

Disaster Reduction and Sustainable Development

Understanding the links between
vulnerability and risk to disasters
related to development and environment

*This background paper was developed in a participatory
manner and was a contribution to the process leading to the
World Summit on Sustainable Development
(Johannesburg, 26 August - 4 September 2002).*



United Nations
International Strategy for Disaster Reduction



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United Nations
International Strategy for Disaster Reduction

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“ Communities will always face natural hazards, but today’s disasters are often generated by, or at least exacerbated by, human activities. At the most dramatic level, human activities are changing the natural balance of the earth, interfering as never before with the atmosphere, the oceans, the polar ice caps, the forest cover and the natural pillars that make our world a livable home. But we are also putting ourselves in harm’s way in less visible ways. At no time in human history have so many people lived in cities clustered around seismically active areas. Destitution and demographic pressure have led more people than ever before to live in flood plains or in areas prone to landslides. Poor land-use planning; environmental mismanagement; and a lack of regulatory mechanisms both increase the risk and exacerbate the effects of disasters.”

Kofi Annan¹

Millennium Goal:

“To intensify our collective efforts to reduce the number and effects of natural and man-made disasters.”

Placed under section IV. Protecting our common environment

Road map towards the implementation

of the United Nations Millennium Declaration²

¹ 2002, UN Secretary-General, Foreword to “Living with Risk: A global review of disaster reduction initiatives,” ISDR.

² 2001, Secretary-General Report to GA A/56/326.

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Disaster Reduction within the WSSD Process

Background documentation on disaster risk reduction for WSSD

The present paper builds on the official Background paper No 5, *Natural Disasters and Sustainable Development: understanding the links between development, environment and natural disasters*, presented to PrepCom2 in January 2002. It was compiled by the ISDR Secretariat in collaboration with experts, practitioners and many UN agencies, among them UNDP, UNEP, UN-Habitat, WMO, UN/DESA and UN/OCHA. The current version, has been revised and expanded based on contributions from 350 participants from 80 countries who participated in an **online debate**, organized for the period 15 April-9 May, by the Stakeholders Forum for our Common Future and the ISDR Secretariat (see www.unisdr.org).

It was also reviewed and commented on by many individual experts, including:

- Participants at the fourth and fifth meetings of the Inter-Agency Task Force on Disaster Reduction (Geneva, November 2001, and April 2002);
- Participants at the expert meeting on Environmental Management and Disaster Risk Reduction: a Gender Perspective (Ankara, 6-9 November 2001);
- Experts attending the Hemispheric Conference on Disaster Risk Reduction (Costa Rica, 4-6 December 2001);
- Participants of the Asian meeting on the ISDR in New Delhi, 24 January (organized by the governments of Japan and India);
- Members of the IATF Working Group 4 on Wildland Fire (Freiburg, 8-9 March 2002);
- Experts at the meeting on Early Warning and Sustainable Development (Bonn, 11-12 March 2002, organized by the German Committee on Disaster Reduction-DKKV); and
- Many individual experts, among them Charlotte Benson, Camilo Cardenas, Juan José Castro Chamberlain, Irene Dankelman, Ian Davis, Yianna Lambrou, Haris Sanahuja, Ben Wisner.

A side event on “Disaster Risk and Sustainable Development—Reducing Vulnerability to Natural Hazards” was organized by the ISDR Secretariat during the last and fourth PrepCom held in Bali, Indonesia, 28 May 2002. Panelists from IFRC, UNDP, WMO, DKKV-Germany, Ecuador and the Stakeholder Forum for our Common Future discussed the topics covered in this paper.

The preliminary version of *Living with Risk: A global review of disaster reduction initiatives*, undertaken by the ISDR secretariat with support from partners, was launched on 9 August in Tokyo. The publication and CD-ROM were distributed at WSSD and to governments, UN agencies and experts, as part of the promotion of the subject and the consultation process (available at: www.unisdr.org, www.eird.org).

Follow-up expected:

- During 2003-2004, a process will take place to review the achievements and shortcomings in the field of disaster reduction since the adoption of the Yokohama Plan of Action for a Safer World (1994). This process is expected to evolve into new and enhanced guidance in this field, building on the Millennium Development Goals and the Programme of Implementation of Johannesburg. A participatory review and formulation process at national, regional and global/thematic levels is being planned for 2003-2004.
- At its 57th Session, the United Nations General Assembly requested the Secretary-General to provide specific proposals to Member States for the implementation of the actions on this matter agreed to by WSSD (A/Res/57/256 paragraph 3). The Inter-Agency Task Force on Disaster Reduction and the Inter-Agency Secretariat of the ISDR are following-up on this request.

Disaster Reduction and Sustainable Development: Understanding the Links between Vulnerability and Risk Related to Development and Environment



4

1. *Can sustainable development, along with the international strategies and instruments aiming at poverty reduction and environmental protection, be successful without taking into account the risk of natural hazards and their impacts? Can the planet afford the increasing costs and losses due to so-called natural disasters? The short answer is, no.*
2. *Disaster reduction policies and measures need to be implemented to build disaster resilient societies and communities, with a two-fold aim: to reduce the level of risk in societies, while ensuring, on the other hand, that development efforts do not increase the vulnerability to hazards but instead consciously reduce such vulnerability. Disaster and risk reduction is therefore emerging as an important requisite for sustainable development.*
3. *The Secretary General, in his report on Strengthening of the United Nations: an agenda for further change,³ paragraph 40, states: "I also believe that we need to be better prepared for natural disasters and incorporate disaster risk management into our poverty reduction, development and environmental strategies."*

³ Report of the Secretary General (prepared in the context of his comprehensive review of the work of the Organization of the United Nations), A/57/387.

I. Disaster Impact on Development

4. During the past four decades, natural hazards such as earthquakes, volcanic activity, landslides, tsunamis, tropical cyclones and other severe storms, tornadoes and high winds, river floods and coastal flooding, wildfires and associated haze, drought, sand/dust storms, and insect infestations have caused major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damage. Economic losses have increased almost 10 times⁴ during this period. In recent years, floods in Algeria, Bangladesh, Ethiopia, Guinea, India, Mozambique, Nigeria, Sudan, Thailand, Venezuela and Vietnam, volcanic eruptions in Ecuador, Democratic Republic of Congo, Indonesia, Montserrat, and the Philippines, and earthquakes in Afghanistan, El Salvador, India, Indonesia, Japan, Peru and Turkey, have created widespread social, economic and environmental destruction. In some cases, natural disasters can amplify man-made emergencies or vice versa, as epitomized by the drought, earthquakes and unfolding events in Afghanistan.
5. The escalation of severe disaster events triggered by natural hazards and related technological and environmental disasters is increasingly threatening both sustainable development and poverty-reduction initiatives. The loss of human lives and the rise in the cost of reconstruction efforts and loss of development assets has forced the issue of disaster reduction and risk management higher on the policy agenda of affected governments as well as multilateral and bilateral agencies and NGOs. This trend led to the adoption of the International Strategy for Disaster Reduction (ISDR)⁵ by governments to succeed and promote implementation of the

Floods in 2002- affected over 17 million people worldwide

(29 August 2002, WMO) Floods in more than 80 countries have caused hardship for more than 17 million people world-wide since the beginning of 2002, according to the World Meteorological Organization (WMO). Almost 3,000 people have lost their lives while property damage is amounting to over thirty billion US dollars. The total area affected by the floods is over 8 million square kilometres, almost the size of the United States of America.

At any time throughout the world a river somewhere is in flood and its waters are threatening communities, their property and even their lives. Few of these events are reported in the headlines due to their local impact. However, the floods in Central Europe and China have drawn international attention. At the other end of this extreme water overload are droughts that have been and are still occurring around the world at the same time.

Droughts and floods both have major impacts on the socio-economic well being of countries. In some cases, countries experience both extremes simultaneously as is currently occurring in India and Niger. Serious droughts are occurring in the SADC countries of southern and central Africa, which is resulting in starvation and global outcry for food aid. In North America, over 37% of the United States are suffering from a severe drought with the longest-lived drought in the southeastern states.

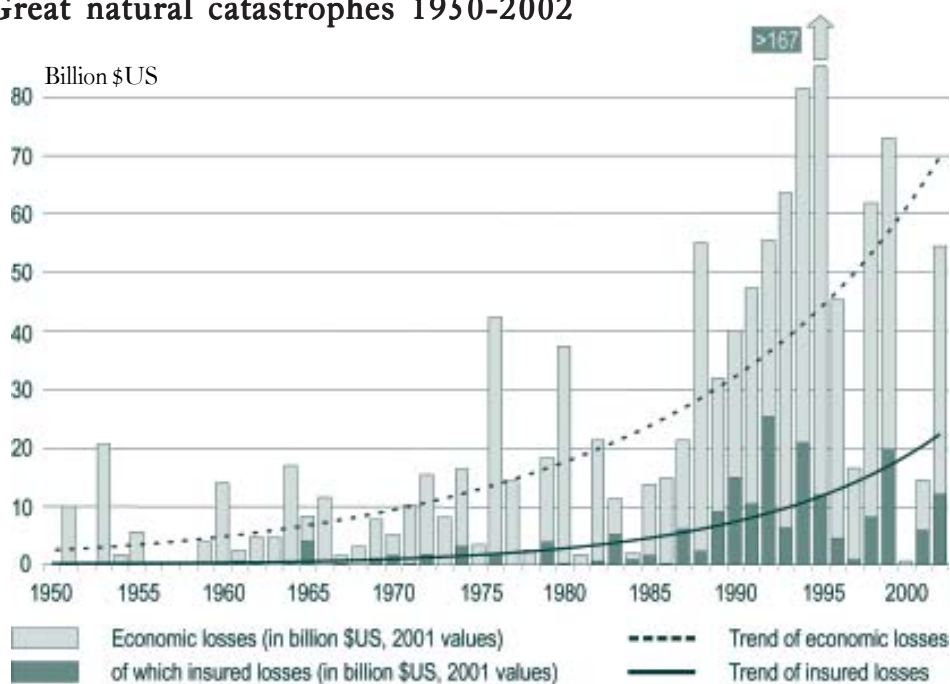
A delayed monsoon in India has resulted in unseasonably hot and dry conditions throughout northern and western parts of the country; its impact is a 10 million-ton drop in India's rice crop. Australia is stricken by severe rainfall deficiencies across eastern portions of the country, resulting in serious crop loss and a need for drought aid packages to farmers.

⁴ Munich Re Topics 2000, Natural Catastrophes—the current position.

⁵ Resolution, UN General Assembly 54/219.

recommendations emanating from the International Decade for Natural Disaster Reduction (IDNDR, 1990-1999). The aim of the ISDR is to mobilize governments, UN agencies, regional bodies, the private sector and civil society to unite efforts in building resilient societies by developing a culture of prevention and preparedness. The Secretariat of the International Strategy for Disaster Reduction (UN/ISDR), which falls under the direct authority of the Under-Secretary-General for Humanitarian Affairs, was established together with the United Nations Inter-Agency Task Force (IATF) on Disaster Reduction,⁶ as the international mechanisms to coordinate the development and implementation of the ISDR.

Great natural catastrophes 1950-2002



Source: Munich-RE, 2003

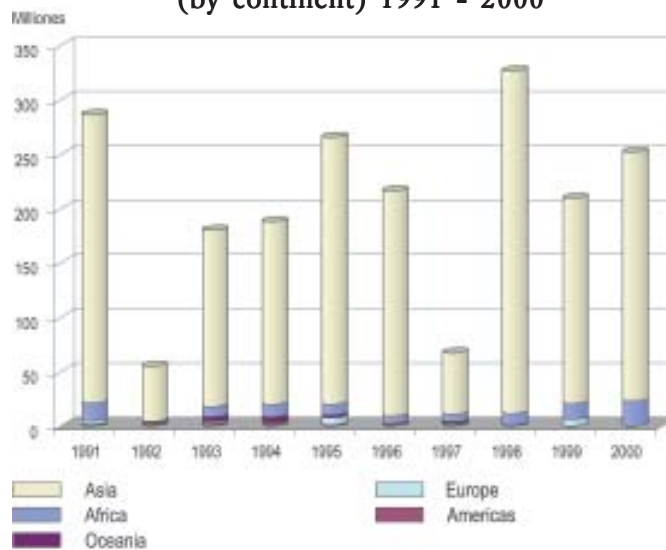
6. In addition to the projected estimate of 100,000 lives lost each year due to natural hazards, the global cost of natural disasters is anticipated to exceed \$300 billion annually by the year 2050,⁷ if the likely impact of climate change is not countered with aggressive disaster reduction measures. The environmental impact of natural hazards, in particular the loss of environmental services (water, forest, biodiversity, ecosystem function, etc.), is still difficult to assess and is often underestimated. Indirect economic losses of 'market share,' following the disruption to trade after a disaster, can also go largely unnoticed. For example, almost seven years after the Great Hanshin-Awaji earthquake (1995) in Kobe, Japan, devastated the facilities of one of the country's primary ports, the equipment and harbor facilities have all been rebuilt and modernized, yet the amount of shipping trade in Kobe has dropped by about 15 percent from pre-earthquake revenues.⁸

⁶ By UN General Assembly resolution 54/219, on 3 February 2000, reconfirmed in resolution 56/195, January 2002.

⁷ SEI, IUCN, IISD: Coping with Climate Change: Environmental Strategies for Increasing Human Security, August 2001 (Source: Munich Re and UNEP).

⁸ Asian Disaster Reduction Centre, Kobe, November 2001.

Total Numbers of people affected by Disasters (by continent) 1991 - 2000



Source: EM-DAT, CRED, University of Louvain, Belgium.

7. While no country in the world is entirely safe, lack of capacity to limit the impact of hazards remains a major burden for developing countries. An estimated 97 percent of natural disaster-related deaths each year occur in developing countries⁹ and, although smaller in absolute figures, the percentage of economic loss in relation to the Gross National Product (GNP) in developing countries far exceeds that in developed countries. This fact becomes even more relevant for small-island developing States (SIDS). In addition, 24 of the 49 least developed countries still face high levels of disaster risk; at least six of them have been hit by between two and eight major disasters per year in the last 15 years, with long-term consequences for human development.¹⁰ These figures would be much higher, and some experts estimate at least double or more, were the consequences taken into account of the many smaller and unrecorded disasters that cause significant losses at the local community level. The chart also clearly demonstrates the considerable geographic variations in the occurrence and impact of natural hazards. Asia is disproportionately affected with approximately 43 percent of all natural disasters in the last decade. During the same period, Asia accounted for almost 70 percent of all lives lost due to natural hazards.¹¹ During the two El Niño years of 1991/92 and 1997/98, floods in China alone affected over 200 million people in each year.
8. While the world has witnessed an exponential increase in human and material losses due to natural disasters, there is an ongoing debate about the increase of the frequency and intensity of extreme hydro-meteorological events due to, in particular, climate change. There is, however, no evidence of more frequent or intense earthquakes or volcanic eruptions. For these geological hazards, the reasons for increased losses are found in the global rise of people's vulnerability, induced by currently determined paths of development. The effects of climate change and the risks posed by the increasing degradation of the environment, epitomized by deforestation, loss of biodiversity and associated knowledge, reduced water supply and desertification, can only contribute to increased concern on these issues. The capacity to cope with the impact of disasters is determined by a number of factors, including the composition and circumstances of the social group affected; for example, whether the group is rich or poor, male or female, young or old, able or disabled.

⁹ World Bank, World Development Report, 2000-1:170.

¹⁰ UNDP, ERD: Disaster Profiles of the Least Developed Countries, May 2001.

¹¹ EM-DAT database, CRED, 2002, see: www.cred.be

II. Need to Reverse Trends of Vulnerability to Natural Hazards

9. The emphasis on disaster response and humanitarian assistance has absorbed significant amounts of resources, which could have been allocated for development efforts. If this trend were to persist, coping capacities of societies in both the developed and developing countries are likely to be overwhelmed. In these circumstances, a practical alternative is to promote and broadly support local, national and regional programmes and initiatives, under the framework of the ISDR, to enable societies to become resilient to the negative impact of natural hazards and related environmental and technological disasters.
10. Vulnerability to disasters is, to a large extent, a function of human action (or inaction) and behaviour. It describes the degree to which a socio-economic system or physical assets are either susceptible or resilient to the impact of natural hazards. It is determined by a combination of several factors, including awareness of hazards, the condition of human settlements and infrastructure, the nature and application of public policy, the resources available to a given society, and organizational abilities in all fields of disaster and risk management. The specific dimensions of social, economic and political vulnerability are also related to inequalities, gender relations, economic organizations, and ethnic or racial divisions. In addition, vulnerability is largely dependent on development practices that do not take into account the susceptibility to natural hazards. The level of risk in relation to natural disasters in a society is determined by the level of vulnerability combined with the level of probability and intensity of the occurrence of a natural hazard. Risk reduction refers to activities taken to reduce both vulnerable conditions and, when possible, the source of the hazard (especially addressing drought, floods and landslides).
11. In order to tailor development policies that reduce vulnerability, it is convenient to review some of the global trends which convert exposure to natural hazards into disasters. These are all related, interdependent processes, dealt with elsewhere in Agenda 21¹², but they have not been sufficiently emphasized from a disaster risk reduction perspective. Lack of awareness amongst decision makers and the public about the factors and human activities that contribute to environmental degradation and disaster vulnerability are aggravating these trends.

- **Human vulnerability, environmental degradation and increasing impoverishment in developing countries**

12. There is a close correlation between increased demographic pressure, especially in developing countries (and most notably in the least developed countries), growing environmental degradation, increased human vulnerability and the intensity of the impact of disasters. Detrimental development and inappropriate use of resources are contributory factors to natural disasters. They can accelerate or amplify recurrent phenomena such as droughts. Environmental degradation increases the intensity of natural hazards, and is often the factor that transforms the hazard, or a climatic condition such as heavy downpour, into a disaster. For example, river and lake floods are aggravated by deforestation, which, in turn, causes erosion and clogs rivers. Floods or droughts leading to famines dislocate families who become refugees as they are forced to migrate elsewhere.

¹² Chapter 7: "Promoting sustainable human settlement development," Programme area E, F; Chapter 11: "Managing fragile ecosystems: Combating deforestation and drought"; Chapter 13: "Managing fragile ecosystems: sustainable mountain development," Prog. areas A and B; Chapter 17: "Protection of the oceans, all kinds of seas ...," Programme areas A and G; and Chapter 18: "Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources."

Poverty and hazard vulnerability are integrally linked and mutually reinforcing. The poor are forced to exploit environmental resources for survival, thereby increasing both the risk and exposure to disasters, in particular those triggered by floods, drought and landslides.

13. Sustainable and integrated management of natural resources, including reforestation schemes, proper land use and good management of rivers and coastal areas, will increase the resilience of communities to disasters by reversing current trends of environmental degradation. Globalization has increased the risks faced by the marginalized and excluded. Whilst no country is safe from natural hazards, lack of capacity to limit the impact of hazards remains a major burden for developing countries. Traditional coping mechanisms have come under severe pressure and adaptation strategies, once valid, are no longer appropriate. Globalization has weakened the organizational capacities that still exist in small towns and rural areas to deal with hazards by introducing dependency factors. Due to inequitable access to resources, poor people in developing countries are far more vulnerable to negative environmental changes than their wealthier counterparts, since they lack the means to cope and recover from the impact of such changes.
14. Deforestation, land degradation, and related food security are shaped by the practices of men and women who make livelihood decisions about how to use these resources. It can be claimed that the major impacts upon these issues are due to unsustainable western consumption patterns and investment decisions in the richer nations. In poorer communities, motivated by poverty, migration, illness, etc., these decisions may also have a profound impact on the environment. In some cases, rural development practices have marginalised and segregated farming and livestock which, in many cases, have turned agriculture into an independent area of economic growth, without linkage to economic and food security of the broader community.

The ecological footprint

Every human requires an area of land and shallow sea for food, water, shelter, transport, energy, commerce and waste. This is called an ecological footprint.

Demographic pressures result in more forest loss and more land degradation. This means increased flooding, drought, or both. In rich nations such as the US, this ecological footprint is almost 10 hectares per person. But even in the poorest places in the US this footprint is at least one hectare.

Every day, another 200,000 newborns will require up to 200,000 hectares of what might have been a benign and necessary wilderness. More people also means more fossil fuel consumption, which means more carbon dioxide emission, which means climate change.

Such a world, climate scientists have warned repeatedly, is a world with a greater frequency of extreme events. The combination of climate change and population growth will exact a price. The latest UN calculation is that three decades from now, around 70 per cent of the world's land will be affected in some way by human activity and half the people in the world will be short of water. Many of the other half will be at risk from increased flooding. By that time, there could be eight billion people on the planet.

Source: Living with Risk: A global review of disaster reduction initiatives, ISDR, 2002

15. Least developed countries are more vulnerable to natural hazards. They are subject to the highest rates of population growth, which is projected to double in less than 30 years. Poverty and social and economic pressures, such as migration, unemployment and illegal land tenure practices, make people more vulnerable by forcing them to live in dangerous locations, often on unsafe land and in unsafe shelters or low-cost dwellings, because there is no other land available at reasonable cost sufficiently close to employment opportunities. Disasters contribute to, and are also exacerbated by other factors that make people vulnerable, for example: unemployment, political instability, poor economic conditions, unequal distribution of wealth, food insecurity, lack of personal security, and violation of human rights. Repeated exposure to disasters can lead the poor into a downward spiral of chronic poverty, even though poverty alone is not the only vulnerability factor.

- **Trends related to climate change and disasters¹³**

16. In industrialized and transition countries, the non-sustainable overuse of resources causes pollution and ultimately leads to changes in the environment. In particular, there is an increasing likelihood of human-induced climate change,¹⁴ which, according to the latest projection of the Intergovernmental Panel on Climate Change, will result in more water-related disasters, especially for countries in tropical and subtropical latitudes. These changes in temperature and related local rainfall variations affect the environment through accelerated desertification, land degradation, and the availability of water resources, as well as reducing the overall agricultural output. There are adverse impacts on human well-being, for example, on people's health and the "slow death" caused by loss of livelihoods. In addition, climate change is expected to affect sea levels and cause climate extremes. All these factors have a compound effect on the occurrence and impact of disasters. On the one hand, they affect the intensity and frequency of extreme hydro-meteorological events, and on the other hand, they increase the vulnerability of societies. Particularly sensitive regions, such as mountainous and coastal zones, as well as island countries, are especially at risk.
17. A rise in sea-level will further exacerbate this situation in small islands and low-lying coastal areas. Storm surges may already have increased coastal erosion and damage to human settlements because of the removal of or damage to natural protective elements such as mangroves, reefs and dunes. It is known that more than one third of the world population live within 100 kilometers of coastlines and many are therefore under threat.
18. Wildland fires often occur as a consequence of extreme weather, such as droughts caused by El Nino. This can be detected and the effects predicted by existing systems for early warning and mitigation of fires. Previously, for many fire-dependent areas, the periodic fire occurrence was an integral part of the ecological development. Today, the human vulnerability and the devastating environmental effects of many wildfires are a result of demographic growth, land-use changes and climate variability. While the effects of devastating wildfires can be mitigated through early warning and local actions, wildfires are the one natural disaster that can be prevented through local actions that reduce the potential for occurrence. Mechanisms for developing community-based approaches exist but they are not widely applied. Resources to organize the transfer of technical knowledge and effective fire management networks to provide support to local communities are not sufficient.

¹³ Relates to the UN Framework Convention on Climate Change and the UN Convention to Combat Desertification.

¹⁴ IPPC, Intergovernmental Panel on Climate Change, Working Group II, 19 February 2001.

- **Migration and unplanned urbanization**

19. Rapid urban growth, particularly when it is accompanied by a large influx of poor migrants from rural areas, is one of the main factors contributing to increased vulnerability to natural hazards in many parts of the world. The accelerated, and often uncontrolled, growth of cities has contributed to the ecological transformation of their immediate surroundings (pressure on scarce land, deforestation, etc.). In addition, the lack of appropriate drainage systems makes some cities susceptible to flash floods and their populations to water-borne disease. Other factors contributing to the urban vulnerability include: lowering or rising of the water table; subsidence; loss of bearing capacity of soil foundations; and instability of slopes.
20. The destruction of natural resources is one of the factors that forces people to seek a new future elsewhere, for example, by migrating to urban areas or uncultivated regions. In the past three decades, the urban population of developing countries has tripled to 1.3 billion. The growth of large urban areas, especially the 'megacities' in the developing world, poses a new vulnerability, for example, in its proximity to earthquake- or flood-prone zones. In the 1990s, 60-70 percent of urbanization was illegal.¹⁵ More and more populations are forced, through lack of choice, to expand into disaster prone areas such as flood plains, unstable hillsides and deforested lands, therefore causing disproportionate setbacks to the economies and livelihoods of the affected communities and nations when disaster occurs.

- **Increasing infrastructure vulnerability**

21. Recent catastrophic earthquakes highlight other key deficiencies and trends in the approach to disaster risk reduction, such as a poor understanding by decision makers of seismic related risk, as well as the tendency of some builders to use the cheapest designs and construction materials available to increase short-term economic returns on their investment. At the Great Hanshin-Awaji Earthquake in Japan, 90 percent of immediate deaths (more than 5,000) were caused by the collapse of buildings. Another aspect of infrastructure vulnerability caused by natural hazards is related to energy production in hydroelectric power plants. For example, drought can cause problems for production of sufficient energy for the community, and floods are imminent if the dams are full and need to be emptied quickly.
22. By way of a domino effect, natural hazards can trigger technological hazards, which in turn can cause environmental and humanitarian disasters. In major industrial infrastructure areas, extreme natural hazards, such as earthquakes or floods, can result in environmental disasters, a fact not given enough consideration in some regions. This should be taken into account by carrying out environmental and human risk assessment.
23. Current trends towards a globalized society have made societies much more dependent on services and infrastructure "lifelines," in both urban and rural areas, including transportation, water and electric supply, gas, drainage, sanitation, storage facilities and communication networks. A failure of these services due to natural or other hazards can have considerable consequences even for people in areas not directly affected. The concentration of political, economic and other resources in an urban area can have national, regional and even international repercussions. More specifically, the impact of a natural (or other) hazard on an urban centre can have a far-reaching effect on a wide range of social groups in that environment. However, there is likely to be a particularly significant impact on women since female-headed households are often disproportionately represented in informal settlements found in urban communities.

¹⁵ UNCHS, Risk and Disaster Management Unit, Urban Development Branch: ISDR public awareness kit, September 2001.

III. Strategies for Development Policies to Reduce Vulnerability to Disasters

24. Disaster reduction strategies are aimed at enabling societies at risk to become engaged in the conscious management of risk and the reduction of vulnerability. The adoption of appropriate development policies can reduce disaster risk. These policies should be gender sensitive and need the necessary political commitment. They involve the adoption of suitable regulatory and other legal measures, institutional reform, improved analytical and methodological capabilities, financial planning, education and awareness. Risk reduction should be seen as a comprehensive process that goes beyond traditional response to the impact of individual national hazards. This process should be multi-sector and inter-disciplinary in nature and comprise a wide range of interrelated activities at the local, national, regional and international levels.
25. Based on the lessons drawn from the International Decade for Natural Disaster Reduction (IDNDR, 1990-99),¹⁶ four overriding objectives have been identified as the guiding principles of the International Strategy for Disaster Reduction.¹⁷ These overall objectives provide broad guidelines for action by national governments, civil society organizations, regional institutions and international organizations:
- **Obtaining political commitment from public authorities.** This objective needs to be addressed through increased intersectoral coordination at all levels, the adoption of risk management strategies and the allocation of appropriate resources, including the development of new funding mechanisms. Disaster reduction should be dealt with as a primary policy issue for which public authorities should assume responsibility and should be pursued as a cross-cutting issue aimed at ensuring policy integration among various sectors and across topics such as agriculture, food security, health and education.
 - **Increasing public awareness** and public participation to reduce vulnerability to hazards. This involves programmes related to formal and non-formal education and should be addressed through public information, education and multidisciplinary professional training. The media, schools and higher education systems, as well as organizations such as the Red Cross and Red Crescent and locally based NGOs around the world, have a crucial role to play.
 - **Fostering better understanding and knowledge of the causes of disasters** through the transfer and exchange of experiences and by providing greater access to relevant data and information. The issues to be addressed in this context are: the assessment and analysis of gender-specific socio-economic impact of disasters; the construction of databases on disasters; the formulation of suitable coping strategies for different social groups; the introduction of early warning systems; and the promotion of relevant scientific research, which takes into account both indigenous or traditional knowledge and the development and transfer of new knowledge and technologies. Efforts to link natural resource management with disaster reduction should also be encouraged.
 - **Stimulating interdisciplinary and intersectoral partnerships** and the expansion of risk reduction networking amongst governments at national and local levels, greater involvement of the private sector, academic institutions, the Red Cross and Red Crescent

¹⁶ Including the Yokohama Strategy adopted in 1994, the strategy document resulting from the 1999 IDNDR Programme Forum, entitled a "Safer World in the 21st Century", and the UNGA Resolution A/54/219.

¹⁷ ISDR Inter-Agency Task Force, Framework for Action for the Implementation of the International Strategy for Disaster Reduction, May 2001.

Societies, NGOs and community-based organizations (CBOs). This will require effective coordination mechanisms, such as appropriate institutional arrangements for disaster management, preparedness, emergency response and early warning, as well as the incorporation of disaster reduction concerns in national planning processes.

26. **Globalization:** The relationship between disaster and risk reduction and globalization will constitute a major challenge in the formulation of future disaster reduction strategies. The desire for quick economic returns and increasing deregulation often lead to increased vulnerability to disasters by encouraging unregulated construction, the inappropriate siting of important facilities, deforestation and the destabilizing of slopes for potential landslides. On the other hand, disaster and risk reduction measures are needed to protect investment trade opportunities, whilst ensuring that no new risks are created, and that business is not interrupted by preventable destruction due to natural hazards. In particular, more effective capacities and methodologies for assessing the economic impact of natural disasters will need to be developed. This will require ongoing analysis of the implications of such impact on the economic competitiveness of national economies. In a globalizing world, risk reduction is an essential element in building competitiveness and a basis for sustainable development. A creative partnership will need to be developed between governments and the private sector in pursuing a strategy in this regard.
27. **Transboundary nature of natural hazards:** The cause and impact of natural hazards often involve adjoining countries which highlights the need for a harmonized approach to the management of such hazards related to, for example, transboundary river basins, volcanoes and seismic faults. Regional and subregional approaches, strategies and institutional arrangements are therefore necessary. Efficiency can be optimized through the exchange of experiences among countries and constructive dialogue among stakeholders through participatory processes. Risk assessment and monitoring, information exchange and early warning systems, enhanced preparedness and response capacities, particularly in border areas, can be facilitated by the conclusion of subregional and regional agreements.

IV. Specific Actions

28. In the context of the objectives outlined above, the following areas should be seen as constituting the key elements of an effective disaster reduction strategy:
29. **Capacity building and strengthening of institutional arrangements** at all levels is necessary to address risk reduction as an ongoing activity, based on the need to ensure the existence of disaster reduction related legislation, land-use regulation, building codes and reinforced links to environmental protection. Capacity building at the national level should include the development of an integrated disaster risk management plan that covers risk assessment, early warning systems, training and public awareness programmes, transfer of technical knowledge, emergency response management and recovery resources, including the strengthening of community-based organizations. This capacity building needs to take into account other primary actors in disaster risk management such as the Red Cross and Red Crescent societies and other major players at the local level. It also includes the increased capacity, sector synergies and networking for sustainable management of forest, land, and water resources.
30. **Advocacy for the integration of disaster risk reduction in national development plans**, which should include risk assessments and related measures as basic requirements to deal with medium and risk management and reduction. This requires the integrated participation of all relevant sectors (environment, finance, transport, construction, agriculture, education and health). Public policy and local development plans are also crucial to adequately minimize the impact of disasters. The implementation of local sustainable development plans and activities, such as Local Agenda 21 initiatives, should include disaster risk assessments and measures.
31. Linked to the above, the **design of development projects** should take risk assessment into account at the appraisal stage. Environmental impact assessments should systematically include a section on hazard proneness and consider disaster reduction measures where appropriate, with particular regard to the protection of lifeline infrastructure and critical facilities, such as health and education. In rural programmes and drought-prone areas, specific attention should be paid to food security and the promotion of agriculture techniques and inter-cropping that reduce hazard-related agriculture losses. Vulnerability goes far beyond geographic location and thus a holistic approach is advocated. Vulnerability assessments or hazard mapping can forget or overlook the expertise of a local population. This resource, if harnessed and developed from the beginning of a project, can be a valuable asset. Gender impact analysis should also be taken into account, highlighting the need for greater integration of gender equality issues in sustainable development and risk reduction goals.
32. Development of **public awareness programmes** and campaigns on the relationships linking sustainable development, natural hazards, vulnerabilities and disasters, to enhance disaster reduction measures. The process starts with formal educational programmes including curricula revision, teacher training and development of resource centres. However, the process needs to expand to all levels of society by training efforts, especially targeting professionals and community-based leaders and organizations. Strategies to support community mobilization and action for disaster reduction are also essential. Involvement of the media in public awareness programmes would ensure that the information reaches a larger segment of society. Dissemination of easily comprehensible information to those who most need it is often the weakest link.
33. Creating and implementing **comprehensive urban development strategies and land use plans**, provide a number of opportunities to mitigate damages caused by hazards. As location is

the key factor, land-use plans and mapping tools should be used to determine the level of risk and to identify the most suitable use for vulnerable areas (e.g., location of buildings, roads, power plants, and storage of fuels). Local governments also need to play an increasing role with regard to issues such as building standards, including the enforcement of building codes, the regulation and taxation of land and property markets, planning, infrastructure construction and management. The retrofitting of existing structures that are vulnerable is also necessary in order to “reduce the possibility of injury.”

34. Global, regional, national and local **early warning systems** and preparedness schemes need to be strengthened and made more effective. Improving communication flows is imperative. The objective of early warning is to provide individuals and communities exposed to disaster risk with accurate information about an impending hazard as early as possible, allowing them to act in a timely and appropriate manner to reduce the probability of suffering, personal injury, death and property losses. Increased sophistication in prediction technology, trained professionals and adequate finances are not effective if there remains poor communication amongst authorities and disaster managers. In the face of a disaster, this can lead to conflict, contradiction and confusion with bad decisions being taken. Early warning must be more than a technological instrument to detect, monitor and submit warnings and alerts. It should also include identification of hazards, risk assessments and combined efforts required by all sectors to plan ahead and build people’s capacity to respond rapidly and appropriately at the local level, and, more specifically, to identify increasing vulnerabilities in their communities. Early warning needs to become part of a management information system for decision-making in the context of national institutional frameworks for disaster management and as part of national and local strategies and programmes for disaster risk reduction. The utilization of indices and indicators is an important tool for environmental vulnerability but results must reach the appropriate decision makers. There is little point in monitoring if there are inadequate resources and support for follow-up actions.
35. Continued research regarding the **relationship of climate, natural hazards and related socio-cultural and environmental vulnerability**, gender analysis and gender specific data-collection, as well as the coordinated application of the results generated by research programmes at the national and international levels should be supported. This includes, in particular, improved international cooperation to reduce the impact of climate variables, such as El Niño and La Niña. Some suggested actions are:
 - Provide scientific, technical and financial assistance to support the establishment of the “International Centre for the Study of the El Niño Phenomenon” and other regional and subregional institutions and networks devoted to addressing the problems caused by natural disasters, mainly those associated with extreme weather events linked to climate change.
 - Encourage international joint observation, research and the dissemination of scientific knowledge for effective disaster and risk reduction of sudden-impact disasters (e.g. floods, sand storms, forest fires, storms, earthquakes, volcanic eruptions) and slow-onset disasters (e.g. sea level rise, desertification, droughts), and ensure wide dissemination of warnings.

V. The Outcomes from the World Summit on Sustainable Development (WSSD)

36. Losses from disasters caused by natural hazards will continue to increase unless there is a shift towards proactive solutions. Sustainable development is not possible without addressing vulnerability to hazards. It is a crosscutting concern relating to the social, economic, environmental and humanitarian sectors. Building on the legacy of the International Decade for Natural Disaster Reduction (1990-1999) and the Action Plan adopted at the First World Conference on Natural Disaster Reduction held in Yokohama in 1994, the World Summit on Sustainable Development provided the opportunity for the conceptual integration of disaster reduction within the agenda of sustainable development. Disaster risk reduction was therefore an emerging issue taken into consideration during the preparatory phase of WSSD.

The outcome of the World Summit on Sustainable Development brought more relevance and commitment towards disaster reduction and a multi-hazard approach to reduce risk and vulnerability, within the context of sustainable development, through:

- a) The political statement adopted by Heads of State at the WSSD acknowledges that today, the impacts of natural disasters are more frequent and more devastating, with developing countries more vulnerable to hazards than ever before. The challenge, therefore, lies in recognising the severe threat that natural disasters pose to sustainable development, and requires immediate attention at the global, regional and local levels.
- b) The Plan of Implementation, which includes commitments related to disaster and vulnerability reduction and improved early warning capacities under the sections of protecting and managing the natural resource base of economic and social development, Africa, small-island developing States and means of implementation (see extracts, annex 2).
- c) A set of initiatives and partnerships, which support the implementation of the areas committed to, were launched during the WSSD. Partnerships already underway, in support of the ISDR objectives, include: integrating early warning and disaster risk management into the sustainable development agenda and practice; regional partnerships for Central America and SIDS for increased coping capacities to confront and reduce vulnerability to natural hazards; resilient cities; and environmental emergency preparedness (see list in Annex 3).

Annexes

ANNEX 1

TERMINOLOGY: Basic terms of disaster risk reduction¹

Coping capacity

The manner in which people and organizations use existing resources to achieve various beneficial ends during unusual, abnormal, and adverse conditions of a disaster event or process.

The strengthening of coping capacities usually builds resilience to withstand the effects of natural and other hazards.

Disaster

A serious disruption of the functioning of a community or a society causing widespread human, material, economic or environmental losses which exceed the ability of the affected community/society to cope using its own resources.

A disaster is a function of the risk process. It results from the combination of hazards, conditions of vulnerability and insufficient capacity or measures to reduce the potential negative consequences of risk.

Disaster risk reduction (disaster reduction)

The systematic development and application of policies, strategies and practices to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development.

The disaster risk reduction framework, as described in this review, is composed of:

- *Risk awareness and assessment, including hazard analysis and vulnerability/capacity analysis;*
- *Knowledge development, including education, training, research and information;*
- *Public commitment and institutional frameworks, including organizational, policy, legislation and community action;*
- *Application of measures, including environmental management, land use and urban planning, protection of critical facilities, application of science and technology, partnership and networking, and financial instruments; and*
- *Early warning systems, including forecasting, dissemination of warnings, preparedness measures and reaction capacities.*

Early warning

The provision of timely and effective information, through identified institutions, that allow individuals at risk of a disaster to take action to avoid or reduce their risk and prepare for effective response.

Early warning systems consist of three elements (i) forecasting and prediction of impending events, (ii) processing and dissemination of warnings to political authorities and population, and (iii) undertaking appropriate reaction to warnings.

¹ Extract from "Living with Risk: A global review of disaster reduction initiatives," ISDR, Preliminary Version, 2002.

El Niño-southern oscillation (ENSO)

An irregularly occurring pattern of abnormal warming of the surface coastal waters off Ecuador, Peru and Chile. This coupled atmosphere-ocean phenomenon is associated with the fluctuation of intertropical surface pressure pattern and circulation in the Indian and Pacific oceans, called the Southern Oscillation.

There has been a number of attempts to define El Niño, both quantitatively and qualitatively, but none has achieved universal recognition. This phenomenon triggers a shift in seasonal patterns of weather systems over many subtropical and mid-latitude parts of the globe.

***La Niña** is the opposite of an El Niño event, during which waters in the west Pacific are warmer than normal and trade winds are stronger.*

Hazard

A potentially damaging physical event, phenomenon and/or human activity, which may cause the loss of life or injury, property damage, social and economic disruption, or environmental degradation.

Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) and/or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity and probability.

Mitigation

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

Preparedness

Activities and measures taken in advance to ensure effective response to the impact of disaster, including the issuance of timely and effective early warnings and the temporary removal of people and property from a threatened location.

Prevention

Activities to provide outright avoidance of the adverse impact of hazards and related environmental, technological and biological disasters.

Depending on social and technical feasibility and cost/benefit considerations, investing in preventive measures is justified in areas frequently affected by disaster. In the context of public awareness raising and education, prevention refers to attitude and behaviour towards a “culture of prevention.”

Recovery

Decisions and actions taken after a disaster with a view to restoring the living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.

Recovery (rehabilitation and reconstruction) is an opportunity to develop and apply disaster risk reduction measures.

Resilience / resilient

The capacity of a system, community or society to resist or to change in order to obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is

capable of organizing itself, and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster.

Risk

The probability of harmful consequences, or expected loss (of lives, people injured, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable/capable conditions. Conventionally, risk is expressed by the equation $\text{Risk} = \text{Hazards} \times \text{Vulnerability} / \text{Capacity}$.

Beyond expressing a probability of physical harm, it is crucial to appreciate that risks are always created or exist within social systems. It is important to consider the social contexts in which risks occur and that people therefore do not necessarily share the same perceptions of risk and their underlying causes.

Risk assessment

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

The process of conducting a risk assessment is based in a review of both technical features of hazards such as their location, intensity and probability, and also the analysis of the physical, social and economic dimensions of vulnerability, while taking particular account of the coping capabilities pertinent to the risk scenarios.

Risk management

The systematic management of administrative decisions, organization, operational skills and responsibilities to apply policies, strategies and practices for *disaster risk reduction*.

Vulnerability

A set of conditions and processes resulting from physical, social, economical, and environmental factors, which increase the susceptibility of a community to the impact of hazards.

Positive factors, that increase the ability of people and the society they live in to cope effectively with hazards, that increase their resilience, or that otherwise reduce their susceptibility, are considered as capacities.

ANNEX 2

EXTRACTS¹ from the text of the United Nations Report of the World Summit on Sustainable Development (A/CONF.199/20) Johannesburg, South Africa, 26 August-4 September 2002

Chapter II. Poverty eradication

7. (l) Combat desertification and mitigate the effects of drought and floods through such measures as improved use of climate and weather information and forecasts, early warning systems, land and natural resource management, agricultural practices and ecosystem conservation in order to reverse current trends and minimize degradation of land and water resources, including through the provision of adequate and predictable financial resources to implement the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa, as one of the tools for poverty eradication;

11. (b) Use low-cost and sustainable materials and appropriate technologies for the construction of adequate and secure housing for the poor, with financial and technological assistance to developing countries, taking into account their culture, climate, specific social conditions and vulnerability to natural disasters;

* * *

Chapter IV. Protecting and managing the natural resource base of economic and social development

24. Human activities are having an increasing impact on the integrity of ecosystems that provide essential resources and services for human well-being and economic activities. Managing the natural resources base in a sustainable and integrated manner is essential for sustainable development. In this regard, to reverse the current trend in natural resource degradation as soon as possible, it is necessary to implement strategies which should include targets adopted at the national and, where appropriate, regional levels to protect ecosystems and to achieve integrated management of land, water and living resources, while strengthening regional, national and local capacities.

* * *

¹ Extracts prepared by UN/ISDR.

26. Develop integrated water resources management and water efficiency plans by 2005, with support to developing countries, through actions at all levels to:

(d) Develop programmes for mitigating the effects of extreme water-related events.

* * *

37. An integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the 21st century. Actions are required at all levels to:

- (a) Strengthen the role of the International Strategy for Disaster Reduction (ISDR) and encourage the international community to provide the necessary financial resources to its Trust Fund;
- (b) Support the establishment of effective regional, sub-regional and national strategies and scientific and technical institutional support for disaster management;
- (c) Strengthen the institutional capacities of countries and promote international joint observation and research, through improved surface based monitoring and increased use of satellite data, dissemination of technical and scientific knowledge and the provision of assistance to vulnerable countries;
- (d) Reduce the risks of flooding and drought in vulnerable countries by, inter-alia, promoting wetland and watershed protection and restoration, improved land-use planning, improving and applying more widely techniques and methodologies for assessing the potential adverse effects of climate change on wetlands and, as appropriate, assisting countries that are particularly vulnerable to these effects;
- (e) Improve techniques and methodologies for assessing effects of climate change and encourage the continuing assessment of these adverse effects by the Intergovernmental Panel on Climate Change;
- (f) Encourage the dissemination and use of traditional and indigenous knowledge to mitigate the impact of disasters, and promote community-based disaster management planning by local authorities, including through training activities and raising public awareness;
- (g) Support the on-going voluntary contribution of, as appropriate, NGOs, the scientific community, and other partners in the management of natural disasters according to agreed, relevant guidelines;
- (h) Develop and strengthen early warning systems and information networks in disaster management, consistent with the International Strategy for Disaster Reduction;
- (i) Develop and strengthen capacity at all levels to collect and disseminate scientific and technical information, including the improvement of early warning systems for prediction of extreme weather events, especially El Niño/La Niña, through the provisions of assistance to institutions devoted to addressing such events, including the International Centre for the Study of the El Niño phenomenon;
- (j) Promote cooperation for the prevention and mitigation of, preparedness for, response to and recovery from major technological and other disasters with an adverse impact on the environment in order to enhance the capabilities of affected countries to cope with such situations.

* * *

38. Change in the Earth's climate and its adverse effects are a common concern of humankind. We remain deeply concerned that all countries, particularly developing countries, including the least developed countries and small island developing States, face increased risks of negative impacts of climate change and recognize that, in this context, the problems of poverty, land degradation, access to water and food and human health remain in the centre of global attention...

* * *

41. Strengthen the implementation of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa to address causes of desertification and land degradation in order to maintain and restore land, and to address poverty resulting from land degradation. This would include actions at all levels to:

- (d) Integrate measures to prevent and combat desertification as well as to mitigate the effects of drought through relevant policies and programmes, such as land, water and forest management, agriculture, rural development, early warning systems, environment, energy, natural resources, health and education, and poverty eradication and sustainable development strategies;
- (e) Provide affordable local access to information to improve monitoring and early warning related to desertification and drought;

* * *

42. Mountain ecosystems support particular livelihoods, and include significant watershed resources, biological diversity and unique flora and fauna. Many are particularly fragile and vulnerable to the adverse effects of climate change and need specific protection. Actions at all levels are required to...

* * *

VII. Sustainable development of small island developing States

58. (h) Extend assistance to small island developing States in support of local communities and appropriate national and regional organizations of small island developing States for comprehensive hazard and risk management, disaster prevention, mitigation and preparedness, and help relieve the consequences of disasters, extreme weather events and other emergencies;

- (i) Support the finalization and subsequent early operationalization, on agreed terms, of economic, social and environmental vulnerability indices and related indicators as tools for the achievement of the sustainable development of the small island developing States;
- (j) Assist small island developing States in mobilizing adequate resources and partnerships for their adaptation needs relating to the adverse effects of climate change, sea level rise and climate variability, consistent with commitments under the United Nations Framework Convention on Climate Change, where applicable;

* * *

VIII. Sustainable Development for Africa

65. Deal effectively with natural disasters and conflicts, including their humanitarian and environmental impacts, recognizing that conflicts in Africa have hindered, and in many cases, obliterated both the gains and efforts aimed at sustainable development, with the most vulnerable members of society, particularly women and children, being the most impacted victims, through efforts and initiatives, at all levels, to:

- (a) Provide financial and technical assistance to strengthen the capacities of African countries, including institutional and human capacity, including at the local level, for effective disaster management, including observation and early warning systems, assessments, prevention, preparedness, response and recovery;
- (b) Provide support to African countries to enable them to better deal with the displacement of people as a result of natural disasters and conflicts and put in place rapid response mechanisms;

- (c) Support Africa's efforts for the prevention and resolution, management and mitigation of conflicts and its early response to emerging conflict situations to avert tragic humanitarian consequences;
- (d) Provide support to refugee host countries in rehabilitating infrastructure and environment, including ecosystems and habitats, that were damaged in the process of receiving and resettling refugees.

* * *

X. Means of implementation

89. Reduce unsustainable debt burden through actions as debt relief and, as appropriate, debt cancellation and other innovative mechanisms geared to comprehensively address the debt problems of developing countries, in particular the poorest and most heavily indebted ones...

- a) Implement speedily, effectively and fully the enhanced heavily indebted poor countries (HIPC) initiative, which should be fully financed through additional resources, taking into consideration, as appropriate, measures to address any fundamental changes in the economic circumstances of those developing countries with unsustainable debt burden caused by natural catastrophes, severe terms-of-trade shocks or affected by conflict, taking into account initiatives which have been undertaken to reduce outstanding indebtedness;

* * *

105. Promote, facilitate and finance, as appropriate, access to and development, transfer and diffusion of environmentally sound technologies and corresponding know-how, in particular in developing countries and countries with economies in transition on favourable terms, including on concessional and preferential terms, as mutually agreed, as set out in Chapter 34 of Agenda 21, including through urgent actions at all levels to:

- (e) Promote the access and transfer of technology related to early warning systems and to mitigation programmes to developing countries affected by natural disasters.

* * *

109. Improve policy and decision-making at all levels through, inter alia, improved collaboration between natural and social scientists, and between scientists and policy makers, including actions at all levels to:

- (a) indigenous knowledge in a manner respectful of the holders of that knowledge and consistent with national law;
- (b) Make greater use of integrated scientific assessments, risk assessments and interdisciplinary and intersectoral approaches;

* * *

130. Encourage further work on indicators for sustainable development by countries at the national level, including integration of gender aspects, on a voluntary basis, in line with conditions and priorities.

134. Support efforts to prevent and mitigate the impacts of natural disasters, including through actions at all levels to:

- (a) Provide affordable access to disaster-related information for early warning purposes;
- (b) Translate available data, particularly from global meteorological observation systems, into timely and useful products.

ANNEX 3

List of selected “Type 2” Partnerships

Among the so-called “type 2 outcome” initiatives and partnerships, launched during the WSSD to support the implementation of the areas committed to in the Plan of Implementation, several were related to disaster reduction and early warning.

These are partnerships with a varying grade of financing available, and lead by either governments, NGOs or the UN (see more information at: www.johannesburgsummit.org/).

The following ones are of immediate interest to the work of ISDR:

- Integrating early warning and disaster risk management into the sustainable development agenda and practice (supported by the WG2 and convened by the ISDR Secretariat);
- Subregional Initiative for the Promotion and Implementation of the International Strategy for Disaster Reduction (ISDR) (presented by El Salvador on behalf of the governments of the region);
- Initiative to Develop Capacities in SIDS to Manage Vulnerability and Build Resilience Particularly to Disasters (presented by UNDP, Capacity 21, with an additional specific initiative for the South Pacific, presented by SOPAC);
- Integrated Approach to Prevention, Preparedness for and Response to Environmental Emergencies (presented by OCHA/UNEP);
- Resilient Communities (presented by ICLEI and involving the ISDR Secretariat); and
- Enhanced capacity in disaster management for Southern Africa (presented by Germany and Mozambique).

The ISDR aims at building disaster resilient communities by promoting increased awareness of the importance of disaster reduction as an integral component of sustainable development, with the goal of reducing human, social, economic and environmental losses due to natural hazards and related technological and environmental disasters.



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