



ENVIRONMENTAL MANAGEMENT AND DISASTER PREPAREDNESS

Building a multi-stakeholder partnership

UNITED NATIONS ENVIRONMENT PROGRAMME

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Building a multi-stakeholder partnership



FOREWORD



It has been more than 10 years since the Member States of the United Nations, and other States, in partnership with non-governmental organizations and the participation of international organizations, the scientific community, business, industry and the media, met in Yokohama, Japan, to discuss natural disaster reduction.

At that time, the conference noted, that the impact of natural disasters in terms of human and economic losses was rising, and that society in general had become more vulnerable to natural disasters. Environmental protection and sustainable development are closely interrelated, and together with disaster prevention, mitigation, preparedness and relief are elements that contribute to and gain from the implementation of environmental sustainable development strategies.

Disaster prevention, mitigation and preparedness are better than disaster relief and response, in achieving the goals and objectives of the Decade for Natural Disaster Reduction. The world is becoming increasingly interdependent and that regional and international cooperation will significantly enhance the ability to achieve real progress in mitigating disasters through the transfer of technology and the sharing of information and joint disaster prevention and mitigation measures.

All these remain valid today. However, the need to reduce risk to disasters and to mitigate against their impacts is now, more than ever, very urgent.

The ferocity and impacts of natural disasters have tremendously increased over the last decade, and so have their socio-economic costs. The poor are more vulnerable to disasters. Developing countries tend to experience more loss of human lives and property compared to developed countries for a disaster of the same magnitude. One of the reasons for this is that the poor rely more on natural resources in their immediate vicinity, making them more vulnerable to environmental degradation and disasters.

Disasters pose a major challenge to the achievement of the Millenium Development Goals. In majority of the cases, especially in developing countries, they postpone the prospect of getting out of poverty or roll back hard-earned economic development and improved livelihoods by many years.

The greater tragedy with the most recent disasters in the world is that they could have been averted if more attention had been paid to the promotion of sustainable environmental management especially in disaster prone areas. Around the globe, land use and land cover changes are eroding the natural buffers that protect communities from hazard risk. These same changes also erode people's capacity to recover from disaster. Other environmental changes, such as climate variability and change promise to create new challenges to the security and sustainability of communities around the world.

Environmental degradation is known to transform a hazard into a disaster or to increase several times fold the impact of a disaster. Areas where the integrity of ecosystems has been compromised are impacted more by disasters than those that are under sustainable environmental management regimes. Many experts have pointed out, for example, that the impact of the Asian Tsunami would have been reduced by proper preservation and management of mangroves and coral reefs that would have acted as a buffer against the

waves. The close link between sustainable environmental management and disaster risk reduction needs to be emphasized.

In the implementation of its mandate, to protect the environment for present and future generations, UNEP continues to address the interlinkages between disasters risk reduction and environmental degradation. There is need for increased investment in environmental management as a means of reducing risks to disasters.

Clearly there is a need to forge global partnerships that will improve the effectiveness and efficiency of the international community to minimize disaster risk. Such partnerships can foster new advances in our ability to enhance human security and environmental sustainability. UNEP is particularly committed to ensure that environmental management concerns are reflected in the follow up to the World Conference on Disaster Reduction (WCDR); to increase the integration of risk reduction in environmental policy, and to strengthen the resilience of ecosystems in an effort to preserve natural buffering functions and to reduce the likelihood of new hazards associated with environmental degradation.

The WCDR was a key opportunity to highlight and disseminate this message to the participating entities. The thematic session that UNEP organized as a part of the proceedings of Cluster 4 on "Reducing the Underlying Risk Factors" focused on the environmental dimensions of disasters. This report forms a record of the discussions during the session, and the key messages emerging from the presentations made. It is hoped that this report will assist and guide UNEP in its follow-up to WCDR, and in formulating policies, strategies and projects on disaster mitigation and management.

Klaus Toepfer
Executive Director, UNEP

ACKNOWLEDGEMENTS

UNEP would like to acknowledge the grateful support and assistance provided by the Government of Japan, particularly the Cabinet Office, Ministry of Foreign Affairs, and Ministry of Environment in organizing the UNEP Thematic Session at the World Conference on Disaster Reduction.

Our Special thanks goes to Japan's Minister of Environment, Ms. Yuriko Koike, for her excellent presentation on the importance of environmental management for overall disaster preparedness, and to UNEP's Executive Director, Dr. Klaus Toepfer.

Our special thanks also goes to Mayor of Toyo-oka City, Mr. Muneharu Nakagai for sharing us the experience from the Tokage Typhoon (Typhoon 23 of 2004), which severely hit Toyo-oka City in October 2004.

Our deep appreciation goes to the five outstanding panelists, Mr. Gerhard Putnam-Cramer, United Nations Office for the Coordination of Humanitarian Affairs, Ms. Lolita Bildan, Asian Disaster Preparedness Center, Ms. Ana Maria Bejar, Save the Children. UK, Mr. Iksan van der Putte, International Federation of Consulting Engineers (FIDIC), and Ms. Joanne Bayer, International Institute of Applied Systems Analysis (IIASA), for their contributions during the Panel Discussion.

Last but not least, we would like to thank the audience for their active participation in our Thematic Session.

EXECUTIVE SUMMARY

Environmental degradation combined with human activities are at the origin of numerous catastrophes such as flooding, desertification, fires, as well as technological disasters and transport accidents." Around the world, a growing share of the devastation triggered by 'natural' disasters stems from ecologically destructive practices and from putting ourselves in harm's way. Many ecosystems have been frayed to the point where they are no longer able to withstand natural disturbances. Comprehensive understanding of natural systems coupled with the application of management tools such as environmental evaluation and risk assessment can make a major contribution to a reduction of risks and mitigation of any impacts. An important aspect is the involvement of a broader range of partners in such a process, and to fully engage the resources and interests of the private sector in prevention and mitigation.

The session was organized with the realization that environmental degradation combined with human activities are at the origin of numerous catastrophes such as flooding, desertification, fires, as well as technological disasters and transport accidents. Around the world, a growing share of the devastation triggered by 'natural' disasters stems from ecologically destructive practices and from putting ourselves in harm's way. Many ecosystems have been frayed to the point where they are no longer able to withstand natural disturbances. The main message coming out of the session was that comprehensive understanding of natural systems coupled with the application of management tools such as environmental evaluation and risk assessment can make a major contribution to a reduction of risks and mitigation of any impacts. An important aspect is the involvement of a broader range of partners in such a process, and to fully engage the resources and interests of the private sector in prevention and mitigation.

The session highlighted the role that comprehensive environmental management can play in reducing the risk of disasters, and to mitigate the consequences if they should nevertheless occur – both on human lives and on the broader ecology. It explored the link between environmental systems and disasters, and also the synergies between man-made and natural disasters. The session specifically examined the need for a multi-stakeholder partnership that links local governments, private sector entities, and civil society organizations in order to facilitate more effective disaster prevention and mitigation. It illustrated successful partnership models between corporations, communities and the government, examining the way entities prepare for disasters themselves, as well as the need to be part of a larger partnership that strengthens local communities' ability to prevent, mitigate and recover from disasters.

Some of the key issues raised in the session related to the need for disaster risk reduction to look at strengthening nature's own abilities to act as buffers and barriers to the impacts of disasters. Panelists also emphasized that partnerships and collaboration are critical to bring a diverse range of resources and skills to manage the environment, and at the same time reduce and manage risk from disasters; addressing risks associated with present day climate variability enhances capacity of vulnerable communities to withstand future climate change impacts; environmental management systems, part of the ISO 14001 standard, can easily be adopted to include aspects related to disaster management needs; innovative affordable financial instruments need to be developed to reduce the disaster risk faced by communities, and enable them to return to normal as quickly as possible. This includes microfinance and micro-insurance for the low-income groups.

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Introduction

The world is facing an increasing frequency and intensity of disasters – natural and man-made – that has had devastating impacts. As reported by the secretariat of the International Strategy for Disaster Reduction (ISDR), the last ten years have seen 478,100 people killed, more than 2.5 billion people affected and about US\$ 690 billion in economic losses. Disasters triggered by hydro-meteorological hazards amounted for 97 percent of the total people affected by disasters, and 60 percent of the total economic losses.

The November 2004 typhoons in the Philippines claimed over 1,000 lives and devastated the livelihoods of many more. The recent Indian Ocean Tsunami was even more destructive: more than 150,000 lives were lost.

The greater tragedy is that many of the losses due to disasters could have been averted. Logging, both legal and illegal, contributed to the incidence of flooding and landslides; but this is only the most recent evidence of the importance of wise environmental management for disaster risk reduction.

Around the globe, land use and land cover changes are eroding the natural buffers that protect communities from hazard risk. These same changes often erode people's capacity to recover from disaster. Other environmental changes, such as anthropogenic global warming, promise to create new challenges to the security and sustainability of communities around the world. There are, however, opportunities to reduce disaster risk, and enhance community resilience.

The impacts of disasters, whether natural or man-made, not only have human dimensions, but environmental ones as well. Environmental conditions may exacerbate the impact of a disaster, and vice versa, disasters have an impact on the environment. Deforestation, forest management practices, agriculture systems etc. can exacerbate the negative environmental impacts of a storm or typhoon, leading to landslides, flooding, silting and ground/surface water contamination – as illustrated by the 2004 hurricane and storm tragedies in Haiti, and in the Philippines.

The high volume of wastes from disasters, from households and debris from forests and rivers, also constitute a major concern for proper disposal. A study conducted by Japan's Ministry of Environment also showed that air pollution from urban and industrial sources has led to increased acid rain by hurricanes and typhoons.

We have only now come to realize that taking care of our natural resources and managing them wisely not only assures that future generations will be able to live sustainably, but also reduces the risks that natural and man-made hazards pose to people living today. Emphasizing and reinforcing the centrality of environmental concerns in disaster management has become a critical priority, requiring the sound management of natural resources as a tool to prevent disasters or lessen their impacts on people, their homes and livelihoods.

Meteorological and hydrological events, such as typhoons, are hazards that cause heavy rain, high wind and sea surges. But the real damage also happens due to the vulnerability of the people who lie in its path. Post-disaster assessment of hurricanes and typhoons have clearly illustrated that, along with disaster preparedness, proper management of the

environment – its air, land, water, forests, and wastes, go a long way in reducing the risks and vulnerabilities associated with typhoons.

Environmental degradation combined with human activities are at the origin of numerous catastrophes such as flooding, desertification, fires, as well as technological disasters and transport accidents.

"Around the world, a growing share of the devastation triggered by 'natural' disasters stems from ecologically destructive practices and from putting ourselves in harm's way. Many ecosystems have been frayed to the point where they are no longer able to withstand natural disturbances ... Although the inherent links between disaster reduction and environmental management are recognized, little research and policy work has been undertaken on the subject. The concept of using environmental tools for disaster reduction has not yet been widely applied by many practitioners." (ISDR).

“ There is a clear need to reinforce the importance of environmental concerns in the entire disaster management cycle of prevention, preparedness, assessment, mitigation and response and to integrate environmental concerns into planning for relief, rehabilitation, reconstruction and development. This will also require the enhancement of capacities to undertake short and medium-term activities in disaster management based on long-term environmental considerations. ”

Klaus Toepfer

Executive Director, UNEP

Comprehensive understanding of natural systems coupled with the application of management tools such as environmental evaluation and risk assessment can make a major contribution to a reduction of risks and mitigation of any impacts. An important aspect is the involvement of a broader range of partners in such a process, and to fully engage the resources and interests of the private sector in prevention and mitigation. Business leadership of 'prevention' actions in civil society and industry needs to occur as a complement to government policies and institutional arrangements. Such an approach relies on industry codes and standards as a supplement to regulations, thus achieving enhanced reduction of civil society's vulnerability to potential disasters.

There is a need to highlight the role that comprehensive environmental management can play in reducing the risk of disasters, and to mitigate the consequences if they should nevertheless occur – both on human lives and on the broader ecology. We also need to explore the link between environmental systems and disasters, and also the synergies between man-made and natural disasters.

Specifically, we need to examine the need for a multi-stakeholder partnership that links local governments, private sector entities, and civil society organizations in order to facilitate more effective disaster prevention and mitigation. We need to compare successful partnership models between corporations, communities and the government, examining the way entities prepare for disasters themselves, as well as the need to be part of a larger partnership that strengthens local communities' ability to prevent, mitigate and recover from disasters.

Much work needs to be done in facilitating a sustained dialogue between different decision makers in the fields of both disaster and environment at global, regional and national levels.

This dialogue will stem from raising greater awareness of the interface between disaster risk and environmental change, and identifying gaps in the understanding of critical hazards and risks at the local level. The dialogue will have to lead to new approaches in managing risk, and the environment, at the same time.

UNEP's special mandates, to assess global environmental conditions in order to identify potential environmental problems and new ways to address the complex effects of environmental change on sustainable development, require UNEP to pay particular attention to the broad causes and effects of disasters. A fundamental part of the global work of the United Nations Environment Programme is to strengthen the capacities of developing countries and countries in economic transition to deal with environmental emergencies. Decisions by the Governing Council of UNEP in 1997, 1999 and 2001 have solidly enhanced and refined UNEP's mandate in respect of emergency prevention, preparedness, assessment, mitigation and response, and strengthened the need for UNEP to transfer know-how on environmental emergencies. In accordance with the Governing Council decisions and the UNEP Strategic Framework on Environmental Emergencies, UNEP's global work to reduce environmental risks of disasters, focuses on collecting information and experiences on many areas of environmental disaster management and studies and manuals have been produced.

UNEP's work in the field has shown that the increasing frequency and severity of man-made and natural disasters may well be changing the global environment. All of these threats to the environment have been apparent in recent disasters. UNEP's response to disasters is based on the premise that disasters affect the environment when they have direct or indirect effects on ecology and human settlements that last far beyond the scope of immediate humanitarian response. Changing ecological conditions can provoke emergencies by placing concurrent stresses on the environment. Mitigating the effects of disasters are primary components in global efforts to ensure environmental security.

It is clear that further coordination and cooperation on environmental matters depends on UNEP's ability to set an environmental agenda for disaster management. In particular, UNEP's strategy on disasters can help the United Nations to pay attention to the environmental conditions that lead to disasters, and to natural resource management for disaster prevention and reduction.

There is a clear need to reinforce the importance of environmental concerns in the entire disaster management cycle of prevention, preparedness, assessment, mitigation and response and to integrate environmental concerns into planning for relief, rehabilitation, reconstruction and development. This will also require the enhancement of capacities to undertake short and medium-term activities in disaster management based on long-term environmental considerations.

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UNEP's message at the WCDR

Environment management is a critical strategy to prevent disasters, and reduce risks/vulnerabilities of disaster prone countries and communities. Disaster risks and vulnerability can be considerably reduced through effective and long-term environmental and natural resource management practices. Linkages between significant environmental changes and frequency/magnitude of natural disasters should be closely monitored, mapped and communicated to vulnerable communities and disaster management teams at the local and national levels.

At the WCDR, UNEP delivered its key message that environment should be recognized and emphasized as a part of the holistic process of disaster reduction/humanitarian relief, and the need to strengthen the positive cyclical interrelationships between environmental management and disaster preparedness.

UNEP continues to identify the causes and effects of disaster with specific reference to the environment; develop environment management strategies that will help reduce the vulnerability of high-risk communities to disasters; mainstream environmental management practices for disaster mitigation; and implement pilot projects and demonstrations of effective strategies, particularly in vulnerable developing countries.

UNEP is committed to the formulation and implementation of the UN's effective and integrated action programmes/initiatives through various global, regional and national/local mechanisms, in close collaboration with International Strategy for Disaster Reduction (ISDR). To strengthen this commitment, UNEP is currently developing a global programme dealing with issues related to disaster risk reduction, with comprehensive links to the theme of environmental management.

UNEP actively communicated its key messages to strategic partners and pursue partnership with national and local governments, private sector entities, NGOs, educational institutions, and other UN agencies. UNEP will promote good case studies and lessons learned on successful disaster reduction efforts, which duly integrate environmental concerns. For this purpose, UNEP presented in Kobe an assessment report of the recent Tokage Typhoon (No. 23 of 2004) in Japan, to demonstrate effective preparedness and response strategies in Japan¹.

UNEP will also continue to work on providing assistance for strengthening early warning systems, post-disaster environmental assessment, environmental capacity building, mitigation and rehabilitation/recovery. This includes strengthening its niche in preparedness and prevention of disasters through strategic initiatives in vulnerable developing countries of the Asia-Pacific region.

¹ This can be viewed online in PDF format at: <http://www.unep.or.jp/ietc/wcdr/unep-tokage-report.pdf>

3

Keynote Presentations

1. Yuriko Koike, Minister of Environment, Government of Japan

Good afternoon, ladies and gentlemen and distinguished guests gathered here today.



First of all, I would like to express my deepest sympathy for the people who were affected by the December 2004 earthquake and tsunami in the Indian Ocean and to extend my most profound condolences for those who were killed or injured during the disaster and also to those who suffered damage in other aspects of their lives and livelihoods. I would also like to extend my most heartfelt sympathy to the countries affected by the disasters.

Ten years ago, I myself experienced the Great Hanshin-Awaji Earthquake while I was in the city of Takarazuka, which is a suburb of Kobe. Many friends and their families perished in that disaster. With this experience, I have much sympathy towards those affected by disasters all over the world.

I very much hope that the tsunami-struck region can recover and be restored through close coordination among countries and relevant organizations.

The Ministry of the Environment of Japan is committed to cooperating as much as possible to support the disaster-struck region.

Recently a number of disasters triggered by weather have been occurring both in Japan and around the world.

In 2003, the heat wave which hit all of Europe caused approximately 15 thousand casualties in France alone. Also, we have been witnessing large-scale forest fires caused by high temperature and dry weather all around the globe. In 2004, a record-breaking number of more than ten typhoons hit the mainland of Japan, leaving more than 200 dead and missing. Also, a large number of houses suffered significant damage.



It is projected that the intensity and frequency of extreme weather events will increase considerably and that the damage will be aggravated. With so many extreme weather events occurring recently at a global level, I am afraid that climate change is already taking its toll. In this regard, these natural disasters are, in fact, man-made disasters.

It has become commonly accepted concept internationally that disaster preparedness is an important element in sustainable development.


The Johannesburg Plan of Implementation adopted at the Johannesburg Summit held in 2002 underlines the importance of the inclusive approach to address vulnerability, risk assessment and disaster management, prevention, mitigation, preparation, response and recovery.

The Ministry of the Environment organized the Asia-Pacific Forum for Environment and Development (APFED), whose

members are eminent persons from around the Asia-Pacific region. This Forum is chaired by former Prime Minister of Japan Mr. Ryutaro Hashimoto and has taken up a review of the methodologies for more equitable and sustainable development which is suitable in the Asia-Pacific region. The Final Report developed as the output of the Forum and compiled in December 2004, underscores that the establishment of early warning systems, managing disaster situations, and mitigating their effects constitute important issues for making sustainable development.

Preparedness is a Key Element for Sustainable Development

- The Johannesburg Plan of Implementation (JPOI) underlines the importance of:
 - ① Vulnerability and risk assessment and prevention
 - ② Disaster management including mitigation, preparation, response and recovery.
- The APFED Final Report recommendations include:
 - ① Establishing early warning systems
 - ② Managing disaster situations
 - ③ Mitigating their effects



An outline of the APFED report will be distributed after the conclusion of this session, and I would like to invite those guests who are interested in to take a look at it.

Disaster Preparedness and Environmental Management

1. The role of monitoring and projections of the global environment in disaster preparedness
2. Environmental management for disaster prevention and impact mitigation
3. Emergency responses upon the occurrence of disasters

In order to prevent disasters, it is indispensable to implement steady environmental management. Today, I would like to address disaster preparedness and environmental management, along with an introduction of Japan's experience and practices. I would like first to address the role of global environmental observation and future projection in disaster preparedness, then, environmental management for disaster prevention and impact mitigation, and lastly, emergency response in the face of the actual onset of a disaster.

First, I would like to address the roles which global environmental observation and future projection play in disaster preparedness.

Changes in the global environment may directly and indirectly trigger disasters. For example, there is concern that climate change will result in an increase of disasters such as sea-level rise, extreme weather events including floods and droughts, the submergence of low-lying land, coastal erosion, and flooding caused by rapid melting of glaciers. Moreover, excessive deforestation triggers an increase in the number of floods and landslides.

1. The Role of Observation and of Projections on Global Environment

Change in the global environment may directly and indirectly trigger disasters

- Understanding of current state of global environment
- Projection of global environment

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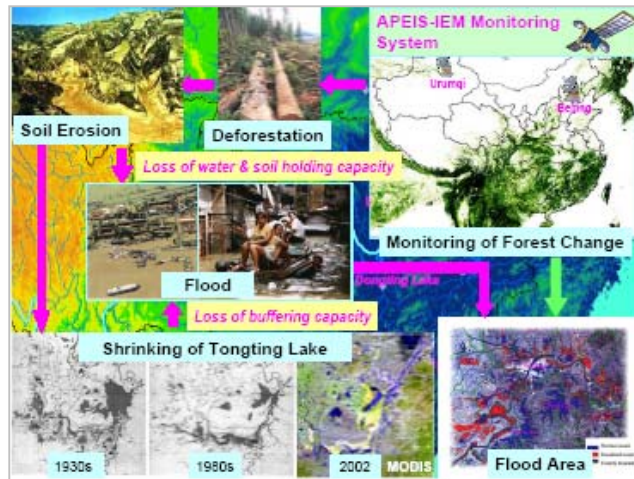
- Early warnings against disaster
- Measures for impact mitigation

Importance of global observation and future projections

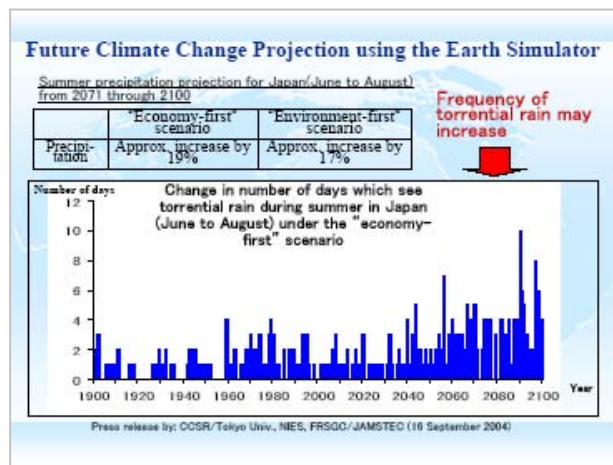
Assessment of the current state of the global environment and changes in it, as well as accurate projections of the future global environment, will enable us to take appropriate measures to prevent disasters and to mitigate the impact.

Let me show you an example of an analysis of the 1998 Yangzi River floods, which the Ministry of the Environment conducted with remote sensing, in cooperation with China.

1. Analyze changes in forests through satellite data
2. Assess the distribution of forest destruction and soil erosion
3. Soil erosion caused a shrinking of Tongting Lake in the middle of the Yangzi River
4. As a result, the forest's water- and the soil-holding capacities were reduced and the controlling capability of Tongting Lake deteriorated
5. And the computer simulation revealed that the above factors contributed to a worsening of the flood



This kind of research will contribute to disaster preparedness and to designing future policy measures.



Also, observation data will enable us to project future weather and the occurrence of extreme weather events.

This is the latest Future Climate Change Projection using the Earth Simulator.

This system shows that precipitation in Japan during summer is projected to increase by 19% under an "economy-first" scenario and 17% under an "environment-first" scenario in the range of the years 2071 to 2100.

Also the number of days in which we see torrential rain is projected to increase dramatically.

Conducting global observations thus prevent disasters in the long- and mid-terms, contributing to the formulation of appropriate measures

To implement global observation, international coordination is required. To this end, approximately 50 nations and 30 international institutions around the world have been promoting efforts to stipulate the Ten-year Implementation Plan for Global Earth Observation. Japan has been proactively promoting this plan, including organizing the Earth Observation Summit in Tokyo in April 2004.

Appropriate environmental management is indispensable for preventing disasters and for mitigating the impacts caused by the disaster.

First, direct causes such as destruction of forests and greenhouse gas emissions as well as anthropogenic causes that aggravate damage from disasters should be reduced to mitigate

potential risks. It will be necessary for the international community to address this through a coordinated approach on the basis a series of international environmental agreements. The United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol stand out as having important roles and we need to make efforts to achieve our commitments.

Also, the maintenance, management and development of sound mitigation capabilities which are already possessed by nature will contribute to the prevention of disasters and to impact mitigation.

I will explain some of our experiences.

Forests have a variety of public benefits far beyond producing timber, including fostering water resources, preventing soil defluxion and destruction, and acting as wind breaks. It has already become clear that some of the damage from the 2004 South Asian tsunami was mitigated by the coastal forests intercepting the energy of the tsunami. In order to mitigate damage caused by tsunamis or high tides, the Government of Japan has afforested and conserved forests on the coastline, designating them as protected forests and maintaining and conserving them appropriately.

Preventive capabilities against soil defluxion and the breakdown of forests are key functions in preventing landslides. Also, rain water is temporarily stored in forest soil, stabilizing the influx to rivers and thus playing an important role in preventing floods.

2. Environmental Management for Disaster Prevention and Impact Mitigation

- **Reduction of anthropogenic causes of environmental change and mitigation of risks**
Forest destruction, greenhouse gas emissions, etc.
- **Importance of international environmental agreements**
United Nations Framework Convention on Climate Change, Kyoto Protocol, etc.
- **Importance of maintenance, management and development of the sound mitigation capability that inherent to nature**

① Forests' Disaster Prevention Capabilities

- **Forests have a wide variety of functions benefiting the public: fostering water resources, preventing soil defluxion and destruction, serving as windbreaks, etc.**



Photo by Prof. Niimi, University of the South Pacific
Negative impacts from logging



Protection forest at coastline (Toyama Prefecture)

② Corral Reefs Assisting in Disaster Preparedness

Reduce the power of ocean wave energy and protect sea bottoms and coasts



Photo by Dr. Hironobu Kam, Okayama University

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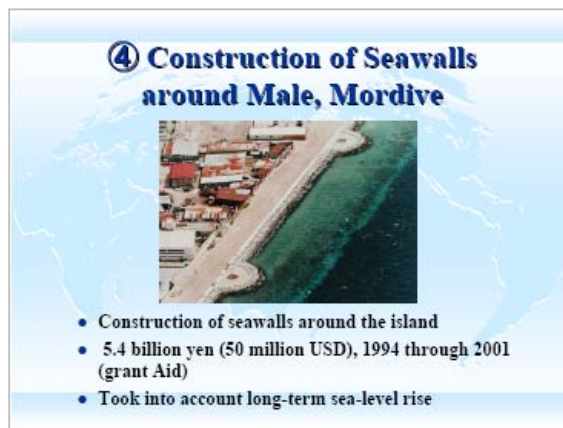
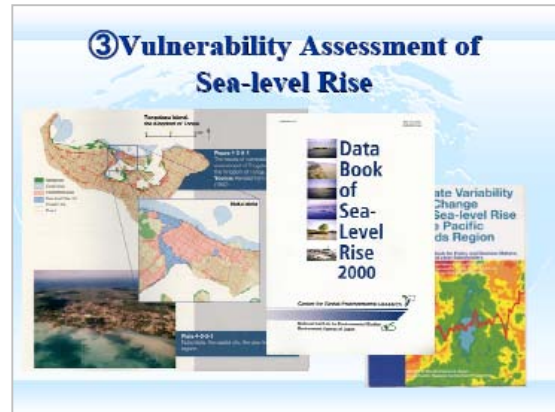
Mitigate high tides and tsunamis



Coral reefs also contribute to disaster prevention. Coral reefs along the coast mitigate the damage caused by high tides or tsunamis by reducing the wave energy and by protecting the sea bottom and coastlines.

In the Okinawa Islands in southern Japan, when the land was developed, defluxion of soil from denuded land significantly affected the coral reefs. Thus, the Okinawa prefectural government formulated an ordinance to prevent land defluxion, making efforts in managing land development.

Since 1991, the Government of Japan has been conducting academic research and feasibility studies for possible measures on the impacts of climate change and sea-level rise in the Pacific region and regional vulnerability in cooperation with the South Pacific Region Environment Program (SPREP). This study was conducted with a heavy emphasis on partnership. Researchers from Japan participated in addition to the local researchers and involved local people in their work. The outcome of this research, a ten-year task, has been compiled and this will contribute to future policies.



In addition, technological mitigation measures are sometimes important. Residents of Male, the capital of the Maldives, have been threatened by high tides, since the island is below sea level. They used to be continuously threatened by high tides from the Indian Ocean and were not able to keep up with constructing strong seawall banks because construction materials were scarce. Seawalls resilient to long-term sea-level rise were constructed with approximately 50 million US dollars provided by Japan from 1994 through 2001.

During the December 2004 South Asian tsunami, damage to the Maldives was less serious than that of other tsunami-struck areas in the region. It is said that the seawall bank project that I just mentioned contributed to this.

I have been addressing environmental management for disaster prevention and impact mitigation.

There are two means of environmental management, namely engineering technology mitigation measures and utilization of the mitigation capabilities which nature already possesses.

Technological measures show their effects over a short period of time. However, this methodology costs more and may not be effective on a permanent basis.

For long-term and broad-based disaster preparedness measures, it is thus crucial to maintain, manage and develop sound natural mitigation capabilities.

In Japan, we are now undergoing a shift from concrete river walls to river walls which make use of the restoration of nature.

It is important to learn from nature's wisdom and select options that are suitable to each particular location.



Lastly I will address the role of environmental administration in protecting human life and health during the onset of a disaster.

In the face of a disaster, the execution of appropriate environmental management will contribute to rapid restoration.

For example, if contaminants flow into the environment due to an earthquake, flood or stranding of an oil tanker, projection of the possible expansion of contaminants through monitoring the status of the contamination and its effect on the environment will significantly contribute to the formulation of responses.

If the cause of a disaster is a factory accident, giving orders for emergency measures to the factory that caused the disaster is an important role for the authorities. In Japan, in fact, the Air Pollution Control Law and the Water Pollution Control Law confer the power to act to local governments.

3. Emergency Response upon the Occurrence of Disasters

- Appropriate environment management and quick restoration is crucial in the wake of disasters
- Linkage among national and local governments, citizens and business entities through partnerships




Oil contaminated seabirds

Also, citizens and NGOs played active roles as important partners in the wake of the oil spill which occurred in the Japan Sea, proactively getting involved in conserving wild animals and cleaning the coast line.

Linkage through partnerships among national and local governments, citizens and business entities is crucial at the onset of a disaster.

Treatment of Wastes Generated during Great Hanshin Earthquake



Demolition work

After demolition and land leveling

Removal of demolition wastes

In the wake of the Great Hanshin Earthquake, the volume of disaster-related wastes, such as building debris, totaled 20 million tons. This is equivalent to the total waste generated in Hyogo prefecture over nine years, and appropriate treatment of this large volume of wastes became a major issues in environmental management. This disaster was one that had never been experienced before, and there was no temporary storage place for separated disaster wastes. In order to treat the wastes, garbage trucks from 136 local municipalities outside of the affected

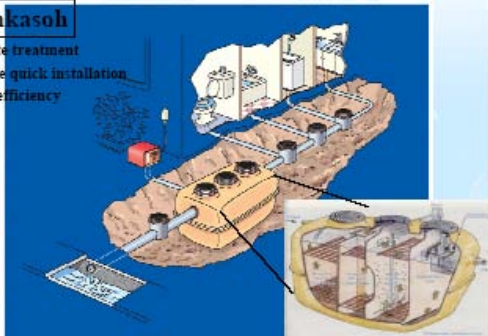
Hanshin Awaji area were mobilized and incinerators of 44 municipalities outside of this area were utilized. The government of Japan aims to establish a Sound Material-Cycle Society. I would like to underline the importance of establishing a coordination system for waste treatment and recycling over a wide area.

Early establishment of a system for the treatment of human waste is needed in the wake of a disaster. This is essential for securing the health of the local people. *Johkasoh* is an on-site treatment system which treats human waste in a simple way. I would like to stress that *johkasoh* is suitable for the recovery of disaster-hit areas, since the system is easy to install without a large-scale managing network. Japan will provide cooperation in the area of human waste treatment for the earthquake- and tsunami-struck countries.

<Treatment of Human waste is Necessary in the Wake of a Disaster>

Johkasoh

- On-site treatment
- Simple quick installation
- High efficiency



Coordinated efforts through partnership among national and local governments, citizens, NGOs, business entities and foreign countries are required to accomplish disaster preparedness at the onset of a disaster. I would like to conclude by highlighting the importance of having a broad spectrum of stakeholders participate in disaster prevention, impact mitigation and emergency disaster response.



I have been addressing the fact that appropriate environmental management contributes to disaster prevention, damage mitigation and disaster recovery.

The Great Hanshin-Awaji Earthquake which occurred 10 years ago and the 2004 South Asian disaster that struck countries on the Indian Ocean renewed our awareness of the importance of preparedness for disasters. I hope that further study on possible contributions in the area of environmental management will be accelerated based on a review of these tragic events.

The slide is titled "Conclusion" in a bold blue font at the top. Below the title, there are three bullet points, each preceded by a blue circular marker. The background of the slide is light blue with a faint world map. The text of the bullet points is as follows:

- Appropriate environmental management contributes to disaster preparedness, mitigation and recovery from damage
- Cooperation by the international community is important and much is expected of the role of UNEP in this regard
- Japan is committed to collaborating with the international community by utilizing its knowledge and experience

Cooperation by the international community is indispensable in the face of disasters of this kind, since individual countries are not able to cope with them.

With regard to environmental management, the roles of UNEP and other international institutions in global observation, early warning, capacity building, and other such areas are tremendous and Japan expects much from these institutions. The Government of Japan is committed to cooperating as much as possible, making use of our knowledge and experience.

Thank you very much.

2. Klaus Toepfer, Executive Director, UNEP

In view of the recent catastrophic disaster, this conference provides an opportunity for us to review what we can do to reduce the risk to such disasters. The recent Asian Tsunami has claimed over 150,000 lives and is currently estimated to have caused damage running into billions of dollars. Much of the damage, especially to the environment will be even more difficult to quantify.

Unfortunately, the environmental dimensions of disasters are usually not given its due prominence in disaster preparedness, mitigation and response.

It has been more than 10 years since the Member States of the United Nations, and other States, in partnership with non-governmental organizations and the participation of international organisations, the scientific community, business, industry and the media, met in Yokohama, Japan, to discuss natural disaster reduction. At that time, the conference noted, that:

- The impact of natural disasters in terms of human and economic losses was rising, and that society in general had become more vulnerable to natural disasters.
- Environmental protection and sustainable development are closely interrelated, and together with disaster prevention, mitigation, preparedness and relief are elements that contribute to and gain from the implementation of environmental sustainable development strategies.
- Disaster prevention, mitigation and preparedness are better than disaster relief and response, in achieving the goals and objectives of the Decade for Natural Disaster Reduction.
- The world is becoming increasingly interdependent and that regional and international cooperation will significantly enhance the ability to achieve real progress in mitigating disasters through the transfer of technology and the sharing of information and joint disaster prevention and mitigation measures.
- The information, knowledge and some of the technology necessary to reduce the effects of natural disasters can be available.

All these remain valid today. However, the need to reduce risk to disasters and to mitigate against their impacts is now, more than ever, very urgent.

The ferocity and impacts of natural disasters have tremendously increased over the last decade, and so have their socio-economic costs (Graphic on disasters by type, their human and socio-economic impact, insured v non-insured losses, etc. We need to add something on the tsunami to indicate its unique impact. We may be guided by what the region needs for rehabilitation as a guide).

The poor are more vulnerable to disasters. Developing countries tend to experience more loss of human lives and property compared to developed countries for a disaster of the same magnitude. One of the reasons for this is that the poor rely more on natural resources in their immediate vicinity, making them more vulnerable to environmental degradation and disasters.

Unsustainable utilization of natural resources and poor land use planning and zoning (especially of human settlements) increases the vulnerability of communities.

Disasters pose a major challenge to the achievement of the Millennium Development Goals. In majority of the cases, especially in developing countries, they postpone the prospect of getting out of poverty or roll back hard-earned economic development and improved livelihoods by many years.

The greater tragedy with the most recent disasters in the world is that they could have been averted if more attention had been paid to the promotion of sustainable environmental management especially in disaster prone areas. Around the globe, land use and land cover changes are eroding the natural buffers that protect communities from hazard risk.

These same changes often erode people's capacity to recover from disaster. Other environmental changes, such as climate variability and change promise to create new challenges to the security and sustainability of communities around the world.

Environmental degradation is known to transform a hazard into a disaster or to increase several times fold the impact of a disaster. Areas where the integrity of ecosystems has

been compromised are impacted more by disasters than those that are under sustainable environmental management regimes. Many experts have pointed out, for example, that the impact of the Asian Tsunami would have been reduced by proper preservation and management of mangroves and coral reefs that would have acted as a buffer against the waves.

The close link between sustainable environmental management and disaster risk reduction needs to be emphasized.

In the implementation of its mandate, to protect the environment for present and future generations, UNEP continues to address the interlinkages between disasters risk reduction and environmental degradation.

There is need for increased investment in environmental management as a means of reducing risks to disasters (any examples where increased investment in environmental management has led to reduced risk to disasters?).

As demonstrated by the Asian Tsunami, effective early warning systems are essential to minimize impacts of disasters, especially in terms of loss of human life.

UNEP supports the development and operationalisation of a global early warning system. However, such a system should be flexible enough to provide early warning information on all disasters, whether natural or human-induced.

Any early warning system must have a community-based focus because it is the local communities who have to react to any warnings, and later deal with the immediate impacts of a disaster before outside help can be mobilized.

Early warning systems must integrate modern technology with indigenous knowledge and the use of local signals. Unfortunately, indigenous knowledge has either been eroded or ignored in the development of these systems. It needs to be revived, harnessed, documented and brought to the service of communities.

The need to build national response capacities must not be forgotten. In addition, as the Asian Tsunami has demonstrated, there is need to add a regional dimension to the early warning systems.

UNEP believes that forging global partnerships will improve the effectiveness and efficiency of the international community to minimize disaster risk. To this end, UNEP is to form a global partnership with ISDR.

The partnership promises to make new advances in our ability to enhance human security and environmental sustainability. Broadly, this timely partnership aims:

- *To ensure that environmental management concerns are reflected in the follow up to the World Conference on Disaster Reduction (WCDR);*
- *To increase the integration of risk reduction in environmental policy.*
- *To strengthen the resilience of ecosystems in an effort to preserve natural buffering functions and to reduce the likelihood of new hazards associated with environmental degradation*

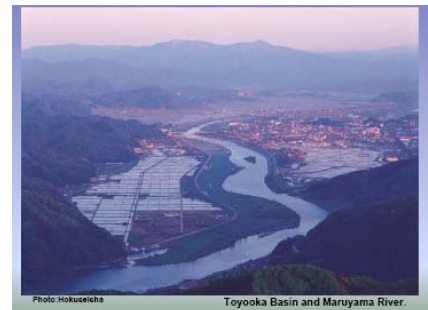
I wish to promise UNEP's commitment to the struggle to minimize natural and other disasters in the world, and its willingness to work at the local, national, regional and global levels to ensure that reasonable progress is made in the short term.

3. Muneharu Nakagai, Mayor of Toyo-oka City, Japan

Thank you for giving me a chance to present to you how we have fought the disaster of Typhoon No.23 of 2004. (This is my first experience to make an English speech. So, god bless me!)

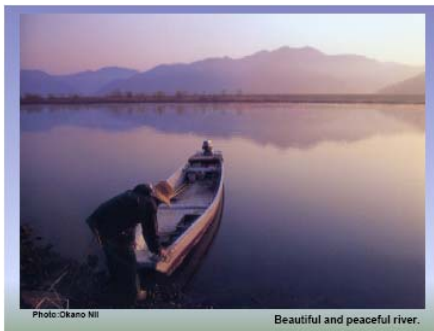
Toyooka City

This is a photograph of Toyooka taken from the sky. It is a small city with a population of 48,000. The Maruyama River flows in the middle of the city.



Maruyama River

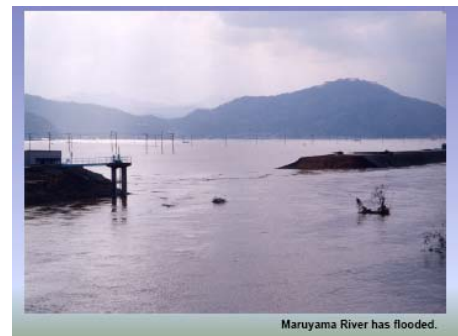
The surface of the river is as beautiful and calm as a mirror. An oriental white stork and waterfowls are playing together.



Typhoon No. 23

From 19th to 21st October 2004, Typhoon No. 23 struck Japan. It also hit my city. The largest amount of water in the past 100 years flowed into the mainstream of the Maruyama River, and I gave an evacuation order to 42,000 people through an emergency radio system.

Floodwaters broke the dykes in the middle of the night.



Next morning.

This is a dyke at breaking point. River, and rice field. Our city sank into the muddy water.



This is next-door town.

Various Forms of Flood Damage Lives at risk

Many people were left stranded in their own houses.

939 people were rescued by the fire-rescue teams, the Self-Defense Force and volunteer fire corps.

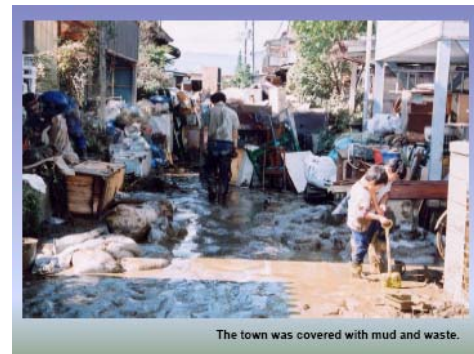


The shelters were overcrowded with 3,800 people.



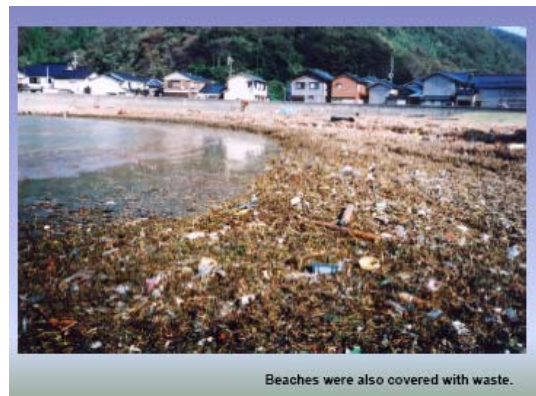
Struggle against mud and waste

After rescue work, struggle against mud and wastes started. The typhoon produced 32,000 tons of wastes, which is equivalent to the total amount of wastes of Toyooka City for one year and a half. However they were not wastes. They were belongings of the inhabitants filled with fond memories. They were "wastes" with full of people's sorrow.



Residents removed silt from their homes.

Beaches were also covered with wastes.



A temporary waste storage site. Disposal costs a great deal. Issues of stench, water pollution, fire and illegal wastes dumping have been big problems to be solved.

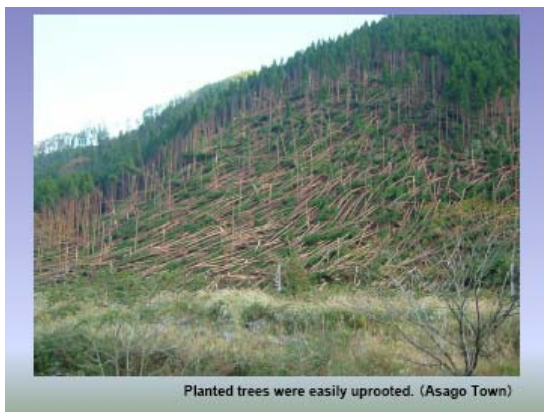
Burning wastes releases carbon dioxide. So, we have to strive for waste reduction as well as carbon dioxide reduction.



Fighting desperately against waste.

Fallen trees and landslide

Landslides attacked houses in various sites.



Planted trees were easily uprooted. (Asago Town)



Landslides hit houses. (Wadayama Town)

Planted trees were easily uprooted. This is an upstream town.

Lumbers which had been left out in forests due to economic reasons floated along rivers and struck houses.



Large pieces of driftwood and waste blocked the river.



Driftwood reached downstream areas.

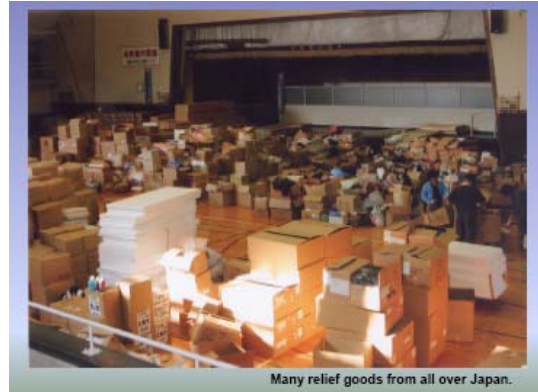
Rivers were closed off by driftwoods and wastes. Upstream forests caused serious damage to downstream urban areas.

People's Efforts for Restoration



Immediately after the typhoon left the country, people started efforts for restoration. 11,000 volunteers came to Toyooka from all over Japan to help emergency restoration. They gave a lot of courage to local citizens who were seriously depressed. Person-to-person relations saved people.

Various sorts of relief goods and monetary donations have also helped and encouraged the local people.



One day, 600 roses were delivered. They reminded us that things which could touch and move people's minds such as flowers, dancing and singing were as essential as houses, blankets, water, food and money.

Though people have returned to their own homes or found new places to live, people's "ordinary lives" have not fully come back yet. But it is always "hope" that could get people out of difficulty. We will never lose our hope for future.



Proposals from the Afflicted City

Our experience has taught us that we have to enhance disaster preparedness in three aspects.

- First one is to enhance physical preparedness such as improvement of dykes, and preservation of forests and retarding basins.
- Second one is to enhance preparedness of institutions such as consolidation of the legal system encompassing all aspects of post-disaster measures and development of a comprehensive and practical support program.
- Third one is to enhance preparedness of awareness and attitude such as learning characteristics of nature, improving disaster and hazard information system, and organizing evacuation simulation exercises. Training programs for decision-makers are also important.

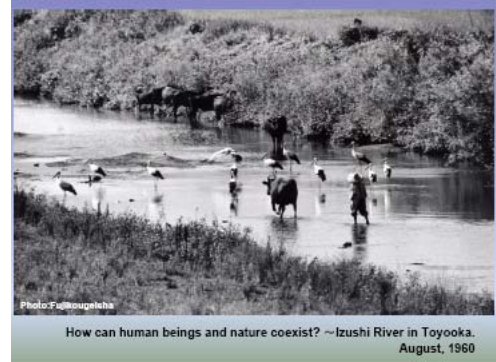
Picture of Toyooka in 1960

Look at the last photograph taken in Toyooka in 1960.

A woman farmer, seven cows and twelve oriental white storks. This picture is posing us a challenging question whether people and nature can coexist or how we can live in harmony with nature.

You can get more information and lessons learnt from the disaster caused by the typhoon in the report published by UNEP.

Thank you.



4

Panelists Presentations

1. Gerhard Putman-Cramer, UN-OCHA

The Importance of Environment in Humanitarian Assistance

Thank you. It is a pleasure to be here today. My name is Gerhard Putman-Cramer, and I am Chief of the Emergency Services Branch of OCHA in Geneva, as well as Deputy Director of Natural Disaster Policy.

This session is to look at environmental aspects of risk mitigation and disaster preparedness, and to examine the role of partnerships.

I am pleased that OCHA was invited, and I thank the organizers. OCHA the UN agency tasked with coordinating humanitarian response to complex emergencies and natural disasters has done a great deal of practical work to ensure humanitarian assistance and partnerships that integrate environmental issues.

In this presentation, I will offer my perspective from within OCHA on that work, and on the role of environment in humanitarian assistance.

I hope that when I am done we will have the opportunity to discuss together practical ways to strengthen current efforts.

By way of introductory comment I would like to note that disasters have many facets. These include poverty, human vulnerability, and environmental degradation and impacts. Effective humanitarian assistance must take account of these.

Humanitarian assistance must also take account of the fact that preparedness, prevention and response are all connected. After every disaster there are lessons, and if these are learned and applied, they may reduce future risks.

If we take these two thoughts as a starting point, it follows that we will be better able to reduce risks, if the right systems and mechanisms are in place - before disaster strikes.

My comments will reflect the fact that OCHA is concerned primarily with response activities. I will describe the mechanisms that we, in partnership with others, have in place. I will also offer a perspective on the vital links between response, prevention and preparedness. Before describing practical examples from OCHA's perspective, I would like to outline some ways in which I understand the links between humanitarian assistance and environment.

The environment may be impacted by industrial accidents, such as a mine tailing dam breach, a chemical spill or a forest fire. These same accidents may of course affect human lives in a very direct sense.

In the case of a natural disaster such as a hurricane, environmental issues may be both cause and consequence. For example, pre-existing environmental degradation may exacerbate flooding impacts. The storm itself may cause problems with waste and sewage.

The tsunami disaster has certainly shown us that in addition to the immediate human catastrophe, there is an enormous amount of waste and environmental impacts.

Some cases may have a combination of natural and technological emergencies, such as where an earthquake or landslide damages an industrial facility.

Finally, complex emergencies may have important environmental aspects. For example, there may be serious environmental problems inside IDP camps. This diagram illustrates in fairly straightforward terms the stages of a disaster, from the point of the disaster, to emergency response, and then recovery, development and preparedness.

In terms of where environment fits into humanitarian assistance, I think it is important to draw a distinction between immediate environmental issues of direct relevance to relief efforts, and very important but longer term issues.

For example, if a storm precipitates a serious toxic waste issue that could kill people, I would describe this as an immediate issue that must be addressed during the response phase. Serious sewage problems are another example, and I would also describe environmental problems in IDP camps as an example of an acute, response phase issue.

Longer term issues might include biodiversity, coral reefs, and other issues that are relevant to recovery and rehabilitation, but not to immediate response.

This distinction can allow us to prioritize assistance most effectively and focus efforts in the response phase where they are needed on the saving of human lives.

The phases of the disaster management cycle are well reflected in the way in which the UN is structured.

Governments determined that a body called the Joint UNEP/OCHA Environment Unit, which is housed within OCHA's Emergency Services Branch, is responsible for addressing immediate issues relevant to the response phase, and that UNEP and development agencies are responsible for longer term rehabilitation issues.

The Joint Unit was created by governments in 1994 as a partnership between OCHA and UNEP. The result has been an enduring partnership which has the mandate you see written here. Mobilize & coordinate response to technological disasters, and natural disasters with major environmental impacts.

The Joint Unit has been active. This map shows some of the places where it has responded to forest fires, conflicts, mine tailings leaks, fuel spills and so on.

It is important to add that not only is the Joint Unit a partnership between OCHA and UNEP, but that it works in close collaboration with many other UN agencies, national governments, the private sector, and so on.

Most recently, the Joint Unit has been active in the tsunami crisis. In collaboration with OCHA UNDAC teams, the Joint Unit carried out important rapid environmental assessments in Sri Lanka and the Maldives. A rapid assessment is now also underway in Indonesia, and I can say from my own brief stay in Banda Aceh last week, that it is certainly needed.

I am pleased to tell you that a report on the Maldives is now available. We will have some copies at our OCHA booth in the exhibition hall, and you can also download copies from the Joint Unit website (the address is on last slide). We will add reports from Sri Lanka and

Indonesia very soon also. I encourage you to read these and other updates from the Joint Unit as they will contain information that is key to improving acute environmental issues.

Other recent examples include the Caribbean Hurricanes and Darfur crisis, where the Joint Unit carried out rapid environmental assessments to identify acute environmental issues, and provided humanitarian professionals the analysis and information that allows them to do their work most effectively.

In the DR Congo, the Joint Unit worked effectively with IAEA, WHO and local authorities in a multidisciplinary assessment at the site of a uranium mine collapse. The Joint Unit also supported work in wake of the Philippines storms, and worked with WHO in Tanzania to investigate a suspected pesticide poisoning. Whatever the specific example, the Joint Unit ensures acute environmental issues are addressed as part of effective humanitarian response.

While I have focussed my comments on response, I also recognize that response, preparedness and prevention are linked.

I am pleased to say that in the Emergency Services Branch, the Joint Unit acts as Secretariat to an innovative OCHA-UNEP partnership that helps make the links between prevention, preparedness and response, and also between disciplines such as environment and civil protection.

The Environmental Emergencies Partnership was launched as a Type 2 partnership at the 2002 World Summit on Sustainable Development in South Africa, and I am happy to note that is engaged in practical activities that respond to stakeholder needs.

This slide shows examples of Partnership actions such as information sharing, training and harmonizing emergency reporting.

The Partnership has also been actively engaging new members. For example, it was recently invited to assist a country in the development of an environmental emergencies center, using in part lessons from past emergencies.

The Partnership has also formed the basis for dialogue between and with agencies and NGOs such as CARE, UN Volunteers and UNHCR. There is an entire session later this week on the subject and I encourage you to attend.

Finally, we anticipate that the Partnership will help step up activities on training, and applying lessons learned following the tsunami response phase.

The goal of this presentation was to show the importance given to environment in humanitarian assistance, using my vantage point from within OCHA.

As some final thoughts, I think it is clear to us all that disasters, however measured, are increasing in number and severity. We need to do even more and even better. I would urge all of us to build on what is in place and on what works.

So where to next?

I suggest that we look at specific, measurable and practical activities. Governments told us they want an Environmental Emergencies Partnership. Let us turn our minds to specific Partnership activities on which we can collaborate.

Let us look also at where we have responded in the past, and ask, have measures been put in place to prevent this happening again? Have lessons truly been learned? If the answer is no, we can, in effect, anticipate another emergency. If the answer is yes, what were the elements of success? How do we build upon them and replicate them elsewhere?

We must also recognize the role that the private sector can play. Some companies have enormous capacity to reduce disaster risk and in the communities where they operate, it is in their interest to do so. We must therefore understand better what is in their interests, they must increasingly understand what is in ours, and we must turn this understanding into practical initiatives. In this way, disaster risks can be reduced to everyone's benefit.

As an international community, I think we have potentially the technology, the funding, the mechanisms and the human resources we need to go beyond what is strictly required. The quality of our future depends on us doing so.

Thank you.

2. Lolita Bildan, ADPC

Interlinkages Between Climate Change and Disaster Risk Management

For most of the 1990s, the climate change debate centered on the stabilization of Green House Gases (GHG) concentration in the atmosphere. Thus, mitigation has been advocated as a major policy intervention. In the late 1990s, however, the climate change debate recognized the inevitable consequences of human induced impacts on climate, regardless of achieving the target of stabilizing GHG emission. Adaptation was recognized as a necessary strategy to complement climate change mitigation efforts. Various strategies and approaches have evolved to operationalize climate change adaptation strategies.

As most of the climate change-associated risks have serious implications for climate-related disasters, the new recognition of adaptation would pave way for enhancing disaster management capacities at all levels to manage the anticipated climate risk. This approach would call for the re-examination of pre-disaster preparedness and disaster mitigation strategies and post recovery programs. However, the mainstreaming of climate change concerns into national policy framework and locally actionable programs to reduce community vulnerability to climate change poses serious challenges.

Challenges in Mainstreaming Climate Change Adaptation into Development Planning

Uncertainties associated with physical climate modeling and socio-economic projections in the next 50 to 100 year time horizon pose serious constraints in mainstreaming climate change adaptation into development planning. There is much uncertainty on how climate will respond to the emission scenario, as current climate models have not yet even captured the complexity of the climate system (for example, the effects of current climate system components and their interactions are not yet all known).

Uncertainties in population and economic change and technological development scenarios arise, not because of the various methods of estimation, but of the contested and political nature of the changes implied.

Hence, policy makers in developing countries experience practical difficulties in committing scarce resources for managing unknown risks at a distant future. Addressing present day development concerns takes priority.

Opportunities in Operationalizing Adaptation Concepts

The shift in disaster management paradigm from reactive to proactive has greatly contributed to the reduction of deaths associated with forewarned natural hazards. The economic impact, however, in terms of damages and loss of livelihood opportunities still remains a major concern. Since the 1990s, efforts have been made to incorporate disaster mitigation into development planning to anticipate and reduce the impacts of climate-related hazards.

With policymakers' appreciation of the desirability of addressing risks associated with known and observed climate variability, it is therefore possible to convince them to undertake planned climate change adaptation strategies by addressing risks associated with societal vulnerability to observed climate variability and extremes. Addressing risks associated with present day climate variability would enhance capacity of vulnerable communities to withstand future climate change impacts.

These, coupled with the remarkable progress in the ability to monitor and predict weather/ climate events on the scale of seasons and beyond in the last decade, provide a unique opportunity for developing countries to reduce vulnerabilities to current climate variability and future climate change impacts.

Translating Adaptation Concepts into Locally Actionable Practices

Climate change impacts would likely manifest from (i) the alteration of the mean state of climate; (ii) increased frequency and intensity of extreme climate events; (iii) combination of (i) and (ii) and; (iv) climate surprises, i.e. the emergence of historically unexpected and sudden climate change-induced patterns.

Climate risks pertaining to (i) to (iii) would likely mimic current climate variability patterns, with higher amplitude variations. The pattern of risks could be anticipated and human experiences dealing with these risks could be drawn to build resilience. With reference to (iv), while past climate pattern may not provide any clue, human experiences dealing with extreme climate events of rare severity may provide guidance for dealing with uncertainties associated with risks.

In dealing with both anticipated and unanticipated type of climate patterns, the relevance of experiences of human systems to deal with current climate variability and extremes could provide guidance to move forward to design climate change adaptation strategies. Recent extreme climate event-associated disaster incidence, such as the 1999-2001 droughts in Southwest Asia, 1998 Yangtze River (China) flood, the four consecutive typhoons in October/November 2004 in the Philippines, and the Indian Ocean tsunami in December 2004 reveal that environmental degradation aggravated the impacts of these natural hazards. The issues to be addressed are (i) the trends in environmental degradation; (ii) the limitation of the existing human systems to address climate variability-associated risks; (iii) the kind of policy changes, institutional mechanisms, strategies and practices required to address the gaps to make communities resilient to current climate variability; (iv) the limitation of the strengthened coping mechanisms to withstand the high amplitude variability due to climate change; and (v) priority actions/ measures that could be adopted to overcome the identified limitations to manage risks associated with high amplitude climate change impacts.

Utilizing recent extreme climate event analogs to enhance adaptive capacity

Past climate fluctuations provide natural experiments to examine reactive (ex-post) responses of human systems to climate extremes. These are the situations that permit direct observation of community and institutional behaviors in response to a dynamic climate. Such natural experiments potentially reveal important details about the sensitivities of human

activities to climate variability. They can be used to identify and quantify bio-physical responses to climate fluctuations and the resilience of community coping mechanisms.

A suitable, preferably most recent, extreme climate event analog, and pro-active (ex-ante) societal and institutional responses to these events, can be identified. These coping mechanisms can then be evaluated if they are able to withstand higher amplitude climate variability. Ways and means to strengthen these coping mechanisms can then be explored to address the gaps. This should lead to location-specific guidance and consolidated policy recommendations on how to further strengthen the role of community coping mechanisms through community-based organizations and local government authorities, including capacity building required to fulfill such role. The process would promote horizontal interaction of local governments with community-based organizations to encourage their active collaboration in the design and implementation of adaptation measures, as well as vertical interaction between different sectors for strengthening local community-based institutions to perform a role to support communities.

Box 1

Adapting to El Niño/ La Niña-associated Climate Variability

The cropped areas of Indonesia and the Philippines are subjected to climate variability-associated droughts and floods almost every year. However, in Indonesia, a La Niña-associated climate variability could amplify the flood impacts at least 2 times that of most of the normal years, and drought impacts could be amplified around 5 times that of most of the normal years due to El Niño. Similarly in the Philippines, El Niño-associated climate variability could amplify drought impacts around 5 times that of most of the normal years, and La-Niña could enhance typhoon impacts significantly. These extreme climate events proved to be a serious set back to the socio-economic development of these countries.

Climate change impacts are expected to mimic El Niño and La Niña type impacts. Moreover, it is likely that climate change may exacerbate the climate event associated with El Niño, thereby increasing the risks of droughts and floods in many regions of these countries. Indonesia and the Philippines have developed strategies to cope with El Niño-induced drought and La Niña-associated floods. These plans have key elements that may be used to evolve an operational program for strengthening adaptation capacity for managing future climate risks.

Utilizing advanced climate forecast information to manage climate risks

Recent advances in climate prediction on El Niño Southern Oscillation (ENSO) provide potential opportunities to mitigate El Niño-associated impacts. The ENSO index-based climate forecast information could provide lead time to enable national/ local institutions and communities to draw ex-ante coping strategies such as seed banks, crop/ weather insurance, negotiating share cropping contracts, local institutional mechanisms to regulate scarce water resources etc. To the extent climate forecasts are utilized with pre-existing ex-ante coping strategies, the need for reliance of communities on ex-post coping strategies such as disposal of assets, migration etc. could be minimized. Hence, while reliable climate forecast generation and application system could be one of the adaptation instruments to manage risks associated with climate extremes, existence of robust ex-ante coping strategies at the community level is a pre-condition for realizing the potential benefits of forecast information.

Table 1 shows the climate forecast products now available and the lead times they provide for making anticipatory actions to reduce risks. These climate information products are

provided by global climate centers, and hence require interpretation taking into consideration local conditions, and are in probabilistic form, requiring translation into a form that is usable by vulnerable communities. Climate forecasts are translated into potential impacts, which are then used in developing response options for communication to end-users. This end-to-end application system connects the climate information provider (one end) and the user community (other end) through intermediary user agencies like agriculture, water resources and disaster management agencies. Experience in managing risks from current climate variability and extremes would create community confidence to take up adaptation measures for future climate change risks.

Table 1. Climate information products, lead times and application

Forecast product	Lead time	Sample application
Weather	3-5 days	Securing lives
Medium-range	5-10 days	Relatively new; early decisions for flood and drought mitigation; preserving livelihoods
Extended range (subseasonal)	20-25 days	Planting/ harvesting decisions; storage of water for irrigation; logistics planning for flood management
Seasonal	1 month and beyond	Long-term agriculture and water management; planning for disaster risk management

Box 2 illustrates how a vulnerable community can utilize climate information that is provided in advance in making decisions to reduce risks from climatic hazards.

Box2
A Farming Community’s Response to the 2002 Dry Season Forecast, Philippines

The climate outlook for the dry season (November 2002 to March 2003) for Iloilo Province was issued in August 2002 by PAGASA. It predicted that rains during the coming dry season would be below the normal level. Based on the forecast, the Provincial Agriculture Office (PAO) prepared an impact outlook, which revealed that farmers at the tail-end of irrigation systems would not receive enough water for cultivating rice crop. The PAO then informed the vulnerable farmers in Iloilo about the impending water scarcity during the critical stages of rice growth, and advised them to plant alternate drought-resistant, short-duration crops. Most farmers followed the advice, and planted watermelon, mung beans, fruits and vegetables, which resulted to about US\$ 6 million worth of produce. Had there been no forecast, farmers would have not realized this benefit, and would have potentially lost US\$ 2.4 million from the rice crop that they intended to plant. Others, who were skeptical about the advisory, still planted rice and lost their crops.

Utilizing results from climate change models

Despite uncertainties in climate change models associated with uncertainties in climate change impacts at the local level, modeling results from climate change scenarios on warming and sea level rise give some degree of certainty. These may be used in evolving and operationalizing adaptation strategies to reduce disaster risks. Box 3 gives an illustration for the water resources and hydropower sector, identified to be the most vulnerable to climate change in Nepal.

Box 3

Utilizing Climate Change Modeling Results in Identifying Adaptation Options

Analysis of recent climatic trends for Nepal reveals a significant warming trend in recent decades, which has been even more pronounced in higher altitudes. Scenarios from multiple general circulation models show considerable convergence on continued warming, with projected country averaged mean temperature increases of 1.2°C and 3°C in 2050 and 2100, respectively. Warming trends have already had significant impacts in the Nepal Himalayas, particularly in terms of glacier retreat and considerable increases in the size and volume of glacial lakes that increase risk to Glacial Lake Outburst Flooding (GLOF). Continued glacial retreat can reduce dry season flows fed by glacier melt. Enhanced variability of river flows is also expected from the monsoon, predicted across climate models to intensify under climate change. Combined with enhanced GLOF risk, this intensification of the monsoon can enhance risk of flooding and landslides. These make Nepal's water resources and hydropower sector vulnerable. Already, this sector has been given the highest priority in terms of certainty, urgency and severity of impact, as well as the importance of the resource affected by a changing climate (91% of Nepal's electricity needs is supplied by hydropower plants). These information are then useful in identifying adaptation opportunities, such as the setting up of micro-hydropower generation facilities as a diversification strategy for GLOF hazards.

Way Forward

The Asian Disaster Preparedness Center endeavors to demonstrate the value of applying climate information derived from past climate analogs, currently available climate forecast information at different time scales, and results from climate change models, wherever locally actionable at the community level, through demonstration projects in high-risk areas and, through this process, promote replication through policy advocacy.

3. Ana Maria Bejar, Save the Children

Children and young people making a difference in sustainable development and community risk management

Background/ Introduction

Save the Children started its activities in Cuba in 1994 during what Cubans called 'the special period' the deep economic crisis occurred after the collapse of the socialist block in Europe. In 1997, Save the Children started an environmental education programme aimed to disseminate global international agreements amongst children and young people, support the national strategy of environmental education and encourage children participation at the community level. As part of this experience, Save the Children started a community risk management programme aimed to involve children and young people in the excellent Cuban disasters preparedness system.

Save the Children UK has just completed a series of child-focused disaster preparedness projects in Eastern Cuba stretching back over 3 years and co-funded by the Disaster Preparedness section of the European Community Humanitarian Office (ECHO). The eastern provinces of Cuba are the least developed area of the country, as measured by health, environmental, food security and migration indices. The area is highly vulnerable to hurricanes and heavy rainfall that often produces flooding and is prone to repeated and prolonged drought, earthquakes and forest fires. The target population of children and young people are one of the most vulnerable sectors of the population in terms of the impact of natural disasters caused by such natural disasters.

The aim was to first introduce the topic of risk in the school curriculum, and secondly to bring about the active participation of children and adolescents in local flood risk management

Save the Children disseminated a community based multi-risk management model for mitigation and preparation in relation to flooding, earthquakes and forest fires, based on the active participation of children and young people through peer education methodologies in the Eastern provinces of Holguin and Guantanamo.

Goal and objectives of the program/ initiative

The goal of the Programme was to reduce the vulnerability of the target communities to the most prevalent risks in the zone, strengthening the efficiency of the Cuban national protection system with sustainable local strategies led by young people, and the validation and dissemination of methodological tools and educational materials. To contribute to the reduction of the number of natural disaster victims, through an educational campaign led by young people together with practical activities (community risk maps, school emergency preparedness plans, early warning systems, reforestation and psychosocial support) which will have a long-term impact.

Activities undertaken during the program

- Creation of a natural barrier through forestation of riverbanks using bamboo, to mitigate against river overflow, followed up and maintained by the young people and local organisations in both provinces.
- Community motivated to adopt best practice in relation to risks of flooding, earthquakes and forest fires through an educational campaign designed, implemented and evaluated young people, sustained through peer education.
- School emergency preparedness plans reviewed and strengthened through the formulation of local multi-risk maps undertaken by girls, boys and young people.
- Early warning system strengthened through effective communication of rainfall and hydrological level at different highland locations to the low-lying town of Mayari in Holguín province towards flooding and forest fires.
- Response capacity of local health system strengthened to support persons affected by flooding, earthquakes and forest fires through provision of first aid and entertainment brigades made up of children and young people
- Project experience evaluated, systematised, and disseminated, with the participation of young people, focusing on peer education and gender perspective assessment tools. Educational material will be produced and designed by young people in co-ordination with local and national authorities and organisations.

Major achievements

The project directly benefited 10,753 children and young people in 47 schools. Indirect beneficiaries are the total population of the area: 12,373 inhabitants in the Toa river basin area in Guantánamo province; 58,722 in the municipality of Sagua de Tánamo and 109,623 in the municipality of Mayarí in Holguín province. Local authorities and leaders, teachers and the overall population in the region have benefited through training and education sessions².

Thanks to the high motivation and commitment of some 3,000 participants in the project, including students, promoters, management teams, coordinators and organisations and institutions involved, “Let’s be prepared – Listening to the Waters” and its follow-up project “Being Prepared: Listening the Earth” has been able to contribute to the invigoration of the system of local flood, earthquake and forest fire risk management in a short period of time in the provinces of Holguín and Guantánamo, in the rest of Cuba, and in the Central American and Caribbean region.

Lessons learned and challenges

- *Peer Education – children learning from and motivating each other - has been a key component of this project and has been taken up with with a high level of enthusiasm and involvement by the students and promoters.*
- *Children involved in the project have also been able to reach a high proportion of adults in their immediate families in the highest risk groups (including young men in their twenties and thirties) – older brothers and uncles were self selected targets for the project’s messages regarding personal security in risk situations put forward by the children involved in the project.*
- *An integrated approach to disaster preparedness and local multi-risk management through the involvement of a wide range of stakeholders such as students, promoters, and local and provincial organizations, through a series of workshops in which the students took leading roles, helped to guarantee the success of the project during its implementation phase and was an important aspect in providing for future sustainability.*
- *The gender training approach and methodology used throughout the proejct immeasurably strengthened the project’s overall impact.*

Suggestion for future actions

“Being Prepared: Listening to the Earth” formed part of the high-priority emergency programme of Save the Children UK in Cuba. This project blended emergency response to a development edge that promotes the effective participation of children and adolescents in efficient local systems of risk management in Cuba. By means of this work, Save the Children seeks to contribute to exercising the rights of children to be part of the decision-making process that affects them, and at the same time carry out work that is sustainable, that integrates relief action, and prepares and encourages a culture of prevention.

² Figures relate to the second phase of this Save the Children Project. Contact details above for complete figures.

4. Iksan van det Putte, FIDIC

Environmental Management Systems for Risk Reduction

Introduction

Actions to reduce vulnerability to natural hazards are closely linked, and are, in most cases, inherent to those required within the framework of sustainable development. Appropriate environmental management together with socio-economic development factors are central items.

A number of environmental management tools are used within society, including the business and the industrial sector, to reduce the risks arising from environmental and human health hazards.

Part of the environmental management tools belong to the group of regulatory control instruments (EIA, IPPC, pollution control, environmental health and safety legislation, building codes). Others belong to the group of voluntary instruments of which Environmental Management Systems (EMS), certifiable according to ISO 14001, is a well-known example. Nowadays, not only industrial facilities are aiming at certified EMS systems, but also increasingly other organisations, including municipalities and the service sector.

The prevention of negative environmental impacts and emergency preparedness and response are important elements of an EMS system. If properly applied, an EMS should be able to contribute to not only reducing the risks and impacts of natural and technological hazards, but also avoid the development of some of these risks in the first place.

FIDIC has a long and continuing involvement in environmental management and sustainable development, and has published several guidance documents as tools in bringing sustainability concepts into business practice.

FIDIC collaborates with UNEP, the International Chamber of Commerce and the International Council of Local Environmental Initiatives in the development and dissemination of environmental management systems for industrial facilities and for urban administrations.

It should be noted, however, that EMS systems as implemented by various organisations tend to focus on the organizations' own organisational and process activities. They are specifically linked to these organisations, and only to some extent on the projects and programmes they are developing and for which they are responsible.

To improve this situation, improved tools are required to evaluate the sustainability of projects and programmes and to improve their sustainability, including elements for risk reduction of technological and natural hazards.

It is clear that the development of such tools requires a multi-stakeholder approach in which the combined efforts of partner organisations can play a crucial role.

FIDIC has started an initiative in this direction by developing guidelines for Project Sustainability Management (PSM). PSM enables project owners and consulting engineers to devise and customize indicators to meet stakeholder concerns and issues, including those relating to the risks of technological and natural hazards, while demonstrating a rigorous, causal link to the fundamental concerns and goals of sustainable development. These guidelines are invaluable for consulting engineers and their clients, many of which are

represented by organisations that have partnerships with FIDIC in the fields of environmental management and sustainable development.

Environmental Management Systems for the industrial and urban sectors

It was because of the increasing number of industrial accidents that voluntary instruments received increasing support. Regulatory control instruments were simply not functioning well enough to prevent industrial disasters such as those in Bhopal, Seveso and Basle. The industrial sector, with its reputation at stake, aimed to improve this situation. The International Chamber of Commerce (ICC) launched in 1991 with one of the first voluntary approaches by issuing “The ICC Business Charter for Sustainable Development” with its principles for environmental management (Figure 1).

Since then, various voluntary environmental management tools have been developed. One of the more common tools which can be applied on a voluntary basis is the ISO 14001 International Environmental Management standard. Issued in 1996 by the International Organization for Standardization (ISO), ISO 14001 is designed to help companies and other organisations to build effective Environmental Management Systems and reduce the environmental impact of their operations. The system, which has recently been revised, originally specified 52 discrete requirements that any well-managed organization should integrate into its operations to continuously improve environmental performance, minimize environmental impacts and reduce the risks and effects of technological and natural hazards, thereby reducing related business risks and liabilities.

Although the establishment of formal EMSs was driven by industry needs and while EMSs have largely been used by industry in the past, it has been recognized in the last few years that EMSs are transferable to other sectors including the service sector, the public sector in general and urban management sphere in particular.

ISO 14001 standard is based on the following reasoning: The EMS is aimed at formulating and achieving an adequate environmental policy in an organisation. Therefore, significant environmental aspects need to be identified, as well as the applicable requirements deriving from the environmental legislation. Based on this understanding, an environmental policy is established, together with objectives, targets and an environmental programme to achieve the objectives and targets.

To be able to realise the environmental programme and to control of activities that are critical for the environment, the organisation needs to establish several organisational measures. These include procedures that must be established and maintained to identify and respond to emergency situations, and to prevent and mitigate the environmental impacts that are associated with them.

The level of control, but also the effects of this control, need to be measured, recorded, analysed and evaluated. Where necessary, corrective measures need to be taken. The correct functioning of the EMS is reviewed by system audits. Management reviews also evaluate on a continuous basis, the continued suitability of the EMS, and can lead to revisions of policy, objectives and targets. After this, the control and improvement cycle will start again.

Companies and organizations seeking formal certification are required to engage an independent third-party “registrar” to periodically audit and register their systems.

According to the latest ISO annual survey of environmental management systems based on the ISO 14001 standard, the number of certificates (world total) has grown from 7,887 in 1998 to 66,070 in 2003. Japan is way out in front, with 13,416 certificates at the end of 2003.

For EMAS – the Eco-Management and Audit Scheme - that is established according European Union regulations, the situation at the end of 2004 was that more than 4000 sites in over 3000 organisations are registered. Most of them are companies from the industrial sector. However, EMAS was opened up to all other areas of economic activity in 2001, so an increasing number of local authorities and companies from the service sector are joining the scheme.

Risk reduction and Environmental Management Systems

In general, two elements are essential in the formulation of risk: 1) a potential unwanted (damaging) event, phenomenon or human activity i.e. *hazard*; and 2) the *probability* that such a hazard occurs, so:

$$\text{Risk} = \text{Hazard} \times \text{Probability.}$$

Risk reduction for technological hazards such as industrial pollution, industrial accidents (explosions, fires, spills, etc.) refers to minimizing the occurrence of such events and mitigating the associated effects.

The risk equation frequently used in the discussion of disaster reduction initiatives in natural hazards is:

$$\text{Risk} = \text{Hazard} \times \text{Vulnerability.}$$

Vulnerability is defined as the degree of susceptibility of the elements exposed to a specific hazard.

The recognition of vulnerability as a key element in the risk equation has been accompanied by a growing interest in linking the positive capacities of people to cope with the impact of hazards.

Environmental Management Systems if properly implemented can effectively be used in risk reduction associated with both technological hazards (e.g., dangers associated with industrial accidents) and natural hazards (hydrometeorological hazards with, for example, floods, desertification and storms as phenomena; geological hazards with, for example, earthquakes and tsunamis as phenomena; and biological hazards).

Various components of an EMS provide the possibility for taking preventive and mitigative actions to reduce the risks of the various hazards. Examples are the chapters on operational control and the one on non-conformance and corrective preventive action. One of the most important chapters in this framework is however the chapter on *emergency preparedness and response*.

For emergency preparedness and response, ISO 14001 requires an organization to:

- Establish and maintain procedures to:
 - Identify the potential for, and to respond to, accidents and emergency situations.
 - Prevent and mitigate environmental impacts that may be associated with these accidents and situations.
- Test the procedures periodically, where practicable.
- Review and revise the procedures, in particular after the occurrence of accidents or emergency situations.

On the documents and records, which are required the following remarks can be made:

- What is important is that there is evidence available that shows that the identification of potential accidents and emergency situations has been done properly. This can be found in the Emergency Plan or in a separate document.
- On top of this there needs to be evidence that the organisation has not only identified what to do in case an emergency occurs, but also what can be done to prevent emergency situations to occur. These measures can then be implemented as part of the operational control.
- The Emergency Plan needs to describe the measures to be taken in case of an emergency.
- There needs to be evidence of tests of the Emergency Plan, and a description of what elements of the plan have been subject to testing. A report of the evaluation of the tests needs to be prepared. If the evaluation shows that deficiencies have been noticed, there needs to be evidence of changes that have been implemented in the plan and in procedures.

Emergencies and environmental impacts may include those related to, and discussed under, technological hazards and natural hazards. Depending on the local situation, preventive actions and emergency plans can be formulated for flood-prone areas and for areas suffering frequently from earthquakes or severe storms, for example.

Environmental Management Systems and the sustainability of projects and programmes

The implementation of Environmental Management Systems by various organisations and economic actors will certainly contribute to reducing the risk of technological and natural hazards.

Most of the systems concentrate primarily on the activities of the organisation which implements the system, especially those activities for which direct control can be exercised. (Note: in the revised version of the ISO 14001 standard, i.e. ISO 14001-2004, reference is made to environmental aspects of activities, products and services, which the organisation can control and those which it can influence.). This is the general approach for industrial facilities. In other types of organisations, there is however a trend to also include projects and programmes in the scope of an EMS. A typical example is the promotion of city planning for sustainable development in urban Environmental Management Systems.

Adaptive design strategies are used in city planning. These make use of the fact that the natural environment provides opportunities to increase the protection against disaster impacts. For example, river and lake floods are aggravated or even caused by deforestation or filling of low lying land for building purposes. Such examples illustrate how the buffer capacity for water uptake is decreased and should be compensated by other measures. Other examples are given in the "Global review of disaster reduction initiatives, 2004 version (UN/ISDR)". To include such elements in the scope of an Environmental Management System should be promoted.

The problem which is encountered, however, is the lack of tools to develop, improve and evaluate the sustainability of projects and programmes in an independent way.

This has been one of the reasons that FIDIC has developed *Project Sustainability Management (PSM) Guidelines*. The PSM Guidelines describe how project owners and consulting engineers can incorporate the principles of sustainable development into individual projects. The components of the FIDIC PSM approach are twofold:

- 1) a framework of sustainable development goals and the corresponding indicators, both of which map back to the whole-society issues, goals and priorities of Agenda 21, and the corresponding sustainability indicators developed by the United Nations Commission on Sustainable Development; and
- 2) a process for setting and amending sustainable development project goals and indicators, making them consistent with the vision and goals of the project owner, compliant with Agenda 21, and tailored to local issues, priorities and stakeholder concerns.

FIDIC has developed a set of core sustainable development project goals and indicators organized in a framework which corresponds to the whole-society issues, goals and priorities of Agenda 21. Also, FIDIC has devised a process to amend these goals and indicators, allowing them to be customized to actual project conditions and requirements (e.g. risk reduction) while retaining its whole-society scope. In addition, the process addresses the full-life cycle of the project, from concept development through design, construction, operation, deconstruction and disposal. In this sense, project sustainability goals and indicators become part of the overall project delivery process.

The conceptual model for the PSM sustainable development project goals and indicators framework is illustrated in Figure 2.

For the private as well as the public sectors, the application of EMS systems with the inclusion of Project Sustainability Management for projects and programmes is expected to represent another important step towards achieving sustainable development and related disaster reduction targets.

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5. Joanne Linnerooth Bayer, IIASA

The Financial Sector and Disaster Risk Reduction

1 Introduction

Financial market institutions are becoming more active in offering catastrophe risk-transfer instruments, including insurance, micro-insurance, weather hedges, catastrophe bonds and other alternative insurance instruments. These instruments can assist households/businesses and governments to cope with their growing catastrophe risk exposures. Moreover, they can provide incentives for reducing losses from disasters. International financial institutions and disaster management communities are endorsing these instruments in their efforts to place greater emphasis on pro-active disaster planning for preventing losses and enabling households/businesses and governments to recover in a timely manner (Gurenko, 2004, Kreimer and Arnold, 2000).

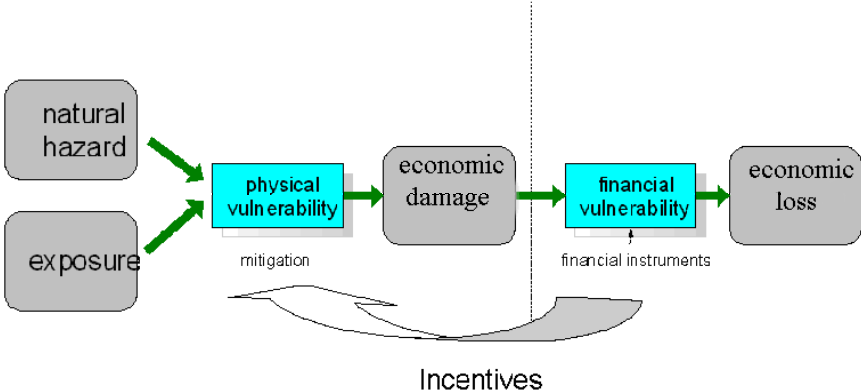
The cost of market instruments can substantially exceed that of traditional family- and state-supported loss-sharing mechanisms, including kinship networks, post-disaster public assistance, reserve funds, borrowing and disaster aid. Traditional post-disaster financing, however, may not be sufficient for low-income households/businesses and developing-country governments that face high catastrophe risks, in which case market-based financing instruments, which are put into place before the disaster occurs, can be an important, but costly, addition to the portfolio of disaster financing measures. One of the greatest challenges is to make these instruments affordable to the population and governments of low-income countries. A second challenge is to couple financial planning with preventive measures to reduce the effects of extreme events on human lives, the environment and the economy. The market alone cannot meet these challenges, but public-private partnerships, including partnerships with the international community, are one promising development in this direction.

This discussion gives an overview of financial risk management instruments for the private and public sectors with a special focus on developing countries. We conclude that the role of market actors, and public-private partnership with governments and international organizations, can make communities, national economies and the environment more resilient to natural disasters.

2 Financial instruments for households and businesses

Individuals and policy makers have two options to reduce losses from disasters: mitigation and risk financing. The first, and highest priority, is to invest in preventing and mitigating damages from disasters, including human and environmental, losses in addition to economic losses. The residual *economic* risk can then be managed with risk-financing strategies. Mitigation, therefore, reduces physical/environmental vulnerability; risk financing reduces economic vulnerability. As illustrated below, these options are interlinked, since the choice of financial instruments can have effects on physical vulnerability because of positive or adverse incentives.

Figure 1: Financial Risk Management



Financial arrangements that spread disaster losses among those most at risk, and including solidarity from those not at risk, can make a difference in the lives of vulnerable people in low- and middle-income countries. For example, many Mexican farmers face double exposure to fluctuations in crop prices and natural catastrophes, which in a very bad year or consecutive years can force them to migrate to the slums of Mexico City, where they face even higher risks. Pre-disaster financial arrangements that spread crop losses, temporally and spatially, have the potential to secure their livelihoods.

As we see from Figure 2, insurance cover for natural disasters is hardly existent in very low income countries. Only at a threshold of per-capita income about \$3,000 does insurance become affordable on a larger scale. For the most part, flood and other types of insurance are not available to the poor, and there is little institutional structure in many low-income countries to provide the necessary legal and regulatory institutional support for a

viable insurance market. Low catastrophe insurance uptake in the developing world is neither surprising nor perhaps disturbing. Although there is great scope for and appeal of transferring risks out of national borders into the capital markets, risk transfer comes at a price. Most private insurance arrangements incur an expected net financial loss to the purchaser since insurance companies are profit seeking and averse to risks that threaten their solvency (Froot and O’Connell, 1999). Commenting on the high price of risk transfer, Auffret (2003) points out that in the Caribbean region, catastrophe insurance premiums are estimated to represent about 1.5% of GDP during the period 1970-1999 while average losses per annum (insured and uninsured) accounted for only about 0.5% of GDP. Following the terrorist attacks of September 11th there has been an increasing concern by the investment community in providing coverage for catastrophic events, and the price for this protection has risen (Kunreuther, 2002).

For the most part, traditional post-disaster funding is less costly than the purchase of pre-disaster market instruments. Yet, if individuals or government officials anticipate a deficit in post-disaster funding sources because of their lack of capital or inability to borrow or otherwise raise sufficient capital for high-loss disasters, then market-based, pre-disaster instruments may be advisable. Other factors also add to the benefits of these instruments. They increase the perceived stability of the business/country and, therefore, may attract domestic and foreign investment. Moreover, they require pre-disaster planning, which may lead governments to invest more in loss-prevention measures.

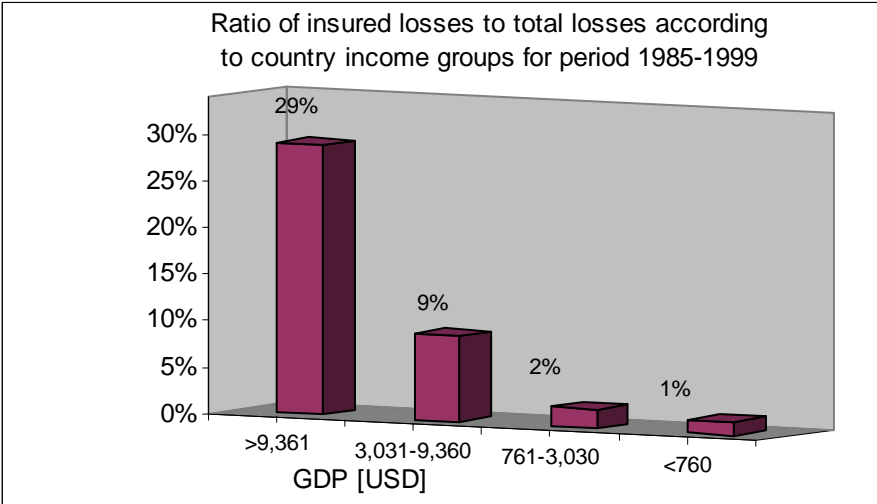


Figure 2: Catastrophe insurance density according to country income groups (per capita GDP in 2000). Source: Munich Re 2000: 24-25.

In most low-income countries, however, there is little knowledge of the risks, and generally these countries lack the institutional structures for commercial insurance. To by-pass formal catastrophe insurance arrangements for very poor households and farmers, and to begin building an awareness and insurance culture, micro-insurance has become topical. Micro-insurance involves voluntary and contributory schemes for the community and is oriented to small-scale cash flows. These schemes are sometimes subsidized by the government; however, they address mainly health and funeral expenses. An exception is earthquake insurance in parts of India and similar schemes against livestock loss from disasters in Bangladesh. In addition, it should not be overlooked that banks and other financial institutions indirectly act as insurers. The Grameen Bank, for instance, expects a large number of defaults on its small-scale loans after a major disaster, and it can pool these risks over the country. To absorb these risks it will have to charge higher interest on its loans, but the low transaction costs may make this form of insurance attractive.

Another interesting alternative to traditional insurance is a weather hedge, which can protect farmers against droughts, storms and other extremes. Accordingly, insurance contracts are written against, say, severe rainfall shortages measured at a regional weather station. The insurance is sold in standard units by banks, farm cooperatives or micro-finance organizations, and all buyers pay the same premium and receive the same indemnity payment per unit of insurance – a kind of lottery against the weather. By keeping it simple, the transaction costs are reduced. A major constraint, however, to this and any micro scheme for providing disaster insurance is the dependent nature of the insured risks within a single region, meaning that if one household is affected, many others also suffer losses. When an event occurs, the insurance provider may not have the capital to cover the dependent claims.

Insurance for the private sector can have both a negative and positive effect on reducing human, economic and environmental losses from disasters. On the negative side, any arrangement for transferring risk has associated moral hazard, which means that agents may take less precaution if they do not fully absorb the losses. On the positive side, insurance and other financial arrangement can provide incentives for risk reduction by lowering premiums if preventive measures are in place. Interestingly, instruments with a physical trigger circumvent the moral-hazard problem and actually create incentives for loss reduction. If insurance premiums are set to reflect the risk, this will create incentives for homeowners and businesses to take loss-reducing measures and to relocate out of high-risk areas. While this is true in theory, the practice looks somewhat different. Insurers generally do not charge premiums that encourage loss-prevention measures since they feel that few people would voluntarily adopt these measures based on the small annual premium reduction (Kunreuther, 1996). For residents in poor regions, there may be few options that individuals can afford to reduce their losses, and for this reason requiring them to take even limited insurance may have little effect on loss prevention. Moreover, Hunter (1994) argues that insurers have not promoted loss-control measures since these measures could negatively affect their profits. The role of insurers in preventing losses, however, may be changing as insurers become more concerned about huge or mega losses. As we will see in the next section, there may be more promise for equating insurance with loss reduction with government and international involvement in the insurance system through public-private partnerships.

3 Public-Private Partnerships

In many countries, neither private insurance nor public assistance can stand on its own for indemnifying victims of natural disasters. Insurers are reluctant to cover properties in high-risk areas (or property owners cannot pay the risk-based premiums); nor can governments facing fiscal constraints fully cover the losses to the private sector. Some countries have legislated national insurance programs that *combine* private and public responsibility. These public-private programs, with the important exception of Turkey, exist only in the developed countries, including the US, France, Norway, New Zealand and Japan. Public insurance systems, and public-private partnerships, appear to be more pro-active in encouraging risk reduction. In the case of the US National Flood Insurance Program, where the government underwrites private insurance, only households living in communities that have taken appropriate land-use and other flood prevention measures are eligible for cover. Moreover, this system is moving to risk-based premiums – away from cross subsidies in the system – so that households have an incentive to reduce their risks (and thus their premiums). The Turkish Catastrophe Insurance Pool (TCIP) makes earthquake insurance policies mandatory for residential property owners living in municipalities, who pay a fee to a privately administered, public fund. This fee is based on their risk zone, the construction of their property and risk-reducing measures, which makes the TCIP, along with the NFIP, one of the few systems that explicitly links insurance with loss prevention. The TCIP has been designed to be affordable to Turkey's property owners with the help of strong limits on cover and assistance for reinsurance from an international financial institution. Another way the TCIP links financing with loss prevention is through the legislated attempt to fully eliminate

post-disaster public assistance to all but the poorest of residents – unlike the US flood insurance system. In other words, knowing there is little public assistance for rebuilding homes, it is hoped that more property owners will retrofit their properties and take other measures against seismic risk.

4 Financial instruments for the public sector

Governments hold a large portfolio of public assets and are also increasingly interested in transferring their catastrophe risks. Pre-disaster financial arrangements can make a huge difference in the economic development of vulnerable countries. If governments do not have the necessary infusion of capital after a disaster to rebuild critical infrastructure and assist households and businesses with their recovery, the indirect costs can greatly exceed the direct losses from the disaster. Such delays can also lead to secondary economic, environmental and social effects, such as deterioration in trade, budget imbalances and increased incidence of poverty (Benson, 1997; Freeman et al., 2002).

Post-disaster financing gaps are frequently encountered in developing countries. For example, after the devastating earthquake of 2001 in Gujarat, India, there was a significant shortfall between the state government’s planned expenditure, planned funding sources and the actual funding made available. Researchers at IIASA have estimated the risk highly exposed governments face in encountering a financing gap after a major disaster (Hochrainer, et al, 2004). A simulation model, which combined the loss probability for public infrastructure in Honduras with the government’s ability to absorb the losses, yielded a picture of the government’s financial vulnerability as shown in Figure 3 (Mechler and Pflug, 2002). According to the model, if the event occurred in 2005, the government could cope with the losses from moderate flood and storm disasters. But for very rare, high-consequence events – one-in-500 years or worse – there is a sizeable funding gap.

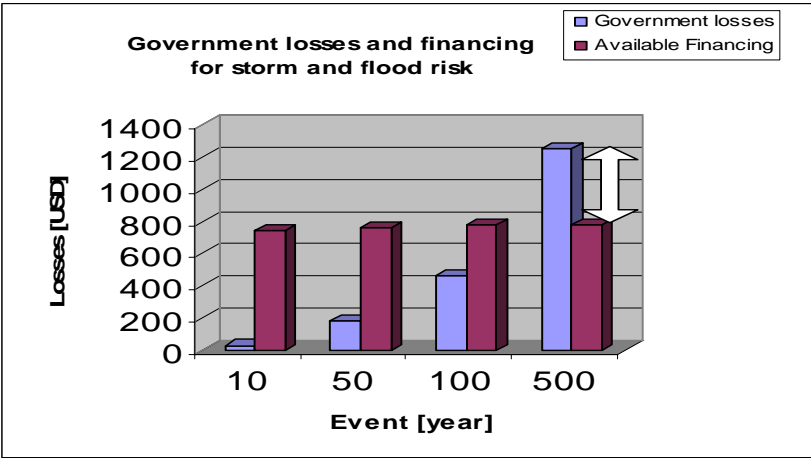


Figure 3: The Resource Gap for Honduras (Source: Mechler and Pflug, 2003)

Historical data corroborate this assessment. Honduras has had a limited ability to finance losses by its own means and has traditionally relied on external assistance to help with economic development in the event of natural disasters.

This analysis can be helpful in illustrating the threshold for which the Honduras government might consider pre-disaster financial instruments. However, poor governments will have trouble affording these instruments, which suggests a role for the international donor community in switching part of its assistance from post-disaster aid to pre-disaster support by subsidizing insurance and insurance-related instruments (e.g., catastrophe bonds). This paradigm shift in disaster assistance could have the added value of linking disaster financing with prevention by making pre-disaster assistance contingent on specified loss-prevention measures. In addition, the analyses necessary for putting these instruments into place would encourage more thought to planning for disasters.

5 Conclusions

Market instruments for transferring risks have great potential for households/businesses and governments, but there are associated costs. Keeping in mind that up to 95% of recent disaster deaths have occurred in poor countries (Mitchell and Ericksen, 1997), the return on preventive mitigation investments may outweigh the return on investing in market-based financial instruments. This point cannot be overemphasized. In low-income countries, the opportunity costs of insurance and other market risk-transfer instruments can be prohibitively high in terms of meeting other human and environmental needs. However, households/business and governments, which face a financing gap and thus cannot readily recover from disasters, should carefully consider the benefits and costs of financial instruments. Since market instruments may be unaffordable to low-income persons or governments, public-private partnerships and international support might be re-targeted to assist before disasters occur. A main advantage of these partnerships is establishing links between financial assistance and disaster risk mitigation.

Without public/international partnerships, the link between market instruments and preventing or mitigating damage from disasters is tenuous. Any transfer of liability, whether through market instruments or public assistance, may have associated moral hazard, which means that prevention will be less with these instruments in place. There is a great potential, however, to create positive incentives for loss reduction by equating the price of the instruments with measures for reducing losses. However, the record of insurance companies on creating incentives is disappointing, but recent experience with public-private partnerships is encouraging. For example, the US flood insurance program requires preventive measures at the community level, and the recent Turkish catastrophe insurance pool equates premiums with household measures to reduce their seismic risks. As is the case in the U.S and Turkey, governments and international organizations can form partnerships conditional on risk prevention. There is enormous potential for these types of partnerships, which may be a new model for providing public and international assistance in the future.

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5

Issues emerging from the session

The impacts of disasters, whether natural or man-made, not only have human dimensions, but environmental ones as well. Environmental conditions may exacerbate the impact of a disaster, and vice versa, disasters have an impact on the environment. Around the globe, land use and land cover changes are eroding the natural buffers, such as coral reefs and mangroves, that protect communities from hazard risk. These same changes often erode people's capacity to recover from disaster. Protecting the capacities of such buffers against calamities and disasters is of critical importance. Environmental changes promise to create new challenges to the security and sustainability of communities around the world.

Deforestation, forest management practices, agriculture systems etc. can exacerbate the negative environmental impacts of a storm or typhoon, leading to landslides, flooding, silting and ground/surface water contamination. The high volume of wastes from disasters, from households and debris from forests and rivers, also constitute a major concern for proper disposal. The secondary impacts of the recent Asian Tsunami will become apparent in the longer term, as the short relief operations give way to clean-up and rehabilitation operations. The erosion of the buffer capacities of coastal ecosystems, including mangroves and coral reefs, probably contributed to a higher impact of the tsunami. Smaller islands in the coastal region of Thailand were affected differently – primarily due to the state of the coral reefs around their coasts. Vietnam has minimized the impacts of typhoon that lash its coasts by replanting and preserving the mangroves along its coasts.

Another major issue now confronting local and national governments in the affected countries is that of waste management. The challenge will be to handle debris and rubble from the tsunami in an environmentally friendly way. Climate change is indeed a cause – hydrological and meteorological causes of disasters will have to be closely looked into, and incorporated in disaster management plans being drawn up by governments and communities.

We have only now come to realize that taking care of our natural resources and managing them wisely not only assures that future generations will be able to live sustainably, but also reduces the risks that natural and man-made hazards pose to people living today. These can be done in concrete ways at the local level – including building codes, urban planning standards and regulations, land use planning etc. Around the world, a growing share of the devastation triggered by 'natural' disasters stems from ecologically destructive practices and from putting ourselves in harm's way. Many ecosystems have been frayed to the point where they are no longer able to withstand natural disturbances. Comprehensive understanding of natural systems coupled with the application of management tools such as environmental evaluation and risk assessment can make a major contribution to a reduction of risks and mitigation of any impacts.

There is a need to highlight the role that comprehensive environmental management can play in reducing the risk of disasters, and to mitigate the consequences if they should nevertheless occur – both on human lives and on the broader ecology. Specifically, we need to examine the need for a multi-stakeholder partnership that links local governments, private sector entities, and civil society organizations in order to facilitate more effective disaster prevention and mitigation. We need to compare successful partnership models between

corporations, communities and the government, examining the way entities prepare for disasters themselves, as well as the need to be part of a larger partnership that strengthens local communities' ability to prevent, mitigate and recover from disasters.

Much work needs to be done in facilitating a sustained dialogue between different decision makers in the fields of both disaster and environment at global, regional and national levels. This dialogue will stem from raising greater awareness of the interface between disaster risk and environmental change, and identifying gaps in the understanding of critical hazards and risks at the local level.

Experience so far has shown that the increasing frequency and severity of man-made and natural disasters may well be changing the global environment. All of these threats to the environment have been apparent in recent disasters. The responses to disasters is based on the premise that disasters affect the environment when they have direct or indirect effects on ecology and human settlements that last far beyond the scope of immediate humanitarian response. Changing ecological conditions can provoke emergencies by placing concurrent stresses on the environment. Mitigating the effects of disasters are primary components in global efforts to ensure environmental security.

It is clear that further coordination and cooperation on environmental matters depends on our ability to set an environmental agenda for disaster management. In particular, well formulated strategies on disasters can help the United Nations to pay attention on environmental conditions that lead to disasters, and to natural resource management for disaster prevention and reduction.

There is a clear need to reinforce the importance of environmental concerns in the entire disaster management cycle of prevention, preparedness, assessment, mitigation and response and to integrate environmental concerns into planning for relief, rehabilitation, reconstruction and development. Risk reduction and environmental management are intrinsically linked, and this means that we need to look to at the environment as a protective investment for disasters.

Three key focal areas highlighted during the session related to those on:

- **GOVERNANCE:** Develop a set of by-laws, regulations, rules related to environmental management, which will specifically assist in effective management of hazards and disaster risks.
- **EDUCATION:** Raise awareness and educate decision-makers at all levels – local, regional and national – to incorporate and link environmental concerns within the disaster management plans being developed at the level.
- **TECHNOLOGY:** Facilitate transfer of technology and best practices (including strategies, decision-making and assessment tools, information management systems etc.) to particularly enable developing countries to be better prepared for disaster that they face.

6

References and further information

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- World Conference on Disaster Reduction: <http://www.unisdr.org/wcdr/>
- UN Office for the Coordination of Humanitarian Affairs: <http://ochaonline.un.org/>
- United Nations Environment Programme : <http://www.unep.org/>

7

UNEP and Disaster Management³

Environmental emergencies are sudden-onset disasters or accidents resulting from natural or man-made factors or a combination of the both factors that cause or threaten to cause severe environmental damages as well as loss of human lives and property. Human populations are suffering from such environmental emergencies. Natural disasters -- floods, droughts, cyclones, earthquakes are occurring all over the world with increasing frequency and severity. Technological accidents -- chemical releases, oil spills and nuclear leakage, etc. continue to happen despite the efforts made. Furthermore, the number and complexity of emergencies involving a combination of natural and man-made elements are also growing.

This situation requires UNEP to develop a strategy for dealing with emergency prevention, preparedness, assessment, mitigation and response.

Further, the document serves as a generic and rolling framework which will be subjected to regular revisions consonant with new and emerging international and global agenda on disaster prevention, preparedness, assessment, mitigation and response.

At its fifth special session held in May 1998, the Governing Council, in its decision SS.V/2, identified environmental information, assessment and research, including environmental emergency response capacity and the strengthening of early warning and assessment functions, as areas of concentration for the activities of UNEP. Subsequently at its 20th session held in February 1999 in its decision 20/8, the Council requested the Executive Director to focus and strengthen the contribution of UNEP's environmental expertise to the coordination of United Nations system-wide responses to disasters.

At the sixth special session of the Governing Council/ the First Global Ministerial Environment Forum, held in May 2000 in Malmö, Sweden, the Governing Council identified increasing environmental emergencies as one of the environmental threats that needed to be addressed and expressed support for UNEP's activities in response to environmental emergencies.

UNEP's overall programmes on the environment are actually long-term measures that intuitively address the issue of environmental emergency prevention. Decisions by the Governing Council of UNEP in respect of emergency prevention, preparedness, assessment, mitigation and response therefore solidly enhance and refine UNEP's mandate. As the impact of environmental emergencies has become more pronounced and as global responses to emergencies have received more attention from within the United Nations, the function of UNEP has grown increasingly important. UNEP's special mandates, to assess global environmental conditions in order to identify potential environmental problems and new ways to address the complex effects of environmental change on sustainable development and to underscore the transnational character of the global environment agenda, require UNEP to pay particular attention to the broad causes and effects of environmental emergencies.

³ This chapter is extracted from UNEP's Strategic Framework on Emergency Prevention, Preparedness, Assessment, Mitigation and Response, July 2004.

In defining the future role for UNEP within United Nations emergency-related activities, the following goals are paramount: to reinforce the importance of environmental concerns in emergency prevention, preparedness, assessment, mitigation and response; to integrate environmental concerns into planning for relief, rehabilitation, reconstruction and development; bring to the attention of the United Nations and its partners and national governments the transnational and global environmental aspects of emergencies; and to enhance UNEP's capacity to undertake short and medium-term activities in environmental emergencies based on long-term environmental considerations.

Each of these goals is intended to strengthen not only the capacity of UNEP, but also the capacity of peoples and countries to prepare for emergencies, survive catastrophes, manage resources to sustain development and deploy resources to ensure the security of the environment.

Building on its current resources and strengths, UNEP's primary role in emergencies is to marshal intellectual resources to ensure that the environmental aspects of emergencies are clearly understood and that the imperatives for prevention and preparedness, including assessment and early warning, are fully recognized as critical to human and environmental security. To develop and maintain an environmental agenda for emergency prevention and preparedness, UNEP must translate its sectoral responsibilities into a broader capacity to act as a think tank for the United Nations on environmental matters. This effort requires four concurrent investments by UNEP: developing methodologies for early warning, undertaking environmental assessments of past and current emergencies, in collaboration with OCHA, other UN agencies and partners, building and maintaining analytical capacity through training, and reinforcing institutional structures that can help to prevent emergencies and alleviate their effects.

All of these concurrent investments should underscore UNEP's role in the development of an agenda for environmental emergency prevention, preparedness, assessment, mitigation and response.

UNEP's mandate for action with respect to environmental emergencies and environmental aspects of complex emergencies stems from decisions of the Governing Council, requests of governments and availability of resources. As part of UNEP's overall reform and revitalization process, increased importance has been given to environmental emergencies and the strengthening of UNEP's capacity in the area of emergency prevention, preparedness, assessment, mitigation and response.

UNEP's agenda for action, which will strengthen its environmental emergency capacity, focuses on prevention and preparedness, assessment and early warning, mitigation and Response, communications, and publicity and resource mobilization.



Appendix : Power Point Presentations of 5 Panelists

Gerhard Putnam-Cramer, UN-OCHA

The importance of environment in humanitarian assistance


Gerhard Putnam-Cramer
Chief, Emergency Services Branch and
Deputy Director, Natural Disaster Policy
OCHA

World Conference on Disaster Reduction
Kobe, Japan 19 January 2004


Contents

- Purpose
- A comprehensive approach
- Environment-humanitarian links
- Joint Unit in Practice: OCHA-UNEP collaboration
- Partnerships and disasters
- The way forward





Purpose

- Give perspective on the link between environment and humanitarian assistance.
- Use opportunity presented by WCDR to further strengthen current efforts.

Introduction: risk mitigation requires comprehensive approaches

- Effective humanitarian assistance must integrate variety of disciplines, including environment.
- Preparedness, prevention, response preparedness and response must also be linked (e.g. lessons can support prevention, preparedness).
- Effective preparedness requires that these links be established before a disaster.




Environment - humanitarian assistance links: examples

- Industrial & Technological Accidents
- Forest Fires
- Natural disasters
- Combinations of technological / natural events (e.g. earthquake damage)
- Environmental impacts from complex emergencies (e.g. IDP camps)




Environment in humanitarian assistance operations

Immediate

- e.g. acute waste, industrial issues relevant to human lives and response efforts



Medium-long term

- Important but non-acute issues – recovery, rehabilitation





Institutional overview

- OCHA has U.N. response mandate, UNEP has specialized expertise.
- Governments create Joint UNEP/OCHA Environment Unit to address acute response phase environmental issues.
- UNEP & development agencies deal with longer-term recovery and rehabilitation issues.



Joint Unit and Response

- Created by governments in 1994.
- Mobilize & coordinate response to *technological disasters, and natural disasters with major environmental impacts*.
- Integrate humanitarian assistance and environmental perspectives in response.



Joint Unit: Global partners and reach

World map showing global reach of Joint Units with callouts to various regions and issues.

- UN agencies
- NGOs
- Private sector
- National governments
- Regional commissions
- forest fires
- conflicts
- mining tailings leak
- fuel spill
- pesticides
- floods
- dam/petto collapse
- tsunamis



Recent Joint Unit Action

- Tsunami Crisis
- Caribbean Hurricanes
- Darfur crisis
- DR Congo
- Philippines
- Tanzania
- ✓ Joint Unit ensures acute environmental issues are addressed in humanitarian response.



'Bridging gaps' through Partnerships

- OCHA-UNEP Environmental Emergencies Partnership (EEP)**
- Ensures better collaboration between stakeholders & across disciplines
 - Links prevention, preparedness and response.
 - Focus is on practical action that respond to partner needs.



EEP in practice

- **Practical projects**
 - Newsletter, training, harmonizing emergency reporting
 - New partners: governments, research institutes, private sector...
 - Invitation to assist Environmental Emergencies Center development.
- **Catalyst for action**
 - Build multi-disciplinary networks & dialogue: e.g. UNHCR, CARE, UNV...
- **EEP & tsunamis**
 - Range of activities proposed with partners.



Much remains to be done: WCDR is where the work can start.

- Disasters increasing in frequency and magnitude with majority of impact on world's poorest.
- Countries and stakeholders want integrated & collaborative approaches.
- Need to build on what is in place.



Next steps

- Specific action for increased coordination and collaboration.
- Opportunities: incorporating lessons from past emergencies into prevention, preparedness.
- Bringing partners together to address 'forgotten emergencies.'
- Engaging non-traditional partners e.g. private sector





Contact information


- Joint UNEP/OCHA Environment Unit
 - www.unep.org/ehp/
- Environmental Emergencies Partnership
 - www.unep.org/emep/

Lolita Bildan, ADPC

Climate Change and Disasters

Climate Change and Disaster Risk Management

Lolita Bildan, Project Manager, Climate Risk Management
Asian Disaster Preparedness Center



Asian Disaster Preparedness Center

Climate Change and Disasters

Climate change implications on disaster risks

- Alteration of the mean state of climate
- Increased frequency and intensity of extreme climate events
- Combination of I. and II.
- Climate surprises (i.e. emergence of historically unexpected and sudden climate change-induced patterns)



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Climate Change and Disasters

For anticipated risks:

Draw on experiences of human systems in dealing with **current climate variability and extremes** to provide guidance in designing adaptation strategies

For unanticipated risks:

Draw on experiences of human systems in dealing with **extreme climate events of rare severity** to provide guidance in designing adaptation strategies



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Climate Change and Disasters

Constraints in managing climate change risks

- ◆ Uncertainties associated with physical climate modeling
- ◆ Uncertainties in socio-economic projections (population, economic, technological development) in the next 50-100 years
- ◆ Demands of present day development concerns vs. risks at a distant future

However these should not be cause for non-action.



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Practical approach to address constraints

Addressing risks associated with **present day climate variability** would enhance capacity of vulnerable communities to withstand **future climate change** impacts.



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Climate Change and Disasters

Issues to be addressed

- ◆ Trends in environmental degradation
- ◆ Limitation of human systems to address climate variability-associated risks
- ◆ Kind of policy changes, institutional mechanisms, strategies and practices required to address gaps in making communities resilient
- ◆ Limitation of strengthened coping mechanisms to withstand high amplitude variability due to climate change
- ◆ Priority actions/measures to overcome limitations




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Climate Change and Disasters

ADPC approach:

Demonstrate the value of applying climate information derived from past climate analogs, currently available climate information at different time scales, and results from climate change models, wherever locally actionable at the community level, through demonstration projects in high-risk areas and, through this process, promote replication through policy advocacy.




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Climate Change and Disasters

Three pronged strategy for enhancing adaptive capacity:

- Utilizing recent extreme climate event analogs (to evaluate if coping mechanisms are able to withstand higher amplitude climate variability)
- Utilizing advanced climate forecast information (to provide experience in managing risks from current climate variability)
- Utilizing results from climate change models (particularly where known impacts lead to a certain direction (e.g. glaciers retreat in Nepal as a result of continued warming))




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Climate Change and Disasters

ADPC's operational program:

End-to-end Climate Information and Application System



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Climate Change and Disasters

ADPC's operational program:




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Climate Change and Disasters

Countries of work

- ◆ Climate forecast applications for disaster mitigation
 - Indonesia (agriculture: rain irrigated systems; food security)
 - Philippines (agriculture: rainfed and hybrid irrigated systems; resource optimization)
 - Vietnam (agriculture: rainfed systems)
 - Bangladesh (agriculture: extending early warning systems; flood management)
 - India (wildfires; drought management)
- ◆ Climate change adaptation
 - Indonesia, Philippines, Vietnam (use of past 1000 climate variation archive and temperature and precipitation trends for evading community-based adaptation practices)
 - Bangladesh (use of past extreme climate events archive, available climate forecast information at all time scales, and climate change modeling results (RCPs and PRCPs) in generating probabilistic climate information for transitions to climate change impacts, and then to agricultural response options and livelihood adaptation practices)



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Climate Change and Disasters

Partners

- Global: International Research Institute for Climate Prediction (IRI); Earth and Atmospheric Science, Georgia Institute of Technology (GATECH, Atlanta)
- Indonesia: BMG, Bogor Agricultural University, Ministry of Agriculture, local government
- Philippines: PAGASA, Department of Agriculture, National Irrigation Administration, IACWCM, local government
- Vietnam: IMR, AIC, CRC, local government
- Bangladesh: BMD, FFWC, IWM, DAE, DMD/MDMR, CEGIS, CARE, FAO
- India: IMD, State and local governments



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Climate Change and Disasters

Candidate Pilot Sites

Diversity of climate-related problems
Participatory site selection with regional partners




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Children and young people as partners for sustainable development and community risk management



Cuba  Save the Children

Background: Context




- Save the Children UK
- Cuban Context
 - Socialist system since 1959
 - IMR 7 per 1000 live births
 - Life expectancy: 75
 - Literacy rate: 97%
 - Model disaster preparedness system. Since 1995 7 hurricanes, 16 deaths
- Save the Children in Cuba - 1994
 - Priority areas: Environmental education, social disadvantage, emergencies.

The environmental education programme 1997 - 2004

- Environmental Mission: Agenda 21 by children and young people, 97 - 99
- Umbrella Programme: Supporting National Strategy for Environmental Education, 2000 - 2002
- Environmental Education for Coastal communities: Research in Action in Local Communities 1997 - 2000 - 2005
- Participatory review, 2004
- Children consultation of National Environmental Strategy, 2005

Aim: Involving children and young people in sustainable development actions



Locations: Havana, Puntarenas, Pinar del Rio, 11 protected areas, Matanzas, Pinar del Rio, Sancti Spiritus, Matanzas. 19,000 children involved

The environmental education programme

Main elements

- Research to action
- Advocacy
- Inclusion: Handicapped & vulnerable children.
- Formal and non-formal education
- Advocacy
- Partnership

Global environmental problems are our problems: Let's act.



The risk reduction programme 2000 - 2005

AJRM: Involving children and young people in community risk management

Let's be prepared: including disaster preparations lessons in schools. *Holgón 2000 - 2005*

We are prepared, listening to the water: flooding. *Holgón 2001 2003*

We are prepared, listening to the earth: walls, risk, gender and peer education. *Holgón and Guantánamo 2003 2004*



Locations: Materas - Barrio de Tanamo and Materas Municipalities in Holguín and Puntarenas provinces

Main programme activities



E&P Gender Multirisk Peer education

Partnership

PRINCIPLES

- Transparency
- Mutual decisions
- Accountability
- "People's Power" - All work hand in hand

CHILDREN AND YP AS PARTNERS

- Right to be part of the decisions that affect them
- Give voice to all groups. Children are the best way to change
- Empowerment for the future and the present in the growing environment and risk reduction
- Participative according to age in a capacity building process.
- Have control the ongoing policies, strategies and activities.
- Children are good communicators that reduce risk behavior change
- Young people capacity for following policies.
- Directed from research to action.




Ministry of Environmental - Civil Defense
Ministry of Education - Schools
Ministry of Science, Technology and Information - National Agency for Environmental Defense - ECHO, ECHO, ECHO

Children and Young People

ACHIEVEMENTS

- International agreements disseminated
- Effective participation of children and young people in environmental and community risk management as a consequence of research
- Documentation of experiences and publication of educational materials.
- Children voices heard by decision makers.
- Methodologies for inclusion, children participation, gender, peer education,
- Influencing and accompanying National Policies
- Risk behavior on earthquakes and flooding changed.
- Integration of environment and risk reduction approach.
- Contribution to the Cuba disasters preparedness system at the community level.



United Nations
World Conference on Disaster Reduction

Environmental Management Systems for Risk Reduction

Iksan van der Putte
International Federation of Consulting Engineers

UNEP Session: "Environmental Management and Disaster Reduction: Building a multi-stakeholder Partnership"
Kobe, 19 & January, 2005

RPS

About the International Federation of Consulting

Founded in 1913, FIDIC membership today numbers 72 National Member Associations representing some 650 000 professionals

FIDIC collaborates with UNEP, ICC (International Chamber of Commerce), ICLEI (International Council for Local Environmental Initiatives) in the development and dissemination of EMSs for industrial facilities and for urban administrations

RPS

Environmental Management Systems and Risk Reduction

If properly applied an EMS might contribute to not only

- ⇒ reducing the risks and impacts of natural and technological hazards, but may also
- ⇒ avoid the creation of some of those risks in the first place

RPS

Environmental Management Systems and Industrial Accidents

Historical background

- ⇒ Regulatory control instruments could not prevent industrial disasters (Bhopal, Seveso, Basko)
- ⇒ Voluntary instruments, including EMSs, received increasing support
- ⇒ Most common tools are the certifiable
 - ISO 14001 system
 - EMAS

RPS

Environmental Management Systems and Industrial Accidents

RPS

Developments in Environmental Management Systems

- ⇒ ISO 14001 Certificates (world-wide): 66 070 (end 2003)
- ⇒ EMAS registrations: more than 4000 (end 2004)

At the start only industrial organizations joined the schemes, now more and more other organizations are participating, (service sector, governmental sector, including local authorities)

RPS

Actions needed to improve EMSs as a tool for Disaster reduction and Sustainable Development

- Most EMSs concentrate on own activities and processes
- EMSs should include (sustainable) projects and programmes within its scope
- New tools are required to improve and evaluate the sustainability of projects and programmes
- A multi-stakeholder approach is required with combined efforts of partner organisations. FIDIC has made a start with its PSM guidelines

RPS

The Project Sustainability Management Process in the FIDIC PSM guidelines

RPS

Season 4.5
WCOR

Disaster Risk Reduction Partnerships in the Financial Sector

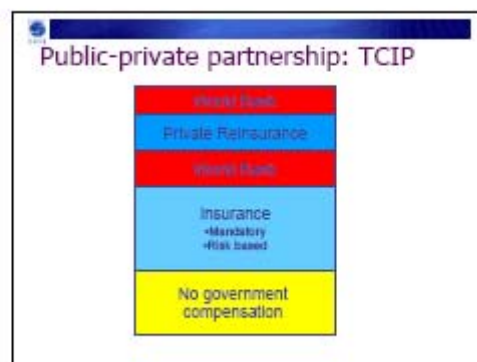
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What financial instruments are available for developing countries?

- ◆ Private sector
 - Insurance
 - Weather hedges
 - Micro-insurance
- ◆ Public sector
 - Contingent credit
 - Catastrophe bonds

But how can these instruments be made affordable?



How can financing reduce risks?

- ◆ Micro-insurance: Can give security needed to heed warnings;
- ◆ Public-private partnerships appear better than commercial insurance alone
 - TCIP: incentives for retrofitting
 - NFIP: communities required to take measures

Public sector losses: Vulnerable governments can transfer risks. International assistance can be linked directly to physical protection (new form of donor assistance).

Example
Honduras

Event (year)	Government losses (USD)	Insurance financing (USD)
10	~800	~100
50	~800	~200
100	~800	~400
500	~1200	~1000

Why assisted risk transfer and not traditional international donor aid?

- ◆ Focuses attention on risks before disaster – development planning;
- ◆ Provides secure planning horizon for country – encourages investment;
- ◆ Can be explicitly linked to disaster prevention.

Summary

- ◆ Mitigation first
- ◆ Financial instruments have potential for developing countries, but high associated costs;
- ◆ Need solidarity/partnerships in the national/international community to make risk transfer affordable;
- ◆ High benefits in terms of risk reduction.



www.iiasa.ac.at

About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:

- > sustainable consumption and production,
- > the efficient use of renewable energy,
- > adequate management of chemicals,
- > the integration of environmental costs in development policies.

The Office of the Director, located in Paris, coordinates activities through:

- > **The International Environmental Technology Centre - IETC** (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
- > **Production and Consumption** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- > **Chemicals** (Geneva), which catalyzes global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- > **Energy** (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- > **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- > **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

UNEP DTIE activities focus on raising awareness, improving the transfer of knowledge and information, fostering technological cooperation and partnerships, and implementing international conventions and agreements.

For more information,
see www.unep.fr

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Around the world, a growing share of the devastation triggered by 'natural' disasters stems from ecologically destructive practices and from putting ourselves in harm's way. Many ecosystems have been frayed to the point where they are no longer able to withstand natural disturbances.

The main message coming out of the session held during the World Conference on Disaster Reduction in Kobe on 19 January 2005 was that comprehensive understanding of natural systems, coupled with the application of management tools such as environmental evaluation and risk assessment, can make a major contribution to a reduction of risks and mitigation of any impacts. An important aspect is the involvement of a broader range of partners in such a process, and to fully engage the resources and interests of the private sector in prevention and mitigation.