



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS

Commission on Sustainable Development
acting as the preparatory committee for the
World Summit on Sustainable Development
Second preparatory session
28 January – 8 February 2002

NATURAL DISASTERS AND SUSTAINABLE DEVELOPMENT: UNDERSTANDING THE LINKS BETWEEN DEVELOPMENT, ENVIRONMENT AND NATURAL DISASTERS

Background Paper No. 5

SUBMITTED BY THE
UNITED NATIONS INTERNATIONAL STRATEGY FOR DISASTER REDUCTION

DESA/DSD/PC2/BP5

**Background document for the
World Summit on Sustainable Development (WSSD)**

**Natural Disasters and Sustainable Development:
understanding the links between development,
environment and natural disasters**

This background document is being prepared as an evolving document in a contribution to the process leading to the World Summit on Sustainable Development (Johannesburg, September 2002). It is prepared by the UN Inter-Agency Secretariat of the ISDR in collaboration with UNDP, UNEP, UNHCS, UN/DESA and UN/OCHA. Valuable comments were also received from participants at the Expert Meeting on Environmental Management and Disaster Risk Reduction: a Gender Perspective, held in Ankara, 6-9 November 2001. It was also reviewed and commented on by participants at the fourth meeting of the Inter-Agency Task Force on Disaster Reduction held in Geneva, 15-16 November 2001, by experts attending the Hemispheric Conference on Disaster Risk Reduction, San José, Costa Rica, 4-6 December 2001, as well as from NGOs and other stakeholders.

In its current version, it will be presented to the second meeting of the Preparatory Committee for WSSD (New York, 28 January-8 February 2002). The ISDR Secretariat plans to continue developing this document by discussing it at additional sectoral stakeholder and regional meetings of ISDR. Revised and expanded versions will be presented at the third and fourth meetings of the Preparatory Committee (New York, March and Jakarta, May 2002) and at the WSSD itself.

Natural Disasters and Sustainable Development - understanding the links between development, environment and natural disasters -

" 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

1. Can sustainable development along with the international 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 to take the increasing costs and losses due to natural disasters? The short answer is, no.

2. Disaster reduction policies and measures need to be implemented, with a two-fold aim: to enable societies to be resilient to natural hazards while ensuring that development efforts do not increase the vulnerability to these hazards. Disaster reduction is therefore emerging as an important requisite for sustainable development to be included in the follow up to Agenda 21.

I. Natural Disasters - Impact on Development

3. During the past four decades, natural hazards such as earthquakes, droughts, floods, storms and tropical cyclones, wildland fires, and volcanic eruptions have caused major loss of human lives and livelihoods, the destruction of economic and social infrastructure, as well as environmental damages. Economic losses have increased almost ten times² during this period. In recent years, floods in Bangladesh, Ethiopia, Guinea, India, Mozambique, Nigeria, Sudan, Thailand, Venezuela, Vietnam and Algeria, volcanic eruptions in Indonesia, Montserrat, Ecuador and the Philippines, and earthquakes in Japan, Turkey, El

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 Munich Re. Topics 2000, Natural Catastrophes - the current position.

Salvador, Indonesia, India and Peru have created widespread social, economic and environmental destruction. In some cases, natural disasters can amplify man-made emergencies or vice versa, as epitomised by the ongoing drought and unfolding events in Afghanistan.

4. The escalation of severe disaster events triggered by natural hazards and related technological and environmental disasters are increasingly posing a substantive threat to both sustainable development and poverty-reduction initiatives. The associated 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. This trend led to the adoption of the International Strategy for Disaster Reduction (ISDR)³ 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 Reduction⁴, as the international mechanisms to coordinate the development and implementation of the ISDR.

5. In addition to the projected estimation of 100,000 lives lost each year due to natural hazards, the global cost of natural disasters is anticipated to top \$300 billion annually by the year 2050⁵, if the likely impact of climate change is not countered with aggressive disaster reduction measures. Many indirect and secondary effects on economic activities, such as changes in fiscal policies or the long-term consequences of the reallocation of investment resources, go unrecorded. When indirect losses are addressed, it might be noted as an example that losses to in the informal sector, in most cases women's work, are both difficult to assess and critically important to long-term household recovery in many instances. Environmental impact of natural hazards, in particular the loss of environmental services (water, forest, biodiversity, ecosystem function, etc.) is still difficult to assess and, often under-estimated. Indirect economic losses of 'market share', following the disruption to trade following a disaster, can also go largely unnoticed. For example, almost seven years after the Great Hanshin earthquake in Kobe, Japan, devastated the facilities of one of the country's primary ports, the equipment and harbor facilities have all been rebuilt and

³ Resolution UN General Assembly 54/219.

⁴ By UN General Assembly resolution 54/219, on 3 February 2000.

⁵ SEI, IUCN, IISD: Coping with Climate Change: Environmental Strategies for Increasing Human Security, August 2001 (Source: MunichRe and UNEP).

modernized, yet the amount of shipping trade in Kobe has dropped by about fifteen percent from pre- earthquake revenues⁶.

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 countries⁷ and, although smaller in absolute figures, the percentage of economic loss in relation to the Gross National Product (GNP) in developing countries far exceeds the ones in developed countries. This fact becomes even more relevant for small island developing states (SIDS). 24 of the 49 least developed countries still face high level 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 on human development.⁸ 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 local community levels been taken into account.

7. While the world has witnessed an exponential increase in human and material losses due to natural disasters, there are ongoing debates on the increase of the frequency and intensity of extreme hydrometeorological events, due in particular to climate change. There is however, no evidence of more frequent or intense earthquakes or volcanic eruptions. The reasons for increased losses are rather to be found in the global rise of people's vulnerability - and particularly poor women - induced by current and human determined paths of development. The effects of climate change and the risks posed by the increasing degradation of the environment, epitomised by deforestation, loss of biodiversity and associated knowledge, reduced water quality and supply and desertification, can only contribute to increased concern on these issues. The capacities to cope with the disaster impact are different depending on social groups; poor and rich, men and women, young and old, indigenous or non-indigenous, etc.

II. Need to reverse trends in vulnerability to natural disasters

8. The emphasis on disaster response and humanitarian assistance has absorbed significant amounts of resources, which would normally be 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.

⁶ Asian Disaster Preparedness Centre, Kobe, November 2001.

⁷ World Bank. World Development Report, 2000-1:170.

⁸ UNDP, ERD. Disaster Profiles of the Least Developed Countries. May 2001.

9. Vulnerability to disasters is a function of human action 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, public policy and administration, the wealth of a given society and organized abilities in all fields of disaster and risk management. The specific dimensions of social, economic and political vulnerability are also related to inequalities, often related to gender relations, economic patterns, and ethnical or racial divisions. It 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 a natural hazard to occur. 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 make exposure to natural hazards turn into disasters. These are all related, inter-dependant processes, dealt with elsewhere in Agenda 21⁹, but they have not been sufficiently emphasized from a disaster risk reduction perspective. Lack of awareness among the public and decision-makers about 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 the trends of increased demographic pressure especially in developing countries, and particularly in least developed countries, escalated environmental degradation, increased human vulnerability and the intensity of the impact of disasters. Environmental degradation increases the intensity of natural disasters, and is often the factor that transforms a natural hazard, or a climatic extreme such as heavy downpour, into a disaster. . For example, river and lake floods are aggravated or even caused by deforestation, which causes erosion and clogs rivers, situation of riverbeds and other factors. Poverty and hazard vulnerability is integrally linked and mutually reinforcing. The poor are compelled to exploit environmental resources for survival, therefore increasing both the risk and exposure to disasters, in particular those triggered by floods, drought and landslides.

⁹ 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”, Programme 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”.

12. Adapted, 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. Poor people in developing countries are more vulnerable to these environmental changes than their richer counterparts, in particular as they have no options to cope, and recover from their impacts. Deforestation, land degradation, and the related food security are shaped by the practices of men and women who make livelihood decisions about how to use these resources. These decisions (motivated by poverty, migration, illness, etc.) may have a profound impact on the environment, as well as access to food.

13. Least developed countries are subject to the highest rates of population growth, with a projection to double in less than 30 years. Poverty and social and economic pressures, such as migration, unemployment, AIDS, illegal land tenure practices, etc., 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, the factors that make people vulnerable –such as unemployment, political instability, poor economic conditions and unequal distribution of wealth, lack of personal security and violation of human rights. Repeated exposure to disasters can lead into a downward spiral of chronic poverty, even though poverty alone is not the only disaster vulnerability.

- Trends related to climate change and disasters¹⁰

14. In industrialized and transition countries the non-sustainable over-use of resources causes pollution and ultimately leads to changes in the global changes in the environment. In particular, there is an increasing likelihood of human induced climate change¹¹, which according to the latest projection of the Intergovernmental Panel on Climate Change will result in more water-related disasters, in particular for countries in tropical and sub-tropical latitudes. These changes in temperature and related local rainfall variations affect on the one hand the environment, through accelerated desertification and degradation, and on the other hand gender specific, socio-economic factors, such as water resources, human health, agriculture and fisheries. In addition, climate change is expected to affect sea levels and 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.

¹⁰ Relates to the UN Framework Convention on Climate Change and the UN Convention to Combat Desertification.

¹¹ IPCC. Intergovernmental Panel on Climate Change, Working Group II, 19 February 2001.

15. Sea-level rising will further exacerbate this situation in small islands and low-lying coastal areas. Storm surges may have increased coastal erosion and damage to human settlements because of the removal or damage of 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 under threat.

- Migration, unplanned urbanization and increasing vulnerability of infrastructure

16. Rapid urban growth, in particular, when accompanied by the influx of huge stream of poor migrants from rural areas is one of the main factors contributing towards 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 and/or sealing (use of concrete and asphalt) increase the volume and speed of rainfall runoff thus making many cities more vulnerable to flash floods. 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.

17. The destruction of the natural sources of life 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 1990's, 60 to 70% of urbanization was unplanned¹², often in areas, which are adjacent to industrial zones, known to be highly seismic or flood prone. Female-headed households are often disproportionately represented in these informal settlements. In the past three decades, the urban population of developing countries has tripled to 1.3 billion. 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 disasters strikes.

- Increasing infrastructure vulnerability

18. 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 to increase short-term economic returns on their investment. Drought causes problems for energy production in hydroelectric power plants.

19. ***“Domino” effect***: natural hazards can trigger technological hazards, which in turn cause and environmental and humanitarian disaster. In major industrial infrastructure areas, extreme natural hazards such as earthquakes or floods can result in environmental disasters,

¹² UNCHS, Risk and Disaster Management Unit, Urban Development Branch: ISDR public awareness kit, September 2001.

a fact not given due consideration in some regions. This should be taken into account in all aspects of risk assessment (environment, humanitarian and technological risk assessment).

20. **Globalization effect:** Current trends towards a globalized society have made societies much more dependent on services and infrastructure “life lines”, in both urban and rural areas, including transportation, water, electric, gas, drainage, storage facilities and communication networks. A failure of these services due to natural or other disasters can have considerable consequences even for people in areas not directly affected. The concentration of political, economic and other resources and assets in one urban area can have national, regional or even international repercussions. Women are primary users of social services and infrastructure in support of their families. Failures in these systems affect them profoundly, and help account for why women are so often organized at the local level to improve and make more secure vitally needed services.

III. Strategies for development policies to reduce vulnerability to disasters

21. There is a wide variety of ways in which disaster risk can be reduced as part of development policies. These involve gender-sensitive regulatory and legal measures, institutional reforms, improved analytical and methodological capabilities, education, awareness, financial planning and political commitment. Disaster reduction is aimed at motivating societies at risk to become engaged in the conscious management of risk and reduction of vulnerability. This must expand beyond traditional response to and defense against the impact of natural hazards, as an ongoing process that does not focus on singular disaster events. It is gender sensitive, multi-sectoral and interdisciplinary in nature and comprises a wide variety of interrelated activities at the local, national, regional and international levels.

22. Based on the lessons from the International Decade for Natural Disaster Reduction (IDNDR, 1990-99)¹³ four overriding objectives have been formulated in order to effectively reduce the impact of disasters, as the guiding principles for the International Strategy for Disaster Reduction¹⁴. These overall objectives set the stage for the course of action for Governments, organizations of the UN System, regional bodies and civil society organizations:

- **Obtaining the commitment from public authorities.** This objective needs to be addressed through an increased inter-sectoral coordination at all levels, risk management strategies, the allocation of appropriate resources including development of new funding mechanisms. Disaster reduction should be dealt with as a separate

¹³ 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.

¹⁴ ISDR Inter-Agency Task Force. Framework for Action for the Implementation of the International Strategy for Disaster Reduction, May 2001.

policy issue and as cross cutting in relevant fields of government (health, agriculture, food security, environment, etc.) aiming at policy integration among the various sectors.

- **Increasing public awareness** and public participation on how to reduce vulnerability to hazards. This involves programmes related to formal and non-formal education and needs to be addressed through public information, education and multi-disciplinary professional training. Needless to say that media and school systems around the world have a crucial role to play.
- **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, NGOs and community-based organizations (CBOs). This calls for strong coordination mechanisms, such as appropriate institutional structures 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.
- **Fostering better understanding and knowledge of the causes of disasters** through the transfer and exchange of experience and 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 impacts of disasters, disaster databases, coping strategies of different social groups, early warning processes, as well as the promotion of scientific research, valuing of indigenous knowledge and the development and transfer of knowledge and technologies.

23. The **relationship between disaster and risk reduction and globalization** will constitute a major challenge in the formulation of future disaster reduction strategies to protect investment and secure that trade opportunities are 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 have 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. Close relationship with the private sector and local communities need to be developed in this regard.

24. **Transboundary nature of natural hazards** : The causes and impacts of natural hazards often occur in a number of neighbouring countries highlighting the need for a harmonised approach in the management of such a phenomenon. Efficiency can be optimised via exchange of experiences amongst countries and constructive dialogue amongst stakeholders via participatory processes. Prioritisation of tasks in the various phases of disaster management (prevention, preparedness, response, rehabilitation and recovery) has to be agreed upon to cope with such situations.

IV. Course for specific action

25. As mutually supportive areas of action, related to the objectives outlined above, the following areas should be considered as key elements for development actions:

26. **Capacity building and strengthening of institutional arrangements** at all levels to address risk reduction as an ongoing function, including disaster reduction related legislation, covering land-use regulation, building codes and reinforced links to environmental protection. Capacity building at a national level needs to include the development of an integrated disaster risk management plan that covers areas of risk assessment, early warning systems, training and public awareness programmes, as well as emergency response management, recovery resources, including the strengthening of community based organizations. It also includes the increased capacity and sectoral synergies for sustainable management of forest and water-resources.

27. Development of gender sensitive **public awareness programmes** and campaigns on the relationships between sustainable development, natural hazards, vulnerabilities and disaster to enhance disaster reduction measures. The process starts in schools with educational programmes including curricula revision, teachers training and development of resource centres. It needs to expand to all levels of society by training efforts, with special emphasis on professionals and community based leaders and organizations.

28. Creating and implementing **comprehensive urban development strategies and land use plans**, which provides a number of opportunities to mitigate damages caused by hazards. As location is the key factor, which determines the level of risk associated with a hazard, land-use plans and mapping should be used as tools to identify the most suitable usage for vulnerable areas (e.g., location of buildings, roads, power plants, storage of fuels). Local governments need to play an increasing role with regard to factors such as building standards, land and property markets, land and housing taxation, planning processes and infrastructure construction and management.

29. Global, regional, national and local **early warning systems** and preparedness schemes (in cooperation with relevant international agencies) need to be strengthened and made more effective. . 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, to act in a timely and appropriate manner to reduce the probability of suffering, personal damage, death and property losses. Early warning must be more than a technological instrument to detect, monitor and submit warnings/alerts. It should also include risk assessment and combine efforts by all sectors to plan ahead and build people's capacity to respond rapidly at the local level (empowering) and more specifically, to identify increasing vulnerabilities in their communities. It 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 utilisation of indices and indicators as an important tool for environmental vulnerability and risk assessments needs to be promoted.

30. 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.

31. **Development projects should take into account risk assessment** at the appraisal stage. Environmental Impact Reviews 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. In rural programmes and drought prone areas, specific regard should be given to food-security and promotion of agriculture techniques and inter-cropping that reduce hazard-related agriculture losses. Gender impact analysis should also be taken into account, highlighting the integration of gender equality, sustainable development goals, and risk reduction.

V. Legacy of the World Summit on Sustainable Development (WSSD)

32. Losses from natural disasters will continue to increase if we do not shift towards proactive solutions. Disaster reduction is both an issue for consideration in the sustainable development agenda and a crosscutting issue 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 constitute another milestone that brings the issue into the development agenda as part of economic, social, environmental, as well as humanitarian concerns. Disaster reduction should be part of the Johannesburg legacy and Programme for Action, in order to further the goals and partnerships of the International Strategy for Disaster Reduction.

Geneva, 19 December 2001