. Yet only 19 died in the neighbouring Dominican Republic (see opposite).

What could have been done to reduce the impact of those disasters? Can climate change be blamed for a series of four deadly storms in just one month? We need to find answers to these questions and answer all we need to react. Responding to disasters is part of the IFRC mandate, but it is also committed to understanding and addressing the risks to which people are exposed. It can thus reduce the frequently horrible consequences of natural disasters.

There is solid evidence that disaster reduc- tion measures can alleviate human suffer- ing. In the Caribbean, the Cuban authori- ties, supported by the national Red Cross, have developed a multi-pronged hurricane preparedness system (see article on opposite page). The Dominican Republic has not exploited its natural resources in the same way as neighbouring Haiti. Though the same deadly hurricane hit both Caribbean nations, the Dominican Republic the incidence of casualties was very different from many other countries in the region.

The Caribbean boasts well trained Red Cross disaster response teams and risk reduction activities, but we can do more to prepare communities to protect them- selves more effectively against the effects of climate change. Disasters are increas- ingly frequent and severe, a trend aggra- vated by an urban development and rapid population growth. Climate change is very probably already contributing to the trend and we need more awareness of communities at risk. All too often it is the poor and deprived in society that are hardest hit. They are the people that the IFRC is targeting worldwide with its risk reduction programmes.

“Red Cross and Red Crescent are the increasing social cost of disaster, in terms of lost lives, destroyed livelihoods and setbacks to human development,” says Eva von Ondrich, Head of the IFRC Disaster Preparedness and Response Department in Geneva. “While donor governments are usually quick and gen- erous in post-disaster relief and recon- struction, they dedicate fewer resources to risk prevention, which is far more cost- effective and visible. An urgent action is needed to provide more substantial investment in disaster reduction measures.”

Supporting community resilience to hazards and awareness of threats such as extreme weather events and more weather variability is key to the key to relief and recon- struction, they dedicate fewer resources to risk prevention, which is far more cost- effective and visible. An urgent action is needed to provide more substantial investment in disaster reduction measures.

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The scientists, who argue that global warming accounts for the frequency and of the hurricanes that battered the Caribbean in 2004, blame one factor in particular: the unexpectedly warm water that has been building up in the mid-Atlantic and Caribbean Oceans over the past years. Hurricanes need specific conditions to form. Two of them are warm water and high water vapour levels. Most experts agree that the conditions cur- rently prevail, though the scientific com- munity does not agree on whether climate change is to blame. But the IFRC cannot afford to wait for the results of that debate – it must be prepared here and now.

Climate change: More impacts from tropical cyclones in the future

According to the report “Climate change 2001: Impacts, Adaptation and Vulnerability” issued by the IPCC, there is still uncertainty about the increase in cyclone frequency, but modulation indicates with a high level of confidence (66-90%) that in the future cyclones will be more violent and accompanied by heavier rainfall. In Asia sea level rise associated to increased strength of tropical cyclones could reduce the displac- ment of tens of millions of people, while the predicted increase in rainfall will lead to a higher risk of floods. Also in Latin America the risk of human and infrastructure losses from tropical cyclones will increase.

The warmer the climate, the higher the chances for a hurricane to form. The prewar- mung for a cycle to develop are a sea surface temperature higher than 26°C to a depth of 60 metres and low atmospheric pressure. Tropical cyclones transform the heat energy stored in the sea water into kinetic force: wind energy. With increased sea temperatures that come with climate change, the number of tropical cyclones will rise in the future, a large part of the scientific community assumes that the excess energy stored in warmer seas will be released as stronger winds.

Nicaragua, Panama, Peru, Rwanda, Sri Lanka, Uganda and several West Afri- can countries – suffer from high rates of deforestation and political tension. The international community urgently needs to provide solid backing so they can achieve sustainable use of their environmental resources, replant their forests and develop alternative energy sources. Developed countries must also stop importing natural raw materials which deplete the environment of the poorest members of the community.

Countries in their predicament – no- long to be part of the un- commercialization of natural resources in the region. The scientists, who argue that global warming accounts for the frequency and the impact of tropical cyclones will rise in the future, a large part of the scientific community assumes that the excess energy stored in warmer seas will be released as stronger winds.

"Eighty-five percent of natural disasters in Indonesia are the result of environmental destruction," (Longzeng Sinting, executive di- rector of the rewild environmental watchdog, to APF.)

((APF 8 Nov 2005))
Environmental disasters and human tragedies caused by industrial accidents such as the Bhopal gas tragedy, Chernobyl, or the collapse of the Ajaccio Hall in Spain, have led to calls for a new approach to industrial safety. The Baia Mare cyanide spill in Romania in 2000 fortunately had few lasting consequences. But it is a good example of an event that made various players learn from past lessons and adopt new approaches to avoid future accidents.

Learning from Baia Mare

Fritz Balkau

On 15 January 2000 a tailings dam at the Aurul Mine in Romania failed and released 120,000 cubic metres of UF
cyanide into the Tisza River. By the time the overflow was
detected, the alarm raised and emergency procedures were put in place. The Tailings Committee of the International Commission for the Protection of the Danube River (ICPDR) swung into action and alerted downstream riparian authorities of the polluted water coming their way. Towns downstream were able to block the pumps drawing river water and make other arrangements for drinking water. Pollution levels were measured regularly at key points along the river.

Other things did not work so well. In particular, the flow of cyanide in the river was unbelievable, and simply added more noxious chemicals to the water. Attempts to public information by vari-
ous parties were guarded, cautious and often insubstantial. Although the physical damage was only temporary there was widespread fear that the cyanide would cause lasting ecological and economic damage. The psychological effect was permanent. Community trust in industry and government experts was eroded.

After much debate it was concluded that little else could be done immediately except wait for the pollution to flush out downstream. Meanwhile various agencies began to review their mandates in order to prevent such an event recurring.

Almost everyone was quick to suggest solutions. Some advocated simply ban-
ing the use of cyanide altogether, and/or solutions. Some advocated simply ban-
ing the use of cyanide altogether, and/or with the multitude of causal factors that contributed to the accident. A more comprehensive approach involving the regulatory agencies for cyanide were reviewed. With the cooperation of the then International Cyanide Management Code (www.chinadaily.com.cn)

Baia Mare contributing factors:

- insufficient safety evaluation during the financing process
- processing plant and tailings facility design shortcomings
- lack of contingency planning and emergency procedures
- non-compliance and enforcement and inspection by regulatory agencies
- inadequate chemical handling procedures
- lack of awareness of hazards by potentially affected communities and authorities

The incident made it all too clear that accurate information is in short sup-
ply during a crisis, and that viewpoints rather than facts weigh heavily on public opinion. The presence of a trusted, neutral and accurate information system available to everyone is a real asset in mounting a coherent response to environ-
mental incidents. Such a system should be established to foster public understanding of the facts and the environment underlying the situation, not just give a description of the event.

Baia Mare caused no human fatalities, but under different circumstances it might well have done so. The lessons learned and applied from the follow-up programme will help prevent the likelihood of similar accidents and future fatalities.

Fritz Balkau is Professor of Environmental and Resources Economics at the University of Göttingen in Germany.

Industrial hot spots of the Tisza river basin

- Mining with tailing ponds
- Mining industry
- Metallurgical industry
- Chemical, cellulose and paper industry
- Energy production and disposal
- Oil industry, pipelines

Rapid Assessment of the Tisza River Basin

Almost five years after a cyanide spill from a gold mine in northern Romania travelled down the Tisza, the rapid Environmental Assessment of the Tisza river basin is presented. The new report “Rapid Assessment of the Tisza River Basin” from UNEP, says more concerted action is needed to mitigate environmental threats and their potential impact. The report says that the Tisza River still has potential environmental threats, and recommends an “Integrated Sustainable Development Strategy” for the entire catchment area of the river Tisza, which includes Romania, Ukraine, Slovakia, Hungary and Serbia and Montenegro. In the wake of the Baia Mare cyanide release and other potential accidents, the risk from mining operations (including from obsolete mining sites) are singled out for particular attention.

China has seen an annual average of about 21 industrial accidents since 2001, with nearly 140,000 deaths each year.
Informal mining in the Democratic Republic of Congo

Rene Nijenhuis

This summer eight people died and 13 were seriously injured while digging for cobalt in the Shinkolobwe uranium mine in the Democratic Republic of Congo (DRC) when their hand-made tunnel collapsed. This accident was just the climax of a string of concerns about child labour, radiation exposure and pollution by heavy metals.

In the DRC, thousands of people earn their living from digging with bare hands and simple shovels to extract ore. They live with the constant risk of exposure to toxic and radiative substances. Moreover, they run the high risk of being buried by a collapsing tunnel. Security measures are almost non-existent.

The Shinkolobwe mine first came to international attention as the supplier of the uranium used in the atomic bombs dropped on Nagasaki and Hiroshima in 1945. The mine had been closed for many years, but yielding uranium (cobalt, uranium, copper, and nickel). The long term risks associated with heavy metal contamination must be seen in the larger context of the area’s poor quality drinking water. Soil, dust and water samples were analysed for heavy metal content (cobalt, uranium, copper and nickel). The long-term risks associated with heavy metal contamination must be seen in the larger context of the area’s poor quality drinking water. Soil, dust and water samples were analysed for heavy metal content (cobalt, uranium, copper and nickel). The long-term risks associated with heavy metal contamination must be seen in the larger context of the area’s poor quality drinking water. Measurements revealed that workers had been exposed to ionizing radiation exceeding international safety standards.

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The assessment mission highlighted the close links between poverty, environment and development. Poverty and unemployment in this region will send diggers back to Shinkolobwe, despite being fully aware of the risks incurred. Problems associated with informal cobalt and copper mining are probably all too common in the mineral-rich province of Katanga. UN experts accordingly recommended setting up an interagency working group on informal mining in the province, in partnership with the government.

This relatively minor incident is symptomatic of innumerable other cases in Africa and further affords demanding an integrated approach to prevent human and environmental disaster. The environment is a cross-sectoral issue that is closely enmeshed with poverty. A one-dimensional solution to the problems at the Shinkolobwe mine would only lead to more of the same elsewhere.

Rene Nijenhuis is an environmental officer at the Joint UNEP/OCHA Environment Unit in Kinshasa.

Legal measures to prevent industrial accidents

Sergiusz Ludwicki

International treaties

Industrial operations may involve substances that do not usually represent a major threat to our health or environment but are nevertheless potentially hazardous. Industry itself has been trying to make its operations safer, but even the safest plant is never totally risk-free.

In the early 1990s, following industrial accidents at Seveso in Italy and Schweizerhalle in Switzerland, UNECE concentrated on preventing such occurrences and especially their transboundary effects in the region. Its work led to the adoption of the Convention on the Transboundary Effects of Industrial Accidents in 1992.

The convention aims to protect people and the environment against industrial accidents. It seeks to prevent them altogether as much as possible, reduce their frequency and severity, and mitigate their effects. It promotes active international cooperation between contracting parties, before, during and after industrial accidents. Thirty-two UNECE member countries and the European Community are currently party to the convention.

The Ruse Maru industrial accident in Rumania in 2010, with severe transboundary effects, demonstrated that operations involving hazardous substances still pose a serious threat to our environment. It also showed that accidental water pollution can have far-reaching transboundary effects even if it occurs far from an international border.

In response to this accident, the international community started negotiations on a legal instrument on civil liability within the UNECE framework (Industrial Accidents Convention and Water Convention). In 2003 the fifth ministerial conference Environment for Europe, in Kotor, adopted the joint protocol on Civil Liability and Compensation for Damage Caused by the Transboundary Effects of Industrial Accidents on Transboundary Waters.

International assistance

The Industrial Accidents Convention imposes concrete obligations on the competent authorities and operators of hazardous installations to prevent, prepare for and respond to industrial accidents. To improve industrial safety and reduce the risk of industrial accidents and their transboundary effects, it is important that all countries of the region fully implement the convention.

This is not yet the case. While implementation of the convention has made good progress in Central and Western Europe, it is proving more difficult in Eastern and South-Eastern Europe, the Caucasus and Central Asia.

An internationally supported assistance programme for those countries is addressing the key obstacles to accession and implementation. Four main things are lacking: an appropriate regulatory and institutional framework, adequate human resources for implementation, monitoring and enforcement, sufficient financial resources, and up-to-date technology.

Sergiusz Ludwicki is an expert on the Environment for Europe (E4E) Convention and an environmental affairs officer at the UNECE Economic Commission for Europe in Geneva.
There is no such thing as a natural disaster. One way of differentiating disasters is their time scale or the duration of their impacts. The most shocking events occur suddenly killing many innocent people in one blow. Sometimes however, their effects can be undated relatively soon after, where as in other cases areas remain vulnerable for years, if not decades. Sloper processes also bring disasters in their wake. The most striking example is climate change. Its effects at a local, national and international level demand far greater attention. We will have completed an important step when the Kyoto protocol comes into force in February 2005, an achievement finally made possible when the Russian Federation ratified the protocol in November 2004.

Asking for disaster

Pascal Peduzzi

A man jumps from a skyscraper and as he plummets he is screaming for help. How far go we? This sums up our short-sighted way of thinking. Our daily lack of concern, let us blame it on the depletion of natural resources, increasing poverty and poor spatial planning, is a recipe for disaster. We behave carelessly and then we are surprised when things go wrong.

Most disasters are not random events without underlying causes. They are the sudden manifestation of slow but continuous degradation processes. Risks multiply through lack of concern or our failure to find alternatives. For example we cannot put all the blame for the death of 2,750 Haitians on Hurricane Jeanne. The long process of degradation that preceded it was greeted by deafening media silence. Only after the disaster did USA Today write: “The torrents of water that raged down onto this city, killing hundreds of people, are testimony to the long process of deforestation that preceded it.”

Why does slow degradation go unnoticed? Why are we blinded by footage of one disaster flickering across the screen until the next tragedy takes its place? Our relationship to the environment resembles that of a scavenger. The higher the death toll, the bigger the damage. Why do the ski patrol travel to a scene of a disaster and express their concern for families, but once issues of sustainability and what happens to the measures needed to prevent the next disaster?

The explosion at the Chernobyl nuclear power station shocked the whole world. But with privatisation of the electrical sector we read more about costs than improving the safety of nuclear reactors. The media reported every detail of the wreck of the Kursk submarine with the loss of 118 sailors. But they say nothing of the dozens of Russian nuclear submarines safely resting in the Barents Sea. Much has been written about the crude oil escaping from the wrecks of Prestige and Erika. Yet every day petrol tankers are voluntarily degassing to cut down on cleaning costs, while media and politicians remain largely indifferent. Double-hulls are still not compulsory. Nor is tank cleaning. Overfishing affects 7% of our oceans but no regulations are being draftedit for international waters, despitethe fact that simple measures – the introduction of nets with a bigger mesh and a ban on bottom trawling – would help to preserve ocean ecosystems. These are just a few examples of slow degradation of environmental and social systems that may ultimately lead to disaster.

The world’s environment ministers made a very clear statement with the UNEP Malmo Ministerial Declaration in May 2000. “Environmental threats resulting from the accelerating trends of urbanisation and the development of megacities, the tremendous risk of climate change, the freshwater crisis and its consequences for food security and the environment, the unsustainable exploitation and depletion of biological resources, drought and degradation, and uncontrolled deforestation, increasing environmental emergencies, the risk to human health and the environment from hazardous chemicals, and land-based sources of pollution, are all issues that need to be addressed.”

Common sense dictates that we treat these issues as a top priority. But only sudden events catch our attention. Our societies seem to be led by short-sighted visionaries. There are several reasons for this affliction:

We prefer to avoid trouble. Nobody can be accused of causing tropical cyclones, but it is relatively simple to identify the culprit behind continuous environmental destruction. Government leaders and the senior management of large companies are directly responsible for the contamination of rivers by mining, erosion following unsustainable exploitation or radioactive waste by industry. But to make such accusations against influential people is too painful. No one wants to be blamed for natural hazards is a much safer attitude.

We are fascinated with speed, which makes it difficult to make the headlines with continuous degradation. Although the long term impact may be much worse, the media will just not make a work-long issue of the underlying causes of thousands of people dying of starvation. It is an uphill struggle keeping readers’ and viewers’ attention. The media need rapidly changing events to avoid boring their audience.

With our blinkered vision, security and the fight against terrorism have monopolised the global debate. Climate change threatens millions of people with more frequent heatwaves, rising sea levels, landslides and more severe storms, among others. But combating it will never attract the same amount of funds.

Our perspective is strictly short-term. To stand a chance of being re-elected politicians must focus on what can be achieved in a four to five-year mandate. Long term issues tend to be sidelined. Our political and economic reflexes prefer quick benefits, leaving the mess to be cleared up later.

We are obsessed with visibility. The media will focus on aid following disasters and government rescue operations. But preventive measures are not attractive enough to make the headlines.

Lastly we imagine natural resources are infinite, so their price does not reflect the cost of producing such resources. For example, there is no such thing as a petrol producer. Bacteria produce petrol. It takes them 200 million years to transform 2.4 tonnes of fer in one litre of crude oil. If we restricted oil consumption to the quantity produced in the previous year it would be stupendous. We can apply the same reasoning to many natural resources.

As long as our main concern is economic growth, we forget that our planet is a finite space in which continuous growth is impossible. We cannot catch fish than the numbers that hatch each year. The same is true of the trees we cut down. Such unsustainable practices can soon lead to the collapse of entire systems on which a large proportion of the popula-
tion depends.

We can no longer wait for the next disaster to happen. We urgently need to reduce the impact of our mismanagement on communities and the environment as a whole. It is a huge task but the goal can be achieved. We must stop ongoing degra-
dation of society and the environment by helping all communities to live on sustain-
able resources. Priority must be given to renewable energy sources and resources, to supporting development, and promot-
ing family planning and education. Only then will we have a chance of reducing the risks. Our economy will certainly benefit from this. We cannot afford to postpone investments in our future. Otherwise the bill will just be too high.

Identifying vulnerability

Pablo Ruiz and Pascal Peduzzi

The UNDP report “Reducing Disaster Risk: A Challenge for Development”, published in 2004 in collaboration with UNEP, highlighted the link between de-
volution and vulnerability. It measured for the first time global exposure to key natural hazards. Today 7% of the world’s population lives in areas affected at least once by earthquakes, tropical cyclones, floods or drought between 1950 and 2000. Such events cause more than 180 deaths a day worldwide.

But these disasters are not “acts of God”. While only 1% of the people exposed to natural hazards live in low human-dev-
dvelopment countries, they account for more than 43% of recorded deaths. Highest risk is in South Asia, home to 25% of those exposed, account for less than 2% of deaths. So the level of human development matters and helps to explain why disasters are not so “nati-
rual”. Some of the disaster impacts could perhaps be avoided.

So far the international community has mostly reacted to disasters, investing only limited budgets for prevention. This might be because disasters attract more media attention (see article above). Prevention programmes (e.g. sound urban planning, reforestation or capacity building for risk management) will never be as powerful as pictures of disasters. But even if there was a global will to invest in prevention, the next question would be where? A decision of this nature obviously must not be based on available resources. The floods that killed 2,000 people in India, Nepal and Bangladesh in August 2004, attracted very different media coverage compared with Hurricane Charley, which killed 20 people in Florida. The Dis-
saster Risk Index (DRI) is a vital first step towards highlighting decision-makers with more scientific, development-oriented tools drawing on independent sources, indices.

Since the project started new data (on deforestation, armed conflict, corruption) has become available, with the prospect of new applications for its findings. But some lessons have already been learnt. The DRI may not qualify as a proper early-warning tool, but it has anticipated some disasters. Iran, for example, was the DRI’s second most vulnerable to tropical cyclones, even before the Bam disas-
ter in 2003. Over and above Small Island Developing State vulnerability to tropical cyclones, the DRI showed that Haiti had the “highest relative vulnerability, perhaps limited to its economic system, degraded environment and weak institutions of governance”. Recent floods in May and October (with more than 4,000 fatalities) dramatically confirmed this analysis. Early warning and action are still major chal-
enges in most developing countries.

Pablo Ruiz is a Disaster Programme specialist in the Disaster Reduction Unit at the UNDP Bureau for Crisis Prevention and Recovery in Geneva.

Seismic stations

The concept of this picture series was developed by Florian Donmez, the Director of the Institute for Transdisciplinarity at the “Fachhochschule der Künste Bern” in Bern, Switzerland.

The World Seismic Network consists of about 2,000 stations that can record earthquakes of magnitude 2.5 or greater. The stations are all affiliated to the Global Seismic Network (GSN), comprised of 72 stations that are monitorable by their 3.0 to 4.0 unconstrained sensor.

www.iris.washington.edu/stations/stations.htm

Australia’s increasing suffer iron water problems, extreme weather events, and natural disasters such as floods and droughts it fails to cut its greenhouse gas emissions – amongst the highest in the world – by 60% by 2050.

(197)
In the last century the world heated up by 0.6 °C. As it seems less likely for tectonic hazards to increase, we can see that the occurrence of reported earthquakes is increasing along similar lines to other hazards. The increase is certainly exponential but mainly due to a significant improvement in access to information worldwide. How, the reader may ask, do we know that?

The number of earthquakes (of sufficient magnitude to register on a seismograph) that hit populated areas has not increased. On the contrary it is steady. But EM-DAT only reports some of them. In the 1970s only 17% of earthquakes affecting human settlements were reported. The figure for the 1980-90 period increased sharply reaching 45%. It carried on rising, to 58%, for 1993-2003. Demographic factors cannot explain the sudden increase in reporting. The most logical explanation is the tremendous improvement in information technology. By the end of the 1970s the media had achieved global coverage. For the first time television channels broadcast live coverage of a war (in Vietnam). Before 1980 only places with reliable channels broadcast live coverage of a war. This is associated with larger and more abrupt climatic variations resulting in more frequent and increasingly devastating natural disasters.

Man-made systemic failures face several huge challenges. We must address the consequences of burning fossil fuels and other greenhouse gas-emitting activities. We need substantially to reduce greenhouse gas emissions. We must also adapt to changed and often threatening environmental conditions. But there any way of putting the clock back. Urgent action to mitigate climate change and its effects, at local, national and international level is required.

The United Nations Framework Convention on Climate Change (UNFCCC), which came into force in 1994, laid the foundations for concerted international action to address climate change. The Kyoto Protocol, adopted in 1997, sets legally binding emission reduction targets for developed countries. Although stronger mitigation action is needed in the future, the Protocol represents an urgently needed first step. Even if it takes decades to slow down and eventually stop changes in the climate, we must prepare mitigation activities – further reducing emissions, improving energy efficiency, creating sunk. The importance of such work preventing long-term disaster risk increases cannot be underestimated.

Global warming has accelerated in the atmosphere urgently need to be stabilized before they reach levels to which it is no longer possible to adapt.

However the climate system is characterized by inertia. The international community must consequently give high priority to adaptation. It presents a challenge, of which disaster reduction is a crucial part. In particular adaptation actions to help communities and ecosystems cope with changing climatic conditions. Reducing vulnerability to climatic hazards today is essential to building future resilience. Man-made risks needs to significantly strengthen its ability to withstand the adverse effects of current and future natural disasters, likely to be even more severe. Adaptation is necessarily a global issue, but it is particularly relevant to developing countries, as they are likely to be the hardest hit by the effects of climate change.

Both adaptation and risk reduction strategies must focus on raising the adaptive capacity of the most vulnerable groups, including small-island developing states and least developed countries. Current strategies include capacity-building to manage climate variability and extreme events, insurance and disaster management that can help to protect the environment. Eventually adaptation to climate change and disaster reduction efforts need to be embedded in national policies, programmes and plans to ensure adequate funding and effectiveness. The global community has a responsibility to raise its capacity to deal with the challenges of climate change and natural disasters.

Henning Wuester is the special assistant to the Executive Secretary of the Secretariat of the UN Framework Convention on Climate Change in Bonn.
Where death really counts

Richard Adams

The satirical US magazine Spy, during its spell as a daily, published an equation account for skin colour? Xenophobia is one thing, but how does it relate to broader issues of media reporting? The easy conclusion is that people in white countries get more coverage. But Bangladeshis are neither white nor English-speaking.

The simple equation for the New York Times was: The death toll was 16 - and the closer they were to Times Square, the more likely they would see storm warnings about Florida, they do not think: “Oh no, I wonder if that gets more coverage. But Bangladeshis are neither white nor English-speaking. The easy conclusion is that people in white countries get more coverage. But Bangladeshis are neither white nor English-speaking.

In Florida the death toll was 16 - by far the longest using the equation.

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Deconstructing disasters

Eric Bohensky

What is a disaster? The simple definition is a sudden, devastating, and sometimes surprising event or series of events. Meanwhile, local prehensile explanation of a disaster is that first, it typically follows a prolonged phase of inappropriate action, second, it is often due to a lack of awareness of the underlying drivers of the problem that spirals toward its ultimate disaster phase. However, second, it is rarely the result of a single management failure or an environmental factor that causes it, but rather an interaction of the two; third, the victims of disasters frequently lack op- tions for responding to their situation.

Improved disaster prevention and prepa- redness requires a greater awareness of how disasters arise, and an expanded set of response options. A recent analy- sis of people’s responses to ecosystems, carried out by the Southern African Millen- nium Ecosystem Assessment (SAMA), has found that one of a set of global initiatives to evaluate the relationships between ecosystems services and human well-being at multiple scales, offers a few lessons worth considering: that the more robust the uncertain future of this region in transition, which also apply to the anticipation and mitigation of disasters.

Disasters are elements of complex systems, in which people and their environments are linked. Complex systems uniquely pro- mise to several problems. First, because complexity is daunting, people tend to simplify the complex world they inhabit. People (whether scientists, managers, or resource users) break problems down to cope with the pieces to their former whole. They act without understanding the dynamic or the policy context of diverse actions. A second problem is that managing complex systems is often non-linear; thus, an abrupt or extreme change is not always pos- sible. Second, systems are often non-linear; thus, an abrupt or extreme change is not always pos- sible. Second, systems are often non-linear; thus, an abrupt or extreme change is not always pos- sible. Third, systems are non-linear; thus, an abrupt or extreme change is not always pos- sible. Fourth, systems are non-linear; thus, an abrupt or extreme change is not always possi- ble.
Some places are more prone to disaster than others. But what does it take to turn a cyclone into a disaster in one place and just a climatic event somewhere else? The main reasons are obvious enough. Economically deprived people living in shacks are more likely to suffer from any calamity. Rich countries may have more to lose financially, but they also have more resources for anticipating hazards. There are many ways of determining vulnerability, apart from economic factors: previous environmental damage, the location of nearby industrial sites aggravating a hazard’s potential, poor social organisation and transparency, shortage of key resources, etc. Whatever you focus on, developing countries seem – predictably – to be the most frequent and most vulnerable victims of disasters.

The planet is scattered with hazardous or explosive leftovers from a succession of technical breakthroughs – be they military or industrial – just waiting to be washed away by a flood or mudslide or carried off by a hurricane. If disaster strikes these “powder kegs” multiply the danger to people and the environment (posing a particularly acute threat to already scarce water resources).

Not all industries are potential powder kegs. But many by-products and effluents can be hazardous, and storage may also pose problems. The following sectors are a source of potential concerns: chemicals (including pesticide stockpiles); mining (tailings being the prime concern); areas of energy production (oil, gas and nuclear).

Lithium powder kegs exist in numerous countries in the form of unexploded ordnance, a missile on an mountain side in Afghanistan for example, bombs dropped in World War II that are still found occasionally, landmines that turn vast areas of previously fertile agricultural land into unusable zones.

Agriculture as well as fishing need a healthy environment. Countries whose economy depends mostly on these resources will probably take many years to recover if the basis of their production is damaged.

Tourism is equally dependent on an intact environment for its prosperity. It doesn’t have to be as devastating an event as the recent tsunami that literally washed away large parts of the tourism industry all around the Indian Ocean. A country’s economy depending heavily on tourism can already suffer from an oil spill, such as on the Atlantic coast of Spain and France where the number of visitors is reduced for years in reaction to the sinking of the tanker Prestige.

Through complex linkages of the globalised economy damage to industrialised countries can happen indirectly, as was the case after the 1995 earthquake in Taiwan where the Californian production line was interrupted because the supply of components from Taiwan had ceased.

Deforestation is well known for aggravating erosion. Bare soil has no protection against heavy rain, washing away immediately. On hillsides, it readily turns into mudslides leaving people very little time to seek refuge and cutting deep ravines into the earth. And where deforested land was turned into cultivated fields, the soil is likely to be overused and exploited through intensive use of fertilizer.

Forest fires in particular increase CO₂ emissions, and reducing forest coverage reduces capacity to absorb CO₂ emitted by various human activities. CO₂ is a key contributor to climate change, and scientists mostly agree that climate change will lead to an increased risk for disasters.
Most of the Earth’s population lives on the coast, with a grandstand view of sea-borne natural disasters – and an immense vulnerability to all hazards that come from the sea. The population around the Indian Ocean faced the deadly waves following the strongest earthquake in forty years without a warning.

In the face of any calamity we instinctively take refuge under a roof. This is little use against a chemical or nuclear accident, but for many there is no other resort. The number of people currently living in shanty towns is rising in all the big cities of the developing world, where urban growth is generally uncontrolled. The map shows how small the proportion of city dwellers with improved access to sanitation in many places is, giving an idea of the number and location of people living in precarious conditions.

It is very difficult to estimate homelessness in the world, but refugee figures are available, their numbers increasing with each new conflict.

For people in countries at war or subject to economic embargos many goods are scarce, food and water constituting the most crucial shortages. But they also have to deal regularly with death and injury. In such countries disaster prevention may well not be a priority.

The PRIO database was developed by the International Peace Research Institute in Oslo and the Uppsala University. Its aim is to provide a basis for a better understanding of the geographical extension of conflicts. For more information on the PRIO database and the calculation method contact the International Peace Research Institute in Oslo.

People living in slums

<table>
<thead>
<tr>
<th>Year</th>
<th>Southern Asia</th>
<th>Sub-Saharan Africa</th>
<th>Latin America and the Caribbean</th>
<th>Western Asia</th>
<th>Eastern Asia</th>
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<tr>
<td>1996</td>
<td>250 million</td>
<td>250 million</td>
<td>150 million</td>
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<td>2001</td>
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In 1998, when Bangladesh was hit by the worst floods recorded in the 20th century, nearly 75% of the country was inundated for more than 50 days.
An early warning is “timely information allowing authorities and decision-makers to take appropriate actions to either avoid a hazardous event or process becoming deadly or to reduce the future extent and number of impacts on human populations, vital infrastructures and/or ecosystems.” An early warning system could have saved the lives of many of the more than 100,000 coastal inhabitants and tourists that were taken by surprise when the deadly tidal waves ravaged the coastline around the Indian Ocean. The technology for a tsunami warning system is available, and in many cases there is a considerable amount of time between the event triggering the deadly waves and the moment they reach the shore. However, it would be too simplistic to think that tsunami warnings would be the solution for the affected states for a lack of preparedness. It is quite understandable that the very costly system wasn’t available in developing countries with pressing needs, considering the chance of such an event is one in at least 50 years.

Early warning information can be generated by sophisticated data-gathering networks demanding high-tech instruments, or by simple observation of changes in physical circumstances. Either way, the whole timing warning is of no help if a fault triggers action. All too often researchers see their warnings go unheeded. There are several reasons why scientific evidence is disregarded and the implementation of proposed solutions delayed, notably politicians’ exclusive focus on short-term election issues, opposing interests of powerful firms, and the inadequate institutional and financial capacity. Many governments still fail to understand the benefits of investing more in risk management, prevention and early warning.

The following pages present a mixture of articles that emphasise the need to listen to our modern Cassandra. It may be interesting to compare these articles, which lay most of the blame for the lack of response on governments, with the article on the back page. There, Tim Radford highlights researchers’ responsibility for delivering their message. It’s a significant influence on how the audience responds to the content of the message.

Fishing activities have various negative impacts on marine ecosystems. The greatest cause for concern is the rapid depletion of fish populations due to over-exploitation fishing. In 2002/03 the world’s marine fish stocks were being harvested faster than they can reproduce. Bottom trawl—the harvest of fish or shellfish other than the species for which fishing gear was designed—is particularly pressing, with the number of vessels now running at a quarter of the total (27mn tonnes) in 2013 and much of it is lost.

For many scientists overfishing now ranks as one of the greatest impacts of human activity on oceans. It increases the vulnerability of ocean ecosystems and contributes to several other problems of other elements of the marine food-chain, including plants and mammals. The record for total fisheries production (captured and farmed) was around 177m tonnes in 1980 and was recorded in 2015. But the apparent glut conceals a serious decrease in the productivity of many fish species.

The fishing industry, ranging from subsistence fish to large-scale mechanical fishing vessels, employs directly or indirectly some 200 million people worldwide. As an economic sector it is a crucial factor in the development of many countries. But fish depletion also threatens food security. In Asia alone more than a billion people depend on fish for their major source of animal protein. The UN Educational, Scientific and Cultural Organisation (UNESCO) warns that fish, long regarded as the “poor man’s protein”, is decreasing fast in large part due to increasing market demand and overfishing.

Modern fishing technology is elaborate. Some trawlers are 170 metres long and can reach catches equivalent in volume to a jumbo jet. Drift-nets may exceed 6 km in length. Fishing vessels stay at sea for months and often prepare the catch for market distribution at sea. For bottom trawling powerful ships drag heavily weighted nets across the ocean floor, destroying the natural habitat. Each year they harvest an average twelve times the size of the continental United States! Sensors, alert monitoring systems and satellite platforms help to locate fish schools and follow them more easily.

Trawl catches are unselective and indiscriminate. For example, up to 95% of the fish of valuable commercial species. Another 5% of all farmed fish is destined for the market. Bottom trawling is particularly damaging to deep-sea benthic habitats, with around 3.8m vessels in 1995 of which nearly 1m is enclosed storage space. The fact that fishing capacity reduction has often been achieved by relocating vessels to other countries’ fisheries or in high sea fisheries is of serious concern, as it does not contribute to a global reduction in fishing capacity. Significant reductions in fishing capacity in highly populated and least-developed countries are not likely to occur due to increasing social pressure. At the same time it is acknowledged that by reducing the number of trawlers would be lower to the total fishing effort as much as possible, and develop selective technologies, better bottom trawlers and stronger enforcement. So far only eight countries have imposed a total or partial ban on bottom trawling (New Zealand, Indonesia, Philippines, Scotland, Italy, Sicily only), Kenya, Seychelles and Greece). In all studies conducted in these countries it was found that pressure on fish resources had been alleviated and stock recovery had occurred.

The Montreal Protocol success story

The Montreal Protocol is an example of the proper response being given to a severe threat. By phasing out certain chemicals this international treaty has greatly preserved the stratospheric ozone layer that absorbs harmful ultraviolet radiation from the Sun. Since the signature of the protocol in 1987 more than 160 nations have ratified it and 91 substances are now being controlled. It is an example of technological evolution that was achieved while transforming whole industries. The protocol created the first ever global environmental fund to assist developing nations and promoted unprecedented North-South collaboration in the research and in the implementation of the measures. In 1995, at the fourth meeting of the parties to the Montreal Protocol, parties acknowledged that all the signatories were uncoordinated, but that the success of the Montreal Protocol stands as a beacon of how science can guide decision-makers to overcome conflicting political and economic interests and reach solutions. The growing consensus now demands that in the real world of ambiguity and imperfect knowledge, the international community, with the assistance of science, is capable of undertaking difficult and far-reaching actions for the common good.”

1. Richard E. Benedick was chief US negotiator and a principal author of the 1987 Montreal Protocol on protecting the ozone layer.
Early warning systems

Maryam Golparhi

Every disaster year, except for climate change, causes billions of dollars in damage. El Niño-Southern Oscillation (ENSO) conditions have been blamed for about 65% of all damage caused by natural hazards. It seems likely that worse things are in store. According to the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), climate change could result in more severe and more frequent natural hazards in the future.

Natural disaster risk management is of particular importance to the World Meteorological Organization (WMO), which operates the global infrastructure for observation, research, monitoring, detection, prediction, early warning, and exchange of information related to natural hazards. Agricultural and capacity-building services they provide backbone capabilities to enable national and regional risk management and communication systems (NHMSs), particularly in developing countries, to work at the frontlines to minimize the risk of a disaster impact. While the disaster statistics of the last decade are sobering, it is important to recognize that losses and damages caused by natural hazards are much greater than actual global damage to property and human suffering.

One of the most important areas to be addressed is the need to help nations understand the benefits of shifting more investment from post-disaster recovery to risk management and prevention. Many countries, particularly the least developed, need to put greater emphasis on the various steps involved in proactive prevention.

For example, WMO’s global network proved highly effective in 2004, during one of the most intense hurricane seasons in the Americas. In addition to using the ENSO condition, WMO coordinates a global scientific consensus, involving the World Health Organization (WHO) to develop Health-Warning Systems for coping with deadly heat waves and malaria; and work with the UN Food and Agriculture Organization (FAO) on monitoring and developing early warnings of locust swarms.

Regional Climate Outlook Forums (RCOFs) are regularly held in regions affected by ENSO and a degree of learning has been developed for forecasting ENSO impacts. In Africa, three regional centres: the Northern Africa and the Maghreb, the Eastern Africa, and the Southern Africa Centre for Meteorological Applications for Development (CAMAD) in Nigeria, develop and disseminate climate outlooks, particularly related to drought monitoring and drought alerts, to each of the NHMSs, and arrange for interactive discussions and interpretations with representatives in the disaster risk management community and other sectors. There is considerable need for sector-specific climate information and early warning systems to be developed. Examples of such activities are WMO collaboration with the World Health Organization (WHO) to develop Heat-Warning Systems for coping with deadly heat waves and malaria and work with the UN Food and Agriculture Organization (FAO) on monitoring and developing early warnings of locust swarms.

WMO uses various formal and informal mechanisms, from technical approaches to more advanced technologies, to disseminate information to authorities and the general public, particularly the public at risk. While in some countries, the national centres rely on public broadcasting systems, in others, satellites, balloons, and balloons are more effective in warning communities that are remote or do not have access to the latest technology. However, this information is only effective if there is a corresponding capacity to respond to the information through prevention, preparedness and response activities at the national and community levels.

Efficient international and national satellite-based data-distribution systems provide timely and reliable access to weather, water, climate information. Two examples among many others are the Emergency Managers’ Weather Information Network (EMWIN) operated by the National Weather Service of the United States and the satellite-based telecommunication system operated by the China Meteorological Administration.

Beyond these activities, the premise of WMO research is to develop seamless end-to-end operational systems for early warning of natural hazards from next-hour to climate change timescales. Research programmes are extending the range of global forecasts to timescales of use in decision-making. WMO’s international research programme on weather and new climate strategy over the next 10 years aims to speed up improvements in the accuracy of one-day-to-two-week high-impact weather forecasts, and to develop prediction capabilities at longer lead-times.

While technical and scientific capabilities are advancing year-to-year, there is a need for stronger, more co-ordinated activities among government leaders, risk managers in both the public and private sectors, organizations at the national, regional and international level, and the scientific community, to develop capabilities to support proactive strategies for natural disaster risk reduction.

Dr Maryam Golparhi is the Chief of the Disaster Prevention and Mitigation Programme at the World Meteorological Organization in Geneva.

Locust invasions are a major threat to agriculture, pasture, food security and soil stability of rural populations occupying a very large area from Western Africa to Northern India. Large amounts of chemicals are being used to check this plague, at a cost of $10m to $50m, and ultimately $100m.

Early agricultural treatments would have sufficed in the Sahel countries and in other affected countries. In 1999, however, the invasion only added up to a few percent of emergent land areas. In 2000, By the end of 2004, nearly 8m hectares had been treated with insecticides... without weakening the invasion.

Since the 1970s efficient control measures have proved successful. Before then, locust invasions were almost continuous and took years to eliminate. Early treatment and control techniques, as well as preventive strategies have been reduced from the length of invasions. In 45 years only two invasions (1987-89 and the current invasi- on) could not be stopped at an early stage.

Early chemical treatment would have sufficed in the Sahel countries and in the rest of the world. Control only added up to a few percent of emergent land areas. In 2000, By the end of 2004, nearly 8m hectares had been treated with insecticides... without weakening the invasion.

The current crisis again points pinpointing the shortcomings in preventive control in Western Africa. National survey and control capability needs to be rebult. But this will require a large financial outlay, backed by an international trust fund. Furthermore we need an efficient governing body associated affecting countries and donors. This is the only way to ensure the long-term sustainability of preventive strategy.

Michel Lecou

Locust invasions are a major threat to agriculture, pasture, food security and soil sustainability of rural populations occupying a very large area from Western Africa to Northern India. Large amounts of chemicals are being used to check this plague, at a cost of $10m to $50m, and ultimately $100m.

Early agricultural treatments would have sufficed in the Sahel countries and in other affected countries. In 1999, however, the invasion only added up to a few percent of emergent land areas. In 2000, By the end of 2004, nearly 8m hectares had been treated with insecticides... without weakening the invasion.

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Indigenous knowledge in natural disaster reduction in Africa

James Kamara

In Africa, local communities had well-developed indigenous knowledge systems for environmental management and disaster risk reduction. However, these systems are often resilient to environmental change. This knowledge had, and still has, a high degree of acceptability amongst the majority of the populations in which it has been preserved. There is a need to integrate this knowledge and facilitate their understanding of modern scientific concepts to improve decision-making processes, including disaster prevention, preparedness, response and mitigation.

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Disaster management in India

K. C. Gupta

After independence India began a process of rapid industrialization. It inevitably lacked some framework conditions, such as an understanding of the risks of chemical hazards. Implementation of safety procedures, focused on immediate responses, soon followed and institutions such as the National Safety Council (NSC) were created. There was much to do.

The Bhola disaster (1970) did much to focus more attention on the need for a holistic approach to technology disaster management, and the role of ordinary people in emergencies. The government took several important measures, with major legislative changes and stronger institutional mechanisms. It set up Crisis Groups at various levels from their headquarters and local levels. NSC took the APELL process as a model, promoting awareness and training projects covering both hazardous materials transport and fixed installations.

India is also vulnerable to natural disasters. While well-established mechanisms for response, relief and rehabilitation were in place, major events such as the Orissa super-cyclone (1999) and the Bhuj earthquake (2001) emphasised the need for a comprehensive approach to mitigation and prevention, for natural and man-made disasters.

NSC adopted several goals based on the APELL procedure: creating or raising public awareness of possible hazards within a community; stimulating development of co-operative operating plans to respond to any emergency that might occur; and encouraging accident prevention.

Implementation in this vast country followed the top-down approach of development of awareness at the national level, and building implementation at selected high-risk industrial areas (HRIA – see map). We needed to gain first hand experience through pilot projects in important areas.

A national Advisory Committee and Technical Core Group was set up for periodic review, getting inputs and technical consultation. In 2001 the first national APELL Centre opened at NSC headquarters in Mumbai. It was the first centre of this sort in the world.

The first projects started in 1992 in six HRIAs, also drawing on international collaboration from UNEP, USAID and IWC. In 2004 an APELL sub-centre opened in Haldia (see map). A manual on cyclone emergency preparedness was prepared.

Transport issues were becoming urgent and a major new programme was based on UNEP’s TransAPELL. A training module and seminars were developed for traffic police. A HAZMAT emergency was started work on a trial basis in Patalganga-Rasayani, and a broad-based programme for transporters was launched.

Several lessons may be learnt from this process. Widespread industrial development in a country like India requires comprehensive elaboration of the programme at local level. Sub-centres are essential for implementation programmes involving local partners. Practical experience at local level has facilitated – and in turn been facilitated by – national legislation such as the law setting up APELL groups and safety management in general. Crisis groups at district and local level require training and support tools (best practice, case studies, etc.) so there is an ongoing need for training organisations such as NSC and its offshoots like NAC. Finally, the programme has propelled the need to treat transport as a priority issue, linking various locations in the hazardous materials chain across the country.

Experience has also aroused much interest abroad, notably in China, South Africa, Jordan and Brazil, underlining the need to share experience internationally.

Emergency prevention and preparedness is a complex issue, and industrialising countries need to address the matter as an integral part of a larger sustainable development agenda. Experience in countries such as India can do much to streamline the process elsewhere; with growing pressure to better address disaster issues.

Sao Sebastiao practising emergency procedures

Ruth Couto

Communities are often unprepared when disaster strikes, and heavy losses may occur. But communities need to practise contingency plans regularly to develop the requisite reflexes. In an emergency there is no time to find and consult instruction manuals. Experience has also shown that many people’s spontaneous reaction is misguided.

It is also important for emergency services to have practical experience of how people behave in an emergency, and how to deal with the impulsive reactions of those involved in an accident.

The city of Sao Sebastiao, in Brazil, has introduced an annual emergency practice drill for the entire community.

Sao Sebastiao is one of the nation’s biggest ports, handling approximately 15% of Brazil’s crude oil. Over the years urban development has encroached on the big Almirante Barroso terminal operated by Petrobras, the national oil company. Any uncontrolled accidents there would affect thousands of people.

In the late 1990s the mayor of Sao Sebastiao decid ed it was crucial to raise public awareness of potential hazards and increase overall safety. The APELL process (see section ‘Tools and techniques’) can be found at http://www.uneptie.org/apell/events/apellmeeting.html.

In 2001 a municipal decree established an “Alert Day”, with a full-scale drill being held every year on the third Saturday of October. The first drill was held the same year. In 2003 nearly 900 people played an active part in the Alert Day. The drill is followed by the involvement of workplace training events to promote community solidarity and drum up support for such training.

The local drills raise people’s awareness of the hazards and risks to which they are exposed and teach them how to react in such accidents. They are free to schools, and students, using teachers who have received training in evacuation procedures and who can discuss the various aspects of disasters. The day before the drill a series of disaster-mitigation events are organised. Community-based programmes make allowance for local culture.

The city of Sao Sebastiao intends to continue this exercise in the future, convinced that a regularly practised and informed and properly trained population is the best guarantee of safety and a successful response to emergencies.

Ruth Couto is a consultant in industrial risk assessment currently working for UNICCO.

Mangrove planting saves lives in Vietnam

Press release

Vietnam is one of the most typhoon-natched nations in Asia. Every year, an average of four severe typhoons and many more storms wreak havoc on this low-lying country. In what may seem a curious contradiction, Vietnam has been able to turn this threat into a blessing.

The Vietnamese government has been planting nearly 12,000 hectares of trees in mangrove groves, which has included the Vietnamese Red Cross (VNRC) has been responsible for mangrove regeneration and protecting them from shrimp farmers and industrial development and chemical disasters.

In 2001, the VNRC planted a mangrove forest in a high-risk industrial area (HRIA – see map). Over the years the mangroves have grown in height of 1.5 metre after three years. The mangroves now provide a natural barrier against the sea, reducing the impact of storms and defending them from shrimp farmers and industrial development and chemical disasters.

Mangroves act as buffers against the sea, reducing the impact of storms and defending them from shrimp farmers and industrial development and chemical disasters. Mangrove planting saves lives in Vietnam

K. C. Gupta

APPELL – Awareness and preparedness for emergencies at local level

A county board programme for disaster preparedness.

Prita Baksh

Local communities often lack the reflexes to take effective action when disaster strikes. If we could reach out to communities before disasters and inform them of what to do, then the impacts could be dramatically reduced.

Following some major accidents in the 1980s, UNEP worked with an international consortium to develop a community process ‘Awareness and Preparedness for Emergencies at Local Level’, generally known as APELL. This identifies and creates awareness of risks in a community, initiates measures for risk reduction, and fosters preparedness for the population at large.

APELL is a practical and hands-on programme community preparedness in emergency planning, via a structured dialogue between representatives of the source of the hazard (e.g. a ‘landowner’), authorities (the emergency services, e.g. fire and/or police) and community members. Such dialogues are achieved through a ‘Co-ordinating Group’ which reviews the hazard situation and then proposes some measures to address the risks. The outcome is an emergency plan to which the community has provided substantial input and which is understood by ordinary citizens. Being prepared also leads naturally to action to prevent accidents—the risk reduction component.

Community consultation is the most important part of APELL, with community participation proving an essential, with replication programmes launched.

Some of the situations where the process has been successfully employed are shown in the brochure APELL Worldwide. http://www.uneptie.org/apell/publications/apell-brochures.htm

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The toxic cloud that struck Nagpur 20 years ago provoked the immediate death of 700 people. Since then, another 15,000 people died from diseases related to that accident. Today more than 100,000 people suffer from chronic diseases.

(annex: International 2004)
Plagued by natural disasters and conflicts, Afghanistan is prone to natural disasters. Nature’s destructive patterns routinely afflict and wreak havoc on the central Asian nation and its people. Earthquakes are frequent in the northern parts of the country and often trigger devastating landslides. Flooding and mudslides are also a recurrent feature in mountainous areas when snow starts melting. Extreme winter conditions and avalanches are also a serious concern in the mountainous areas of the country.

As of 1998, Afghanistan has experienced a prolonged drought, which affects over 6 million Afghans mainly in the southern and eastern regions. Other common hazards include agricultural pests, such as caterpillars and locusts, and dust and sandstorms. In all, it is estimated that natural disasters have killed more than 100,000 Afghans and affected about 7.5 million Afghans since the early 1980s.

While Afghanistan has been adversely affected by environmental hazards for centuries, the wars and civil conflicts that have plagued the country for more than three decades, combined with increased environmental degradation and mismanagement, have heightened its vulnerability to damage wrought by natural hazards.

Afghanistan on the brink of natural disaster

Francis Caia, Yoko Hagiwara and David Jensen

Environmental reconstruction of conflict and disaster areas

The scale of environmental impacts caused by a conflict largely depends on the duration of the conflict and the state of industrial development in the country. The conflict in Afghanistan lasted approximately 30 years, causing a complete collapse of national and local governmental structure. The resulting environmental degradation was mainly caused by extreme poverty and the breakdown of governance system. The scale impacts to the forests, water, soil and wildlife reduced the productive capacity of the country’s land and undermined both food security and the sustainable human livelihoods. If the peace negotiations and conflict resolution process will undermine the reconstruction process and lead to further instability as people fight for scarce resources. Solutions to environmental problems in Afghanistan begin by building the basic capacity for environmental management, resulting land tenure disputes and then progressing to field-based restoration programmes and the development of sustainable livelihoods. Sustainable reforestation will take decades to complete and will require sustained assistance from the international community.

Recent conflicts in Serbia and Montenegro (former Federal Republic of Yugoslavia - FRY, 1999) contrast markedly with Afghanistan. In both countries, the conflicts lasted for only a few months, and the primary environmental impacts were largely caused by direct bomb damage to industrial facilities, and the subsequent release of toxic chemicals. In both cases, the vulnerabilities created were acute risks to human health from the contamination of air, ground water and locally produced food. Addressing these issues and reducing risks mainly involves technical solutions that can be implemented in several months to years. Compared to post-conflict recovery and environmental hotspots in Serbia and Montenegro, a good example of successful risk reduction after a technology-driven conflict caused by a disaster.

Conflicts and clean-up

In the context of the FRY conflict the intensity of air strikes, targeting of the industrial and military facilities, and drastic television coverage not only highlighted the fact that a fuel claims that an environmental disaster had occurred with massive pollution of air, land and water. Montenegro (Ng) was emphasizing its policy of selective, precision targeting and denying reports of environmental damage. As a result, in the case of times in war, it became hard to separate fact from rumour and propaganda. UNEP and the UN-HABITAT programs initiated a neutral, independent, scientific assessment of the environmental situation in Serbia and Montenegro.

They carried out a field assessment between July and October 1999 involving 130 experts from 22 countries and the assessment included on-site visits to the four conflict areas. Their findings were published in a report entitled “The SERBIA – Montenegro Conflict – Consequences for the Environment and Human Settlements”. This report contains a comprehensive assessment of an environmental disaster in Serbia and Montenegro, but that more localized impacts – included in some cases with a long-term legacy of poor environmental management and economic collapse. In the environmental situation at four hot spots (Novi Sad, Pancevo, Kragujevac, Novi Sad Waterworks), the lack of information and the sensitivity of location, the以下是Clean-up – in two projects in all were able to go ahead.

At the oil refinery in Novi Sad, UNEP undertook a project in cooperation with Novi Sad Waterworks making an immediate start on construction of a hydraulic barrier to remove contaminated groundwater from the refinery area and a drinking-water well. At the Pančevo petrochemical plant, UNEP and other partners installed the necessary equipment at the vinyl chloride monomer (VCM) plant to recover and treat approximately 150 tonnes of VCM that had spilled from storage tanks during the conflict. At the Zastava car factory, UNEP and its partners initiated a programme, working with the Kragujevac University’s Institute of Chemistry, removing about 120 tonnes of hazardous waste resulting from the clean-up work.

All of these projects have improved the environmental situation and significantly reduced risks to human health and well-being at the four hotspot sites. While the main focus of the UNEP Programme has been the physical work needed to clean-up the hotspots, the operation has also contributed to the recovery and associated environmental risks, institutional strengthening and capacity building has already begun to have a positive impact. A better environment would mean a better to assess environmental vulnerabilties and reduce risks.

Case by case solutions

In Serbia and Montenegro, Afghanistan and now other countries including Iraq and Libya highlights the need for environmental assistance to be part of the post-disaster reconstruction agenda. While the emphasis always should address urgent environmental issues, the role of restoration and rehabilitation institution should be an element of the effort to repair the benefits of the environment for the benefit of the local population.

Although world military expenditure fell by an average of 4.5% a year during the decade 1980-97, serious armed conflicts have been accompanied by increased pressure on ecosystems. In 1995, disputes over water triggered 16 international conflicts. (oecd.org/evnat/nat.htm)
Illegal logging is destroying the equatorial rain forests of Borneo, bringing the island to the brink of ecological disaster. 95% of the forest set aside for logging has been cleared and nearly 60% of supposedly protected national parkland has been illegally logged.

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Leading mining and metals companies are committed to continuous improve- ment of their sustainable development performance. Strengthening, advancing and promoting comprehensive safety and emergency measures is crucial to this commitment.

Mines and mineral processing and metal fabricating facilities are large and complex operations that involve workers and interact with neighbouring communities and the environment in similarly multifaceted ways. Notwithstanding the ongoing design and application of measures to ensure those interactions are positive and safe, the mining and metals industry recognises that none of its operations can ever be completely free of risk. Similarly, the industry acknowledges that if an accident were to occur, it could affect the environment and communities beyond the boundaries of the operation.

In the event of an accident, communities can be affected by direct exposure, or psychologically by fear of unknown impacts. Both real impacts and fears can be significantly lessened if local communities and emergency services are adequately informed of potential risks and briefed on how to respond. More importantly and beyond one-way communication, if an emergency response plan is to be successful, neighbouring communities, regional emergency services and site operators need to work collaboratively to design the necessary steps and their application. Recent, well-publicised acci- dents have shown there is considerable scope for improved emergency planning and response.

The International Council on Mining and Metals (ICMM), the representative body for many of the world’s leading mining and metals companies and asso- ciations, is working in partnership with UNEP to promote the adoption of good practices in the awareness, preparedness and response to emergencies in this sector, as set out in the Awareness and Preparedness for Emergencies at Local Level (APPEL) process. UNEP developed APPEL in partnership with industry associations, communities and governments to provide a structured process for including communities in the development and implementation of emergency response plans.

In 2001 the International Council on Metals and the Environment — ICMM’s predecessor — and UNEP co-published “APPEL for Mining”. For the first time it provided guidance on the application of APPEL in the mining sector. The current collaboration between ICMM and UNEP will extend this work by contributing more detailed guidance and practical experience through case studies.

The overall aim is to help companies and neighbouring communities prepare for and respond to the risks associated with mining and metals facilities, transportation of chemicals and other products to and from these facilities, natural disas- ters, and other hazards.

ICMM and UNEP will be publishing a compilation of case studies, “Involving the Neighbours in Emergency Planning”, in mid 2005. The publication will help companies de- velop appropriate local emergency manage- ment plans that are consistent with local, regional, national and international regulatory requirements. In addition, it will provide companies with examples of good practice and lessons learnt which demonstrate the practical application of engaging and involving communities in emergency preparedness. Finally, it will seek to broaden understanding of what companies need to do, in partnership with local emergency response services and the community, in the event of an emergency or disaster.

Andrew Parsons is Director of Environment, Health and Safety Programmes at the International Council on Mining and Metals (ICMM).

Disasters, natural or man-made, are of course extremely disruptive to business. Learning to cope with disaster has been a painless business. Many small business- owners never recover from the effects of disaster, even if insured, and the insure- ance business, especially in Europe, fears that several major disasters in short succession could be disastrous to itself.

Disaster management in the corporate/ business sector is seen as both a hu- manitarian and a business activity. A commonly accepted role of business, and especially in poor countries the ef- fects of disasters can be long-lasting. Looking at the local picture, business sees disaster management as a strategy to protect a nation’s potential for growth.

Andrew Parsons

Preventing chemical disasters

The chemical industry has been at the forefront of disaster prevention. Industrial disasters in countries like Seveso and Bhopal prompted chemi- cal firms to rethink their response to accidents, and more generally, how they do business.

In 1971 the European chemical industry launched a voluntary initiative, Res- ponsible Care, committing chemical companies to achieve continuous im- provements in environmental health and safety performance beyond levels required by local and international regulations. A fundamental element of Responsible Care is open com- munication with governments and international and local organisa- tions, including disaster prevention and emergency response.

Chemical companies are working to prevent chemical accidents and reduce their impact. Global and re- gional networks are a crucial part of this strategy. In Europe the Interna- tional Chemical Environment (ICER) network of emergency professionals provides information, practical help and equipment to the competent emergency authorities to cope with chemical incidents.

In the United States the Chemical Transportation: Emergency Centre (CHEMTREC) operates a public- service hotline, with law enforcement, and other emergency agencies, providing data and assis- tance for incidents involving chemica- lals and hazardous materials. The chemical industry, in countries such as Japan, Mexico, Canada, China and Thailand, has also set up emergency networks. Every major re- gion and country has developed and adapted its own system, following ICER and CHEMTREC guidelines.

Chemical companies are comple- menting emergency networks with their own schemes and systems. For example, most global chemical companies provide their deliveries with safety data sheets, emergency preparedness and emergency labels, usually under the supervision of national technical agencies.

Mara Cahoon

Companies may also offer direct assis- tance and support to disaster victims, funding recovery programs to help implement conservation and emergency- preparedness plans, and offering medical care to victims and their families.

There are a few examples of disaster prevention and management practices in the chemical sector, over and above concerted action by chemical industry networks. Our experience at association level and company level has led us to formu- late our own recommendations on how best to use international resources in disaster prevention and remediation, and how public-private partnerships may reduce impacts.

We must create a portfolio of disaster reduc- tion actions, compiling best practice and lessons learned from previous disasters, and sharing strategies and techniques to reduce the impact of future disasters. The chemical industry should share well-developed codes, translated into several languages and adapted to the differ- ent environments in which we operate.

We should also do more to integrate environmental emergency preparedness and response activities into strategies and sustainable development programmes. In particular we must identify specific activi- ties, to implement relevant provisions of the 2002 Johannesburg Plan of Implementa- tion, and conform more closely with the Millennium declaration and its goals.

Discussion of emergency prevention, response strategies and disaster issues involving the competent authorities, private sector and public general must develop. We should assess the effective- ness of existing public-private partner- ships. Would the World Conference on Disaster Reduction, for instance, be an appropriate place for new partner- ships, and if so, how should partnerships differ from existing ones?

Lastly we must develop and enhance early-warning systems, still the most critical aspect of risk reduction. We need to create suitable technical instruments, supported and sustained by networks of professionals. The lack of such networks is an obstacle to prevention, allowing accidents to develop into fully-blended disasters.

Mara Cahoon is the manager of the International Council of Chemical Associations.
Knowledge management and education for disaster reduction

Bashirou Rashid

Knowledge management and education can help communities in hazard-prone areas to gain a better group of the ways to cope with risks. Knowledge and innovation, education, training and skill for goal, are closely linked to disaster reduction efforts. Disasters can strike at any time and in the magnitude of the risk of impacts that will reflect the level of preparedness and education of the exposed community and community. It is now widely agreed that achieving disaster resilience is essentially a process of using knowledge and of learning at all levels.

Advancement, transfer and sharing of knowledge are key foundations for disaster risk management. When it comes to living with risk, we must embrace education in all its forms, from drills involving disaster simulations in primary and secondary schools to university and post-graduate studies. We must also capitalize on traditional local knowledge about hazards. Nor can there be sustainable development without education in disaster reduction.

Education for disaster reduction and human security should not be a one-off affair, but rather a continuing process, offering individuals and communities coping with hazards not just once but several times throughout their lives. Furthermore, education and raising awareness of disaster risks must respond to society’s changing needs and find its way into the daily lives of individuals throughout their lives. Educating all sectors of society on disaster reduction actions that are based on application of sound scientific, engineering, and cultural principles to create sustainable systems therefore constitutes a long-term UNSCO goal.

UNESCO is well placed to address the challenge of mainstreaming knowledge applications and education in disaster prevention and preparedness into the broader agenda of education for sustainable development. Through its international coordination role in the forthcoming UNI Decade of Education for Sustainable Development (2005-2014), and drawing upon its experience of intersectoral programming, UNESCO will promote and support efforts to ensure that disaster education is integrated into national action to create a safer world. In the next years, UNESCO should be fully embedded in the International Strategy for Disaster Reduction.

Dr Bashirou Rashid heads the Section for Disaster Reduction of the Natural Sciences Sector at UNESCO.

Infrastructure: a key issue for disaster reduction

Peter Boswell

The physical infrastructure sector is an important part of the economy. Urban and industrial infrastructure is planned, approved, built and operated according to elaborate rules, standards and criteria, and is the responsibility of local authorities. Ensuring that such infrastructure is safe and sustainable is a key task for governments and industry. Vital community infrastructure must go on working after natural and other disasters to provide services and ensure rapid recovery can occur. Some infrastructure such as emergency response systems, hospitals and waste treatment and disposal facilities are there to deal with such events, as well as being indispensable even in normal times. The preparedness of these facilities is a key factor in the recovery of communities after disaster.

Consulting engineers are largely responsible for designing, planning and managing infrastructure and the profession has huge potential to contribute to disaster reduction and recovery. As the industry’s global voice, the International Federation of Consulting Engineers (FIDIC) is working with governments and industry to develop global best practice guidelines and procedures.

The most visible part of disaster management is the response phase, which starts with immediate search and rescue, where engineers are trained in survival skills. Then follows a safety evaluation of critical infrastructure such as hospitals and dams before extending to transport and service utilities. Several national and international associations have developed preparedness mechanisms for infrastructure with which member firms already have links. In this way key organizations have timely access to engineers familiar with their operations.

The next response phase is evaluation of building safety, generally carried out in partnership with local authorities. This may be followed by the fast-track procurement of critical infrastructure such as rebuilt dams and temporary roads and bridges.

Wider mechanisms for preparedness, response and recovery depend on extending this partnership to other stakeholders. Normal development and zoning plans increasingly recognise the importance of non-traditional stakeholders. Consulting engineers help to define how these stakeholders are incorporated into plans.

International, national and local registers of professionals and firms that have demonstrated disaster preparedness and response skills and capacity can help build effective partnerships. Some registers cover safety evaluation and fast-track procurement of critical infrastructure such as potable water supplies, telecommunications systems and airstrips.

In the longer term, risk reduction strategies are needed to take a systematic approach to disaster avoidance. These incorporate elements such as risk identification, assessment, monitoring and early warning for emerging risks such as climate change, deforestation and soil degradation, and from development patterns and urbanization. Future investments must take these aspects more systematically into the core planning process, and consulting engineers are key players in the design and delivery of more sustainable infrastructure. Infrastructure projects are rendered operational through land use planning, use of construction codes, and implementation of infrastructure systems in ongoing operation, and increasingly, countries are setting criteria that advance progress towards millennium goals.

Peter Boswell is the General Manager of the International Federation of Consulting Engineers (FIDIC), Geneva, Switzerland.

Cyanide Management Code

Norm Greenwald

Toxic chemical spills and accidents are a controversial issue with the general public and government emergency services. Modern gold-mining processes use cyanide solutions to extract the precious metal from ore. It is then dispersed in large ponds or “tailings dams”. The toxicity of cyanide is well known; although the use of this substance has caused relatively few fatalities, public concern is running high.

Following a number of spills during transport and from tailings dams in the 1990s, the mining industry started a review of safety procedures for cyanide usage.

Following another highly publicized accidental release of large amounts of cyanide and sulphate from the Baa Moru gold mine in Romana in January 2000, the industry committed itself to framing an International Cyanide Management Code for the Mining Industry, Transport and Use of Cyanide in the Production of Gold (referred to as the Cyanide Code). Under the auspices of UNEP and the International Council on Metals and the Environment, a multi-stakeholder steering committee composed, representing the gold mining industry, governments, non-governmental organizations, the workforce, cyanide producers and financial institutions.

This committee devoted almost two years to drafting a voluntary international voluntary programme for safe management of cyanide in gold mining.

The Code as an management mechanism that covers the entire life cycle. It addresses risk prevention, safety operations, emergency preparedness and possible responses to accidents. It sets comprehensive goal for safety management of cyanide usage in the gold industry.

The Code as an management mechanism that covers the entire life cycle. It addresses risk prevention, safety operations, emergency preparedness and possible responses to accidents. It sets comprehensive regulations and procedures.

Unrestrained growth, spanning the entire life cycle, from production and use to disposal, will make accidents a continuing threat in the future and make mitigation easier.

Norm Greenwald is the manager of the International Cyanide Management Code.

Training local authorities

Julia Fredriksson

Injuries are a serious problem for the health of any population. Cooperation between Russia and Sweden promotes accident preparedness at the local level with the focus on reducing the number of accidents and injuries. The threats facing Russia in emergency operations have changed in recent years. They are still the first on the accident scene and play an important part in saving lives and helping the injured person, but as well as being heroes they often become victims. There is a need to improve the capability and knowledge of rescue personnel in order to minimize secondary incidents.

The UNEP/APPEL programme in the North West Region of Russia is addressing several scenarios, now or in the future: a severe traffic accident in the countryside; emission of toxic gas (chlorine) from an industrial plant; a natural disaster caused by a severe snowstorm and an ammonia spill as a result of a transport collision; floods involving various damage scenarios, and toxic-chemical and petroleum-related risks.

One of the results of the APPEL programme in the North West Region is the establishment of several competent authorities, not only at government level, but also at regional level in the North West Region of Russia and in Nordic countries. They have pooled risk assessment knowledge and experience and introduced adequate preparedness and preparedness measures to guarantee effective cooperation and response in an emergency.

The goal is to continue cross-border cooperation, developing and enhancing the ability to prevent and counter-act terrorism.

Julia Fredriksson is a Senior Executive Officer at the UN and International Affairs Department of the Swedish Red Cross Rescue Services Agency.

For more pictures about disaster-causing gods and fish see http://www3.la.psu.edu/textbooks/172/graphics/ch8/10.htm.


“Kamland” to be banished (Hokkaido and the foundation story) Frys rage and the earth shakes while a young boy chases after the Kamland Deity who has left town to search for the sacred fish of the sea. And what is he going to do? For one thing he’s trying to make a mountain fall from the burning city. The person on the left is the thunder deity. He seems to be engaging in a peculiar pattern of the thunder deity or ‘‘thunder fishing.’’ The object of this sport was to make more noise than your opponents. The thunder deity, his temporary replacement, the likeable but less diligent deity Obus, is sleeping high above the sky, the thunder deity who should be working, is off at the Bujyong Ridge fishing for something. Thunder deities have allowed a major disaster to unfold in the town of the terrorized, post-earthquake Edo...

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GOMO – Guam, Mariana Islands

FS3 – Ruzhin Sahlakhin, Russia

WMOQ – Urumqi, China

ERM – Ermos, Japan

LSA – Leusa, Tibet

Tokyo has a 70% chance of being struck by a tremor of 7.0 or higher in the next 30 years, with a quake of 6.7 expected to kill as many as 15,000 people.

(Japanese government study quoted by AFP, 14 Dec 2004)

Environment & Poverty Times
Financing the risk from natural disaster

Tobias Gasser

Last autumn leading insurance groups, humanitarian organisations and govern- ment policymakers gathered at The Swiss Re Centre for Global Dialogue in Zurich for an international conference on “Solidarity and Opportunity: The Potential of Insurance for Disaster Risk Management in Developing Countries”.

The conference was organised under the aegis of the ProVention Consortium, founded by the World Bank. This is a global consortium of international reinsurance companies such as Munich Re and Swiss Re, Lloyd’s, the Red Cross and Red Crescent Societies, the UN World Food Programme (WFP), the World Bank, as well as foreign ministries and other NGOs. The aim of the conference was to involve the private sector in disaster reduction and reconstruction.

The world’s humanitarian organisations are facing slow growth or stagnation of available aid and consequently unable to keep up with demand for help. Major disasters tend to occur at irregular frequencies, with each event upsetting aid budgets.

The World Bank and the WFP are working on new initiatives to present an “innovative solution”. In a recent article in Global Times (China), James T. Morris, Executive Director of the WFP, says that “high-performance financial instruments such as weather derivatives and catastrophe bonds are being used to create a risk management system to protect populations at risk from losses incurred through weather-related damage”, in short, a form of hunger insurance for the world’s poorest.

Morris says that such financial market instruments would have a fundamental impact. The risk of a disaster would no longer be borne by the families concerned, but by humanitarian organisations.

Richard Wicks, special programme director of the WFP, explains that the WFP and the IOI have started a pilot project in Ethiopia. Another drought like the one seen in 1992 would require aid in excess of $3.6bn. “Even at the highest levels, funds pledged for humanitarian aid are underutilised and come too late,” says Wicks. The WFP now plans to start talks with reinsurers, using a rainfall index as a basis for insuring Ethiopia’s harvest for 2005 with a catastrophe bond and a reinsurance policy.

Speaking to Switzerland’s Wochen- zung, Jung Triib, head of Swiss Re’s weather desk, compares hunger insur- ance with similar solutions in energy. “When the winter turns out to be warmer than usual, and energy companies sell less power, they come to us to help make up for the shortfall.” The difference with hunger insurance is that it covers changes in precipitation levels instead of temperatures. Triib sees a number of conditions that would have to be met before Swiss Re could move into hunger insurance.

One of these is the existence of reliable precipitation measurement data. Also, local supervisory bodies would have to approve the kind of instruments that insured parties would have to be prepared to pay for. The biggest problem with such volumes of transactions would be necessary to make the market worthwhile.

Bruno Kopp is an independent insur- ance risk financier, responsible for the hard-to-insure market. His company, Risk Management Service, offers insurance products for businesses affected by war or political instability. Kopp is all in favour of turning this potential into a new cash flow. “If the disaster occurs during this period, investors lose all or part of their money. What investors want is a bond that is more secure than a bank deposit – the lack of insurance penetration – is the intention behind the creation of disast- er insurance products. Typically, only 15% or less of loss disaster losses are covered by insurance in the international market,” he explains.

The Turkish Catastrophe Insurance Pool (TCIP) can be considered as a model case which has already served as a catalyst for the establishment of similar pools in Tai- wan and very recently in Algeria, for the conception of pool solutions in several other countries. Essential elements of the TCIP are:

• mandatory scheme
• full coverage up to $5,000 for any losses
• rating scheme graded according to hazard zone and risk type
• complete risk transfer to global reinsur- ance market in the starting phase

The scheme covers developments and small commercial risks, whereas larger com- mercial and industrial risks and high- value residential buildings are covered by the private market.

None of the above is within the reach of a large part of the world’s population, whose incomes are very low. Beyond the regula- tory contest mentioned above the state is often expected to serve as a reinsurer of last resort for very rare, extraordinary losses on one hand and uninsured risks like dewplings of the pool on the other hand. Whereas the first role will continue to exist for quite some time, this is not necessarily true for the second role. Microinsurance schemes, which first started in life insurance, now find counterparts in property insurance. Markets in Southeast Asia seem to be particularly promising and attractive in this field, and companies like ASIA in the Philippines, which has insurers that have more than 10m customers covered under microinsurance schemes, which may illustrate the potential of this new area to produce better protection for the poor.

Dr. Anouk Smits is Head of Geographical and Hydrological Risks at the Swiss Re Swiss Insurance Group Department of Reinsur- ance. Smits is an independent journalist in Bern, Switzerland, and regularly contributes to the weekly Kosovo, which originally published this article in April 2005.

Translated by Arvind Wright.
Preparedness and response to pollution at sea

Patricia Charlebois

The Prestige: business interests at odds with safety concerns

Thomas Hoffer

On 15 November 2002, in stormy weather off the north-western coast of Portugal, a ship with a Norwegian crew under Brazilian flag sank. The tanker Prestige carried 77,000 tonnes of heavy fuel oil. It began to take on water and drifted towards the coast of Galicia. The Spanish authorities considered the Prestige to be a threat to Spanish waters and head beyond the 24-mile territorial limit. Once the ship had been reported as being in danger, the Portuguese government sent a warship to prevent it from entering waters.

After five days of towing operations, 150 miles off the coast of Spain and Portugal, the tanker split in half and sank. The two parts of the wreck now lie at a depth of 3.5 kilometres more than 200 miles off the coast. The Prestige spilled 64,000 tonnes of oil, 60% more than initially estimated. The resulting pollution is thought to have killed 300,000 seabirds. It will take between 20 and 50 years for the affected ecosystems and resources to recover.

Damage to fishing and related economic sectors, tourism, and the natural heritage along 3,000 kilometres of coastline polluted by the spill may cost approximately €500m (€1bn confirmed by the Spanish Government two years after the disaster), with society at large paying almost the full amount. It has directly affected some 30,000 people in fishing and shellfishing.

It is believed that a Greek shipping dynasty, the OPRC Convention. Though still in its infancy, and as yet not in force, IMO continues to encourage States sign the OPRC Convention. Though still in its infancy, and as yet not in force, IMO continues to encourage States sign the OPRC Convention.

The tanker Prestige was a single-hulled tanker, but the majority of their ships are registered under flags offering lower fees, less restrictive laws and access to low-wage crews. Although corporate globalisation is often blamed as a risk factor, tanker law cannot be effectively enforced under such conditions.

People living on the coast face shipping routes and on the natural environment pay the real price of spills. For the fishermen, the authorities opened national funds and defined monthly income compensation. Credits offered on €1m claimed from the ship's insurer, which would not cover pollution damage liability paid by the Prestige's legal representa.

An oil tanker causes pollution, then compensates according to the ship's insurance and the International Oil Pollution Compensation (IOPC) Fund. According to Lloyd's press office, there is a likelihood of compensation amounting to about €6m for the ship, another €2m for the cargo and €2m to €4m for pollution damage liability paid by a Lloyd's Protection and Indemnity Club.

Major oil spills will recur as long as so-called ‘lucky breaks’ are the major factor. In November 2003, some 18,000 tonnes of crude oil around the world by sea each year. In most cases, the tanker cargo is transported and delivered safely and securely to its destination without incident due to good preventive measures and instruments introduced over the years.

However, another problem is associated with the transport of these substances. The tanker's daily operations supply some 6,000 tonnes of crude oil around the world by sea each year. In most cases, the tanker cargo is transported and delivered safely and securely to its destination without incident due to good preventive measures and instruments introduced over the years.

Hazardous material transport risk management in Canada

Wayne Bissett

Transport risks at Compañía Minera Antamina, Peru

Steven D. Botts

Big mines require large quantities of fuel to operate and chemicals for mineral processing. In mountain areas, spill prevention measures are needed to ensure safe transport of such substances along steep, winding roads. Past transport accidents caused spillage of cyanide, mercury and other chemicals, prompting public outcry and strong media reactions. Safety training for mine employees has become a priority for mining companies.

High in the Andean mountains in Peru, Compañía Minera Antamina, together with other nearby mines, has introduced a Safe Road Trans- portation initiative as an integral part of a wider company programme addressing safety, health, and social responsibility.

A specialised contractor monitors the transportation units of all companies and in support of an emergency occurs along the route. Hazardous materials trucks travel in convoy, escorted by vehicles that carry equipment to deal with any inci- dent. If a spill occurs, the trained teams are to respond to an emergency. The trucks are inspected for tire tread depth, number of immediate employees, daily scheduled preventive maintenance, first-aid kits, and equipment to control spills. All transporters are certified, and the route has been evalu- ated by experts who examine any bridge crossings, proximity to residential vil-

cerca, causing neither physical injury nor envi-

or future oil spills. But safety management requires that we push performance ever closer to our common goal of zero accidents.

Transport Canada operates the Can-

nadian Transport Emergency Centre (CANUTEC) which maintains ex-

tensive scientific database on chemicals transportation, mass- and toxic substances. CANUTEC handles some 50,000 telephone calls a year, about 1,000 of which involves an emergency re-

on, government organisations to improve immediate response.

The Canadian Chemical Producers’ Asso-
iates has been operating a Transportation Emergency Assistance Plan since 1975 to provide emergency response personnel and equipment to incidents involving their members’ products as well as other events. The Canadian Transport Emergency Centre (CANUTEC) is a multi-jurisdictional body, and is an active member of the UN Environment Programme Global Environment Facility (GEF) and the UN Office of Drugs and Crime.
Environmental management is risk reduction – UNEP's role in emergencies

As the environmental agency of the United Nations, UNEP assesses global environmental conditions and identifies potential environmental problems in order to propose ways to address the complex effects of environmental change on sustainable development. Partnering with governments, private sector and local communities, science and interest groups as well as other UN agencies, UNEP continues to provide expert guidance in helping to prevent and respond to the increasing number of disasters as well as to assist in determining environmental needs for recovery and rehabilitation.

Primary components in UNEP's efforts to ensure environmental security include:

- “Early Warning and Assessment” programme identifies and maps key environmental changes and develops vulnerability assessments, predictive information services as well as modern of preparedness strategies including Global Environment Facility -GEF-GEF.

- The “Joint UNEP-UNCA Environmental Unit” provides environmental assessments of disasters and emergency environmental response services.

- The “Readiness and Preparedness for Emergencies at Local Level” (APPELL) programme works with the different actors involved in potential environmental emergencies related to industrial activities.


- “Environmental Policy and Law Development” supports the use of effective legal tools, international agreements and strategies that strengthen national environmental authorities and their capacity to prevent and reduce environmental emergencies and their effects.

- UNEP’s work on building current strengths, UNEP will reinforce its efforts to ensure that in the future the importance of environmental knowledge and the need for preparedness and prevention has a direct impact on human and environmental security. In the concrete case of the recent tsunami tragedy in South Asia, UNEP established a South Asia Tsunami Task Force. While the focus of the UN agencies is still to be seen, we must already look at how to minimize the underlying risks and plan for the recovery. Along with UN colleagues, UNEP is using its utmost to help the countries and is working in close collaboration with OCHA and the respective UN country teams as well as the national authorities to mobilize the environmental needs, assist in mobilizing environmental assistance and provide expertise to the environmental activities.