United Nations
International Strategy for Disaster Reduction

Background document for the
World Summit on Sustainable Development (WSSD)
No 5, revised version 17 May 2002

Disaster Reduction and Sustainable Development: understanding the links between vulnerability and risk related to development and environment

This background paper is an evolving document being prepared in a participatory manner as a contribution to the process leading to the World Summit on Sustainable Development (Johannesburg, 26 August- 4 September 2002).

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" More effective prevention strategies would save not only tens of billions of dollars, but save tens of thousands of lives. Funds currently spent on intervention and relief could be devoted to enhancing equitable and sustainable development instead, which would further reduce the risk for war and disaster. Building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; they are the disasters that did NOT happen. "
- Kofi Annan,[1]

Millennium Goal:
"To intensify our collective efforts to reduce the number and effects of natural and manmade disasters." Placed under section IV. Protecting our common environment,
- Road map towards the implementation of the United Nations Millennium Declaration[2]

[1] UN Secretary-General: "Introduction to Secretary-General's Annual Report on the Work of the Organization of United Nations, 1999" (document A/54/1)
[2] Secretary-General Report to GA A/56/326

Disaster reduction within the WSSD process

Intergovernmental process

The fourth and last Preparatory Committee will take place in Bali, Indonesia, 27 May – 7 June 2002. The expected outcome of PrepCom4 in Bali will bring:

- Elements for a **political statement** by Heads of States to be further negotiated as outcome for Johannesburg . It is suggested that disaster reduction be included as one priority area of increased challenge.
- A draft **Programme of Action**, with focus on implementation. The topic of disaster reduction is included under the sections of Protecting and Managing the natural resource base of economic and social development, and Decision making (see Annex 2 of this document as of the draft 9 May 2002).
- A list of **initiatives and partnerships**, which should be endorsed at WSSD and be part of the implementation arrangements for the Programme of Action. Partnerships relating to early warning, integrated flood management, increased coping capacities for SIDS to confront natural disasters, education and community action, and environmental emergency response are, amongst others, under formulation to be submitted to WSSD.

Background paper for WSSD

An 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, many UN agencies, among them UNDP, UNEP, UN/Habitat, WMO, UN/DESA and UN/OCHA. The current version, prepared for PrepCom4 in Bali, is 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. This debate focused on risk assessment, education, community action and early warning and developed on further ideas on the recommendations for the course of action, implementation and future commitments *(see websites www.earthsummit2002.org/debate and www.unisdr.org).*
Continuing consultation will take place for expanded text on course of action for WSSD in Johannesburg, based consultation with agencies other stakeholders. It was also reviewed and commented on by participants at:

- the fourth and fifth meetings of the ISDR Inter-Agency Task Force (Geneva, November 2001, and April 2002);
- the expert meeting on Environmental Management and Disaster Risk Reduction: a Gender Perspective (Ankara, 6-9 November 2001);
- by experts attending the Hemispheric Conference on Disaster Risk Reduction (Costa Rica, 4-6 December 2001);
- by participants of the Asian meeting on the ISDR in New Delhi, 24 January (organized by the Governments of Japan and India);
- IATF Working Group 4 on Wildland Fire (Freiburg, 8-9 March 2002);
- Expert meeting on Early Warning and Sustainable Development (Bonn, 11-12 March 2002, organized by the German Committee on Disaster Reduction-DKKV);
- NGOs, regional centres, and experts, including the EU Commission Joint Research Centre.

Follow-up:

Immediately after WSSD in Johannesburg, a review process will start to look into the level of implementation and shortcomings of the **Yokohama Plan of Action for a Safer World (1994).** This process is expected to lead to the development of a Global Programme of Action for Vulnerability and Disaster Reduction, building on the commitments in the Programme of Action of Johannesburg. A participatory review and formulation process at national, regional and global/thematic levels should start in 2003.

Disaster Reduction and Sustainable Development: understanding the links between vulnerability and risk related to development and environment

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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 to be included in the follow up to Agenda 21.

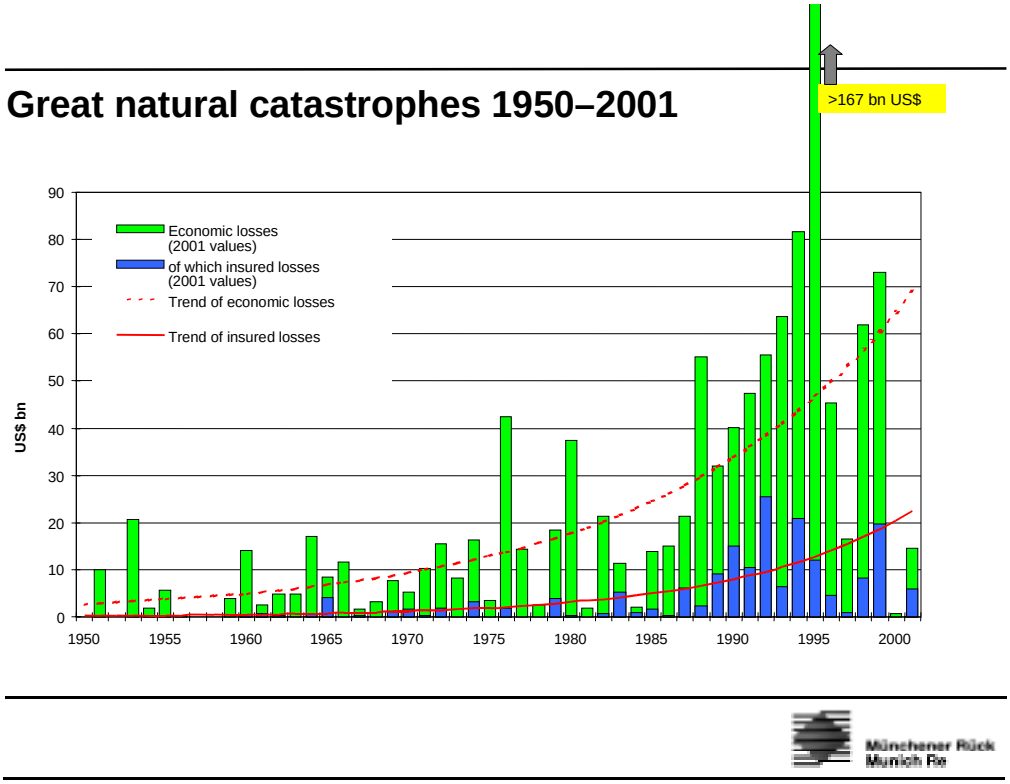
I. Disaster Impact on Development

3. 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 ten times[3] 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 ongoing drought, earthquakes and unfolding events in Afghanistan.

4. The escalation of severe disaster events triggered by natural hazards and related technological and environmental disasters is increasingly posing a substantive threat to both sustainable development and poverty-reduction initiatives. The significant 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 rapidly up the policy agenda of affected governments as well as multilateral and bilateral agencies and NGOs[4]. This trend

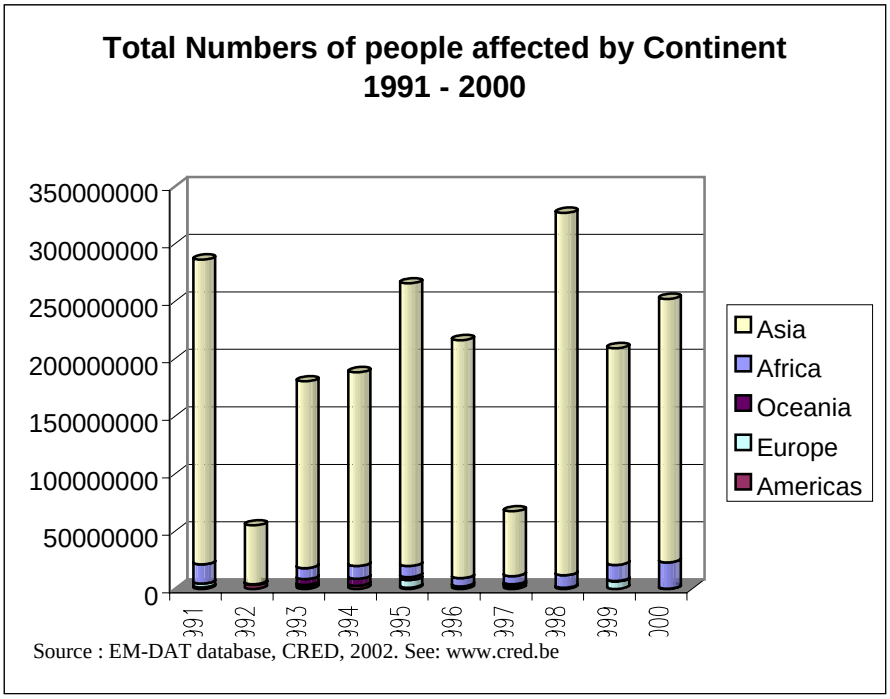
[3] Munich Re. Topics 2000, Natural Catastrophes- the current position.
[4] Charlotte Benson, 2001

led to the adoption of the International Strategy for Disaster Reduction (ISDR)[5] by governments to succeed and promote implementation of the 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, 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.



5. 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 under-estimated. Indirect economic losses of 'market share', following the disruption to trade after a disaster, can also go largely un-noticed. 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 fifteen percent from pre-earthquake revenues[8].

[5] Resolution UN General Assembly 54/219
[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: MunichRe and UNEP)
[8] Asian Disaster Reduction Centre, Kobe, November 2001



Source : EM-DAT database, CRED, 2002. See: www.cred.be

6. 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% of natural disaster related deaths each year occur in developing countries [9] 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 6 of them have been hit by between 2 and 8 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 of the many smaller and unrecorded disasters that cause significant losses at the local community level, taken into account. The chart also clearly demonstrates the considerable geographic variations in the occurrence and impact of natural hazards. Asia is disproportionately affected with approximately 43% of all natural disasters in the last decade. During the same period, Asia accounted for almost 70% 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.

7. While the world has witnessed an exponential increase in human and material losses due to natural disasters, there is on ongoing debate about the increase of the frequency and intensity of extreme hydro-meteorological events due, in particular, to 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 instead 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

[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

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.

II. Need to reverse trends of vulnerability to natural hazards

8. 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 the 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.

9. 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. Vulnerability is also 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 levels 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 for the hazard (especially addressing drought, floods and landslides).

10. 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, inter-dependant processes, dealt with elsewhere in Agenda 21[12], 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

11. 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

[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.
Chapter 18: “Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources”

disasters. Development and inappropriate use of resources is a contributory factor to natural disasters. It 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. Poverty and hazard vulnerability is 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.

12. 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. Globalisation 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. Globalisation 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. 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 arise/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 delinked 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 community.

13. 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 disasters[13]

14. In industrialized and transition countries the non-sustainable over-use of resources causes pollution and ultimately leads to changes in the environment. In particular, there is an

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

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 sub-tropical latitudes. These changes in temperature and related local rainfall variations affect the environment through accelerated desertification, land degradation, 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" that loss of livelihoods causes. 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.

15. Sea-level rise 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 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 km of coastline and many are therefore under threat.

Wildland fires, often occur as a consequence of extreme wealth, such as droughts caused by El Nino. This can be detected and the effects predicted by existing systems for early warning and mitigation for 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.

- Migration and unplanned urbanization

17. 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.

18. 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 cities, especially the 'megacities' in the developing world, poses a new vulnerability, for example, in its proximity to earthquake or flood prone zones. In the

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

1990's, 60-70% 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

19. 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% 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.

20. 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.

21. 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 to be found in urban communities.

III. Strategies for development policies to reduce vulnerability to disasters

22. Disaster reduction strategies are aimed at enabling societies at risk to become engaged in the conscious management of risk and the reduction of vulnerabilityy. 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

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

impact of individual national hazards. This process should be multi-sectoral and inter-disciplinary in nature and comprise a wide range of interrelated activities at the local, national, regional and international levels.

23. 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 inter-sectoral 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 multi-disciplinary professional training. Needless to say 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 as well as 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.

- **Stimulating inter-disciplinary and inter-sectoral 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, 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. Efforts to link natural resource management with disaster reduction should also be encouraged. There is also the health issue. Epidemics of infectious diseases should be considered as a disaster; control measures have to be integrated into decision-making responses.

[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

24. **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 leads 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 ion this regard.

25. **Transboundary nature of natural hazards:** The cause and impact of natural hazards often involves adjoining countries which highlights the need for a harmonized approach to the management of such hazards, for example related to transboundary river basins, volcanoes and seismic faults. Regional and sub-regional approaches, strategies and institutional arrangements are therefore necessary. Efficiency can be optimized through the exchange of experiences amongst countries and constructive dialogue amongst 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 sub-regional and regional agreements.

IV. Specific actions

26. 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[18]:

27. **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 local level. It also includes the increased capacity, sectoral synergies and networking for sustainable management of forest, land, and water resources.

28. **Advocacy for the integration of disaster risk reduction in national development plans,** which include Risk assessments and related measures as a basic requirement to deal with medium and risk management and reduction. This requires the integrated participation of all relevant sectors (environment, finance, transport, construction, agriculture, education, 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.

29. 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.

- One target should be that by 2010 all development projects involving infrastructure or urban development, supported by bilateral or international organization, should take into account risk assessments to natural hazards and necessary vulnerability reduction measures.

30. Development of **public awareness programmes** and campaigns on the relationships between sustainable development, natural hazards, vulnerabilities and disaster to enhance disaster reduction measures. The process starts with formal educational

[18] In Annex 2, please find a summary of findings and suggestions for action provided by the On-line debate organized by the Multi Stakeholders Forum for our Common Future and the ISDR Secretariat, 15 April -9 May 2002. See also: www.earthsummit2002.org/debate)

programmes including curricula revision, teachers 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.

31. Creating and implementing **comprehensive urban development strategies and land use plans**, provides 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, 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".

32. 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 finance is 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 monitoring if there is inadequate resources and support for follow-up actions. Risk assessment requires promotion. *(See outline for a global partnership for enhanced early warning capabilities in Annex 3).*

33. Continued research regarding the **relationship between 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 level 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 include:

- 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 sub-regional 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. Desired outcomes from the World Summit on Sustainable Development (WSSD)

34. 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. Disaster risk reduction is therefore a specific issue for consideration within the sustainable development agenda as well as being 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, 1994, the World Summit on Sustainable Development will provide an opportunity for the conceptual integration of disaster reduction within the philosophy of sustainable development. Disaster reduction should be an important part of the Johannesburg Programme of Action in order to ensure the promotion of the goals of the International Strategy for Disaster Reduction.

Some definitions and concepts.

What is a natural hazard?
Natural hazards include phenomena 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; insect infestations. Other types of hazards include human-made ones arising from technological issues or conflict/violence and epidemiological hazards.

What is a natural disaster?
A natural disaster is the result of the impact of a natural hazard on a socio-economic system with a given level of vulnerability, which prevents the affected society from coping adequately with this impact. Natural hazards themselves do not necessarily lead to disasters. It is only their interaction with people and their environment that generates impacts, which may reach disastrous proportions. That is why the word "natural" becomes misleading when describing a disaster, since the vulnerability is human induced. A disaster event is usually defined as a serious disruption of the functioning of society, causing widespread human, material or environmental losses which exceed the ability of the affected society to cope using only its own resources.

What is vulnerability to disasters?
Vulnerability to disasters is a process resulting from human action or inaction or from an inherent situation such as poverty. It describes the degree to which a society is threatened by the impact of natural hazards. The degree of vulnerability depends, amongst other factors, on the condition of human settlements and their infrastructure, the way in which disaster management is addressed by public policy, and the level of information and education available about hazards and how to deal with them.

Why target society's vulnerability to disasters?
Although societies have always experienced major natural disasters, they have, in recent years, been increasingly affected by their adverse impact. In early 2001 alone, three consecutive earthquakes in El Salvador and one in India, together with recurring floods in Mozambique caused significant loss of life and damage to economic and social infrastructures in these countries. This global development is directly linked to a number of trends such as increasing wealth and poverty, population growth and density particularly in the context of rapid urbanization, environmental degradation and climate change.

What is Risk?
The probability of harmful consequences, or expected loss (of lives, injury, property or environmental damage, livelihoods and economic activity disrupted) resulting from interactions between natural or human hazards and vulnerable conditions. Conventionally, disaster risk is often expressed by the equation, Risk = Hazard x Vulnerability. The equation sometimes expresses the potential for managerial and operational capabilities to lessen the extent of the hazard or the degree of vulnerability.

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

What is Disaster Reduction?
Solutions to counter the increasing impact of natural hazards exist. The knowledge and technology necessary to apply these solutions is widely available. Disaster reduction – or rather disaster risk reduction - is the sum of all the measures, which can be undertaken to

reduce the vulnerability of a socio-economic system to natural hazards. The measures cover a wide spectrum of activities ranging from avoiding disasters altogether (disaster prevention) to measures aimed at limiting the severity of a disaster when it strikes. Sound information and political commitment are the basis of successful disaster reduction measures.

This is an ongoing process, which is not limited to a single disaster. It seeks to motivate societies at risk to become engaged in conscious disaster management, beyond the traditional response to disasters. Disaster reduction is multi-sectoral and interdisciplinary in nature and involves a wide variety of interrelated activities at the local, national, regional and international level.

Definitions of some commonly used concepts

Disaster Reduction is more comprehensively referred to as disaster risk reduction, and involves measures designed to avoid (prevention) or limit (mitigation and preparedness) the adverse impact of natural hazards and related environmental and technological disasters.

Prevention involves the outright avoidance of the adverse impact of natural hazards and related environmental and technological disasters. Good planning is an example of disaster prevention, i.e. the decision not to build houses in a disaster-prone area for example. Of course, in a strict sense, total prevention is very difficult to achieve. Within the context of awareness raising and education, prevention refers to attitudinal and behavioural changes needed to move towards a “culture of prevention”.

Mitigation involves measures taken to limit the adverse impact of natural hazards and related environmental and technological disasters. Examples of mitigation are the retrofitting of buildings, the installation of flood-control dams, training and legislation. Mitigation also refers to easy access to early warning system and development of comprehensive risk assessments.

Preparedness involves measures taken in advance to ensure effective response to the impact of disasters. Preparedness measures include effective evacuation infrastructures or the regular testing of warning systems.

Annex 2.

SUMMARY OF FINDINGS AND SUGGESTIONS PROVIDED BY ON-LINE DEBATE, 15 APRIL – 9 MAY 2002

Introduction.

The aim of the online discussion was not just about obtaining feedback on ISDR's Background Document No. 5 but sought to broaden discussion out to a much larger stakeholder group, raising awareness of the inter-connected nature of the topics under debate and sustainable development. 350 participants from 80 countries registered and a dedicated website (www.earthsummit2002.org/debate) was developed for message posting. Topics covered included: The impact of natural hazards on development and how to reverse vulnerability; Risk assessment and early warning systems; Fostering community involvement and developing coping capabilities within communities, and promoting education and capacity building. A wealth of expertise unfolded as the month went by, with case examples and careful comment about current limitations, roles and responsibilities and potential solutions. The results are still being analyzed and will be incorporated into further revisions of this document.

Summary of some findings and suggested action[19]:

Suggested action in relation to capacity building, institutional strengthening and community action:

- There has to be greatly enhanced information sharing and research and development on risk reduction techniques between countries. The response should be on humanitarian grounds rather than political or economic criteria. Decision-makers at government levels should have the responsibility of constantly working with the communities with high risk about the changes they need to make.

- Mutual efforts should strive to bridge the gap between scientific expertise and the concerned public. There is a need to work towards finding a balance between outside/expert knowledge and insider/local knowledge. Both approaches can complement each other in increasing local preparedness.

- Non-governmental organizations (NGOs) and community-based organizations often have the trust of local people in a way that local government doesn't. Their role as brokers of local knowledge both' upwards' (as regards, mitigation) and 'downwards' (as regards warnings) needs broader recognition.

- If local capacity is to develop and thrive, it is important to ensure local 'ownership' of ideas and a supportive and co-operative working relationship amongst different organizations and agencies.

[19] Many of the Suggested Actions, as follows, were expressed by participants from 80 countries during the on-line debate on these subjects, held by the Stakeholders Forum for Our Common Future and the ISDR Secretariat, 15 April – 9 May, 2002. See www.earthsummit2002.org/debate

Set up in the 1970's, the Cyclone Preparedness Programme (CPP) is jointly implemented and managed by the Government of Bangladesh and the Bangladesh Red Crescent Society. It draws heavily upon volunteers trained at the local level with detailed plans for operations during normal times (i.e. no disasters), alert and warning phases, disaster and recovery phases. Substantial emphasis is placed upon continually motivating and ensuring public awareness through leaflets and poster campaigns, drama, film shows and publicity campaigns before cyclone seasons start using radio and television
- Abdul Latif Khan, Asian Disaster Preparedness Centre, Bangkok, via online debate

- Community-based risk reduction is most effective if it takes place within the context of broader community building initiatives. This builds upon a community's collective strength and skills. Forging an expert/local relationship between various stakeholders is a tough challenge but worth the effort. Local social cohesion and community resources can have a big impact on reducing vulnerability.

- Humanity lays itself open to natural disasters because we do not 'listen to nature' or heed traditional cultural knowledge and sustainable practices. Recovering and understanding traditional knowledge is an important form of mitigation. For example, the Global Hunger Alliance is opposing industrial agriculture operations and supporting sustainable cultivation of a diverse array of indigenous and locally-adapted plants as the best long-term solution to hunger and malnutrition.

- Adopting and implementing effective hazard mitigation and emergency preparedness is the only way to reduce loss of life and livelihood. There has to be more substantive co-operation between experts and governments involved in national planning.

- Caution must be exercised over direct transplantation of developed world hazard assessment into developing countries. Data insufficiencies and sparse monitoring can make transplantation inappropriate, too costly and may actually increase risk.

- Disaster risk management shouldn't ignore social dynamics: it must be more concerned with the changes that are deeply embedded in the structure of society not just risk perception or attitudes. Mitigation measures need to build upon, not destroy local knowledge and local capacity, particularly within rural communities in developing countries. It needs to be culturally compatible and affordable.

- Risk and resource assessment should include, where appropriate, participatory rapid appraisal tools and techniques.

- Risk assessment seeks to help planners mitigate a particular risk but it should also extend to helping the community understand the risks and try to enlist their help towards mitigation. Complicated models disconnect community engagement. Experience from Nepal highlights how flexibility and adaptability can break though these barriers:

"We translated the technical data into a common person's story about suffering, damage, recovery, their role in risk mitigation etc. Our experience is that this approach is quite good to bring awareness to communities, even planners and policy makers, as not all of them can understand vague technical models, and probabilistic results."
(Jitendra K Bothara, National Society for Earthquake Technology, Nepal via online debate)

- The limitations and inadequacies in the international definitions surrounding natural hazards and disasters have to be addressed. Lack of agreement on definitions and the lack of a common language in addressing vulnerability and disaster risk reduction can mask clarity in the search for solutions.

Suggested Actions for Public Awareness and Training:

- There is a need to change people's perceptions on vulnerability away from the narrowly focused approach that problems only need to be addressed "when and if something happens" to a broader preventative approach. The chances for mitigating the impact of hazards will drastically improve when we all realize that hazard mitigation is everyone's job on a daily basis e.g. planners in their design of new public works, educators when preparing and delivering lesson plans etc.

- Securing multi-sector recognition and stronger reinforcement within decision-making processes of the role that public participation can play in risk reduction initiatives. The importance of hazard mitigation cannot be over-stated. People living near potential hazards need to understand the risks facing them. Mitigation requires clear and accessible information, sensitive to cultures, beliefs and priorities. There is a clear role for partnership. In addition, government sectors have to work together – this is not 'business as usual.'

- Global agencies, working with local leader, need to be more proactive in the targeting of the risk reduction message to ensure better use of limited resources. Critical questions have to be asked about target audiences and the best means of reaching them.

- The UN Development Programme, and other relevant agencies, should significantly step up its in-country disaster management work by creating a time-bound plan to assist governments of disaster-prone countries to implement nationwide disaster training and public awareness programmes. The initial focus of this work should be with those countries most vulnerable to disasters and with the least capacity to cope. Achieving civil-wide society education will require:

    - developing training programmes with, and for, local government which cover all aspects of disaster mitigation and pre-disaster planning (as called for in Chapter 7 of Agenda 21). Training programmes must be simple, practical and sustainable.
    - in addition to community training, there needs to be public awareness campaigns using all available media, including disaster prevention in educational programmes and curricula at all levels.

- Agencies and Funds such as UNICEF have a key role in extending the risk reduction message in their work with children.

- ISDR, the World Bank and other global initiatives should encourage greater use of local NGOs (local champions) in risk reduction and mitigation programmes as they often have an established familiarity with local culture, social processes and, if carefully chosen, established communication channels with those working on health, development, education and/or capacity building. Their work as multipliers of the message could be enhanced by investment in training them in disaster prevention measures.

- ISDR and related global initiatives should work to overcome deep cultural inequalities that limit people's access to education and aid. In particular, it should ensure a gender perspective is integrated within risk reduction. Increasing access to education and encouraging the participation of women results in greater empowerment of benefit to whole communities. NGO's can play a major role in facilitating such work.

- ISDR and other agencies have a role in finding a synergy to help alleviate the inevitable 'tug-of-war' between 'educated people' and 'local knowledge' (which is often the loser). Lack of attention here currently increases the risk to disasters.

- In countries with high seismic risk, the Ministry of Education should include a course on teaching seismic protection skills within the school curriculum.

Armenia is highly vulnerable to seismic hazards and the toll from previous earthquakes revealed that lack of awareness and preparedness was a contributory factor to the large loss of life and property. A partnership between the Northern Department of the National Survey for Seismic Protection and the NGO, Women for Development resulted in the implementation of two respected 'Life Skills' education programmes in specific localities. Teachers and pupils have been trained in seismic protection skills. Using the motto, "Don't be scared, be prepared", visual and practical information has communicated the message in a sensitive way, paying attention to the fact that many children had direct experience of loss of family and friends in earthquakes. The message is getting through – pictures drawn by children in the second project reflected the knowledge obtained by them during the training. Project funding came from UNICEF.

- *Dr Armine Mikayelyan, Armenia via the online debate*

- Disaster preparedness education for children also has to involve education for the parents.

In Pacific Grove, California, the local fire department, the American Red Cross and its local chapter, and the Federal Emergency Management Agency (FEMA) have evolved an effective partnership with an emphasis on practical preparations to empower children and adults (physically and mentally) on how to cope in a disaster situation. Children are used as 'champions' for the preparedness message and as conduits to reach the adults. Attention is given to education and instilling a sense of personal responsibility for their own preparedness. Actions, however small or limited, could be life-savers. Resources include information leaflets, instructor's manuals, videos, colouring books, and practical advice on developing things like a disaster supplies kit. Much of this work could be replicable in different ways and at different levels within other communities.
Russell Coile, USA via online debate

- Expanding communication channels is vital. Disaster experts such as seismologists and the scientific community need to develop deeper dialogues with the people who are responsible for implementing earthquake resilient design in current and future buildings. The structure of buildings is the weak point in risk mitigation. Reaching building's owners is often a barrier. Involving local craftspeople/artisans/stone masons as motivators is a solution that has worked well in Nepal. On-the-job training in earthquake resistant construction, retrofitting of school buildings etc and respecting local vernacular knowledge paid dividends. "Replication of the work was instantly observed within the community."

- Communication with the news media and participation in public outreach activities by disaster experts is essential too.

- Developed countries have a responsibility to share their expertise with developing countries. The private sector has to take their share of responsibility for initiatives that promote preventative and mitigating measures.

- Disaster recovery efforts are usually financed by redirecting unused resources from other budgeted programmes to the rebuilding and repairing tasks. The lack of dedicated resources for disaster recovery and the dependency on external assistance must be seriously addressed if countries are, over the long-term, to start taking responsibility for their own actions. One suggestion to assist in building the necessity capacity is that future external assistance to disaster impacted countries should be subject to the implementation, by the affected country, of sound mitigation practices as well as to the implementation of effective educational and outreach activities, designed to create a 'culture of mitigation' amongst public authorities and the wider population.

- Agencies and organizations have to work more collaboratively and cooperatively to put integrated management for disaster mitigation into practice. The type of effort required surpasses traditional disciplinary boundaries, for example, social scientists must be able to work with applied scientists. Why is this still so difficult?

"We're finding that women farmers (particularly those who are not the head of the household) prefer seasonal climate forecast information to be made available through the extension officer or school, rather than the radio (preferred by male interviewees). The farmers state that in attempting to balance farming, child care and other domestic responsibilities, they are less able to schedule a fixed time to listen to the radio. They also prefer information to be provided on site, in an environment where queries can be handled immediately, and discussion can take place. . .This confirms a growing sense in the climate impacts and applications community that women are a crucially under-served clientele."

Emma Archer, IRI/PSU/NOAA, USA/South Africa, on-line debate on gender and disaster reduction, UN/DESA-DAW and ISDR Secretariat, November 2001

Annex 3:
Outline for a Partnership on Early Warning on Natural Hazards for Sustainable development

*"32. Global, regional, national and local **early warning systems** and preparedness schemes need to be strengthened and made more effective. Improving communication flows is imperative."*

Suggested action[20]**:**

- Develop a global programme and partnership, including an international forum, on early warning to natural hazards based on existing systems, platforms and expertise at global, regional and national levels. Its objective would be to strengthen and link existing early warning systems and disaster risk management strategies through policy recommendations, international and regional conferences, capacity building at national and local levels and enhance the development of new pilot projects and partnerships. This activity would be carried out within the framework of the International Strategy for Disaster Reduction (ISDR) and other relevant strategies or frameworks.

    - The programme and forum should primarily serve as a networking and sharing of information and experience (lessons learnt), coordination and cooperation platform of early warning activities. It should seek synergies with conventions on biodiversity, desertification and climate change;

    - It should include aspects related to the promotion of unrestricted and affordable access to information for early warning purposes for all users and translation of available data (particularly from global observing systems) into timely and useful products for decision-makers and specific applications.

    - Another aspect of the programme would focus on the user , dissemination and reaction chain of early warning, by promoting elaboration and use of vulnerability/risk assessments at the regional, national and local levels, based on standardized methodologies to serve as bases for the warnings, elaboration of guidelines to design effective early warning systems focusing on: an end-user oriented approach, clear definition of functions in the early warning chain, provision of multi-purpose information, feedback process, effectiveness indicators and assessment of technological needs or coping strategies at the community level. Capacity building and awareness programmes, as well as pilot projects should be undertaken in this regard.

- The global programme and the international early warning forum should also support national and sub-regional early warning platforms/forum to strengthen networking and capacities among the actors involved in the early warning chain.

[20] Input from WG 2 on Early Warning and Working Group 4 on Wild Fire of the Inter-Agency Task Force on Disaster reduction, and from an Expert Meeting on early warning convened by Deutsches Komitee für Katastrophenvorsorge e.V. (DKKV), German Committee for Disaster Reduction, within the International Strategy for Disaster Reduction (ISDR), supported by the ISDR Secretariat, in Bonn, 11-12 March, 2002. This proposal is preliminar and pending

- By building on existing global, regional and national early warning and monitoring systems and involved partners, the development of an early warning forum, under the auspices of the United Nations, would facilitate the dialogue between stakeholders and support the exchange of experiences and information on early warning at all levels.

- The major partners for the above activities should include: local communities, national, regional and international institutions, development banks, World Bank, ISDR (Secretariat and Inter-Agency Task Force) and all other relevant UN agencies (e.g. WMO, UNEP, UNDP, FAO, UNESCO, UNITAR). The Convention secretariats (biodiversity, climate change, desertification), European Union, bilateral donors, scientific community, NGOs and the private sector should also be approached, for coordination and exchange purposes.

Annex 4

Excerpts of relevant texts from the «Chairman's Text» of 9 May 2002 relating to disaster reduction

For negotiation at the fourth Preparatory Committee (Bali, 26 May – 4 June 2002)

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II. Poverty eradication

7. Achieve the Millennium Declaration poverty-related goals, including the reduction by half, by 2015, of the proportion of people whose income is below $1 per day, the number of people suffering from hunger, and proportion of people without access to safe drinking water. This would include international, regional and national actions to:

(j) Combat desertification, drought and floods through improved land management, agricultural practices and ecosystem conservation, in order to reverse current trends of degradation of land and water resources, including through the provision of adequate and predictable financial resources to implement the UNCCD as one of the prime tools for poverty eradication.

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

23. Support developing countries in developing integrated water resources management and water efficiency plans by 2005, through actions to:

(d) Develop programmes for mitigation of the effects of extreme water-related events;

32. Develop and implement a global programme of action to reduce the impact of disasters and enhance the international mechanisms established for the International Strategy for Disaster Reduction (ISDR) for coordination and monitoring of its implementation. International, regional and national actions are required to:

(a) Encourage the international community to provide the necessary financial means to the Trust Fund for the ISDR;

97. Address vulnerability to natural disasters and disaster reduction based on a multi-hazard approach including to establish and strengthen the institutional capabilities of countries, promote international joint observation and research, disseminate technical and scientific knowledge;

98. Implement wetland and watershed restoration, better land-use planning and improved drainage, develop and apply techniques and methodologies for assessing the potential adverse effects of climate change and provide assistance to vulnerable countries to mitigate this impacts;

99. Encourage dissemination and use of traditional and indigenous knowledge to mitigate the impact of disasters;

100. Establish a global early warning system, in the framework of the ISDR and in cooperation with WMO, UNEP, FAO and other stakeholders, as the nucleus for a global early warning network, which should be integrated with national, regional, and international mechanisms;

101. Establish effective global, regional, sub-regional, and national strategies and institution involving medium and long–term actions and international support to prevent, mitigate and repair the damage by providing technical, scientific, and financial assistance;

102. Promote cooperation in the prevention, reduction, relief and post-disaster rehabilitation of 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.

IV. Health and Sustainable Development

44. Strengthen the capacity of healthcare systems to deliver basic health services to all in an efficient, accessible and affordable manner aimed at preventing, controlling and treating diseases and to reduce environmental health threats and, to this end, take measures to:

(j) Launch an international capacity building initiative that assesses health and environment linkages and uses the knowledge gained to create more effective national and regional policy responses to environmental threats to human health;

VII. Sustainable Development of Small Island Developing States

48. Small island developing States (SIDS) are a special case both for environment and development. Although they continue to take the lead in the path towards sustainable development in their countries, they are increasingly constrained by the interplay of adverse factors clearly underlined in Agenda 21, the Programme of Action for the Sustainable Development of Small Island Developing States, and decisions of the 22nd Special Session of the UNGA. Actions at the international, regional and national levels are required to:

103. Extend assistance to local communities and appropriate national and regional organizations of SIDS for comprehensive hazard and risk management, disaster prevention, mitigation and preparedness and help relieve the consequences of disasters, extreme weather events and other emergencies;

104. Support the finalization and early operationalization of economic, social and environmental vulnerability indices and related indicators for the promotion of the sustainable development of the small island developing States;

105. Launch a global initiative aimed at assisting small island developing States in mobilizing adequate resources and partnerships for their adaptation needs relating to climate change, including extreme weather events, climate variability, and sea level rise

VIII. Sustainable development initiatives for Africa

106. Deal effectively with natural disasters and conflicts through initiatives to:

107. Strengthen the capacities of African countries, including institutional capacity, for the assessment, prevention, management of and preparedness for such natural disasters and conflicts;

108. Provide support to African countries to enable them to better deal with the displacement of people as a result of natural disasters and conflicts;

VIII. Means of Implementation

109. Reduce the debt burden of developing countries, with actions at all levels to:

110. Implement speedily, effectively and fully the enhanced Heavily Indebted Poor Countries (HIPC) Initiative, which should be fully financed through additional resources and take, as appropriate, measures to address any fundamental changes in countries' debt burden caused by natural catastrophes, severe terms-of-trade shocks or conflict;

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111. Urgent action is required at all levels to promote, facilitate, and as appropriate, finance the development, transfer and diffusion of environmentally sound and cost-effective technologies and the corresponding know-how, to and among developing countries, with action to:

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

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75. Improve policy and decision-making at all levels through, *inter alia*, improved collaboration between natural and social scientists, and between scientists and policy-makers, with action to:

113. Make greater use of integrated scientific assessments, risk assessments, and interdisciplinary and inter-sectoral approaches;

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97. Promote the development and wider use of earth observation technologies to collect data on environmental impacts, land use and land-use changes, with action to:

(a) Strengthen cooperation and coordination among global observing systems and research programmes for integrated global observations, taking into account the need for sharing of data from ground-based observations, satellite remote sensing and other sources among all countries;

(b) Develop information systems that make the sharing of valuable data possible, including the active exchange of Earth observation data.

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97. Support efforts to prevent and mitigate the impacts of natural disasters, through action to;

(a) Provide unrestricted and 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.