

# ***Reducing Disaster Risk: A Challenge for Development***

*A GLOBAL REPORT*



United Nations Development Programme  
Bureau for Crisis Prevention and Recovery  
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## Executive Summary

Some 75 percent of the world's population live in areas affected at least once by earthquake, tropical cyclone, flood or drought between 1980 and 2000.

The consequences of such widespread exposure to natural hazard for human development is only now beginning to be identified. *Reducing Disaster Risk: A Challenge for Development* plays a role in this learning process.

Natural disaster risk is intimately connected to processes of human development. Disasters put development at risk. At the same time, the development choices made by individuals, communities and nations can generate new disaster risk. But this need not be the case. Human development can also contribute to a serious reduction in disaster risk.

This Report shows that billions of people in more than 100 countries are periodically exposed to at least one event of earthquake, tropical cyclone, flood or drought. As a result of disasters triggered by these natural hazards, more than 184 deaths per day are recorded in different parts of the world.

This Report demonstrates that development processes intervene in the translation of physical exposure into natural disaster events. This is demonstrated by the observation that while only 11 percent of the people exposed to natural hazards live in countries classified as low human development, they account for more than 53 percent of total recorded deaths.

The Report argues that disaster risk is not inevitable and offers examples of good practice in disaster risk reduction that can be built into ongoing development planning policy. These examples are summarised in this Executive Summary.

### I. Development at Risk.

**Meeting the Millennium Development Goals (MDGs) is severely challenged in many countries by losses from disasters.**

The destruction of infrastructure and the erosion of livelihoods are direct outcomes of disaster. But disaster losses interact with and can also aggravate other financial, political, health and environmental shocks. Such disaster losses may setback social investments aiming to ameliorate poverty and hunger, provide access to education, health services, safe housing, drinking water and sanitation, or to protect the environment as well as the economic investments that provide employment and income.

**A considerable incentive for rethinking disaster risk comes from the goals laid out in the Millennium Declaration.**

The MDGs direct development planning towards priority goals. Each of these goals interacts with disaster risk. These goals will potentially contribute to a reduction of human vulnerability to natural hazard. But it is the processes undertaken in meeting each goal that will determine the extent to which disaster risk is reduced. This implies a two-way relationship between the kind of development planning that can lead to the achievement of the MDGs and the development processes that are currently associated with an accumulation of disaster risk.

The primary responsibility for achieving MDGs lies with individual countries. New windows for environmental sustainability have been discussed at the World Summit on Sustainable Development, held in Johannesburg, South Africa in 2002. For example, Poverty Reduction Strategy Papers need to take disaster risk and environmental sustainability into account. Bringing disasters and development together also requires a better integration between the humanitarian and development communities.

## **How Can Development Increase Disaster Risk?**

There are many examples of the drive for economic growth and social improvement generating new disaster risks. Rapid urbanisation is an example. The growth of informal settlements and inner city slums, whether fuelled by international migration or internal migration from smaller urban settlements or the countryside, has led to the growth of unstable living environments. These settlements are often located in ravines, on steep slopes, along flood plains or adjacent to noxious or dangerous industrial or transport facilities.

Rural livelihoods are put at risk by the local impacts of global climate change or environmental degradation. Coping capacity for some people has been undermined by the need to compete in a globalising economy, which at present rewards productive specialisation and intensification over diversity and sustainability.

## **Can Development Planning Incorporate Disaster Risk?**

The frequency with which some countries experience natural disaster should certainly place disaster risk at the forefront of development planners' minds. This agenda differentiates between two types of disaster risk management. *Prospective disaster risk management* should be integrated into sustainable development planning. Development programmes and projects need to be reviewed for their potential to reduce or aggravate vulnerability and hazard. *Compensatory disaster risk management* (such as disaster preparedness and response) stands alongside development planning and is focused on the amelioration of existing vulnerability and reduction of natural hazard that has accumulated through past development pathways. Compensatory policy is necessary to reduce contemporary risk, but prospective policy is required for medium- to long-term disaster risk reduction.

## **Bringing disaster risk reduction and development concerns closer together requires three steps:**

- a. The collection of basic data on disaster risk and the development of planning tools to track the relationship between development policy and disaster risk.
- b. The collection and dissemination of best practice in development planning and policy that reduce disaster risk.
- c. The galvanising of political will to reorient both the development and disaster management sectors.

## **II. International Patterns of Risk.**

**UNDP has begun development of a Disaster Risk Index (DRI) in order to improve understanding of the relationship between development and disaster risk.**

The findings of the DRI project, presented in this Report, enable the measurement and comparison of relative levels of physical exposure to hazard, vulnerability and risk between countries and the identification of vulnerability indicators.

Four natural hazard types (earthquake, tropical cyclone, flood and drought), responsible for 94 percent of deaths triggered by natural disaster were examined and the populations exposed and the relative vulnerability of countries to each hazard were calculated.

**In the last two decades, more than 1.5 million people have been killed by natural disasters.**

Human deaths are the most reliable measure of human loss and are the indicator used in this Report. However, as with any economic data, this reveals only the tip of the iceberg in terms of development losses and human suffering. Worldwide, for every person killed, about

3,000 people are exposed to natural hazards.

In global terms and for the four hazard types assessed, disaster risk was found to be considerably lower in high-income countries than in medium- and low-income countries. Countries classified as high human development countries represent 15 percent of the exposed population, but only 1.8 percent of the deaths.

*Earthquake* – About 130 million people were found to be exposed on average every year to earthquake risk as defined in this Report. High relative vulnerability (people killed/exposed) was found in countries such as the Islamic Republic of Iran, Afghanistan and India. Other medium development countries with sizeable urban populations, such as Turkey and the Russian Federation, were also found to have high relative vulnerability, as well as countries such as Armenia and Guinea that had experienced an exceptional event in the reporting period.

*Tropical Cyclone* – Up to 119 million people were found to be exposed on average every year to tropical cyclone hazard and some people experienced an average of more than four events every year. High relative vulnerability was found in Bangladesh, Honduras and Nicaragua, all of which had experienced a catastrophic disaster during the reporting period. Other countries with substantial populations located on coastal plains were found to be highly vulnerable, for example India, Philippines and Viet Nam. Small Island Developing States (SIDS) represent a high-risk group of countries. But comparing within this group pulls out differences, for example, between the relatively high vulnerability of Haiti and the lower vulnerability of Cuba and Mauritius.

*Flood* – About 196 million people in more than 90 countries were found to be exposed on average every year to catastrophic flooding. Many more people are exposed to minor or localised flood hazards that can have a cumulative

dampening impact on development, but do not cause major human losses in single events. They were not included in this assessment. High vulnerability was identified in a wide range of countries and is likely to be aggravated by global climate change. In Venezuela, high vulnerability was due to a single catastrophic event. Other countries with high vulnerability to floods included Somalia, Morocco and Yemen.

*Drought* – Around 220 million people were found to be exposed annually to drought and African states were indicated as having the highest vulnerability to drought. Methodological challenges prevent any firm country-specific findings being presented for this hazard. The assessment strongly reinforced field study evidence that the translation of drought into famine is mediated by armed conflict, internal displacement, HIV/AIDS, poor governance and economic crisis.

For each hazard type, smaller countries had consistently higher relative exposure to hazard and in the case of tropical cyclones, this was translated into high relative vulnerability.

### **What are the development factors and underlying processes that configure disaster risks?**

The analysis of socio-economic variables, available with international coverage, and recorded disaster impacts, enabled some initial associations between specific development conditions and processes with disaster risk. This work was undertaken for earthquake, tropical cyclone and flood hazard.

*Earthquake* – Countries with high urban growth rates and high physical exposure were associated with high levels of risk.

*Tropical cyclone* – Countries with a high percentage of arable land and high physical exposure were associated with high levels of risk.

*Flood* – Countries with low Gross Domestic Product (GDP) per capita, low local density of population and high physical exposure were associated with high levels of risk.

These findings had very high degrees of statistical significance and highlight the importance of urbanisation and rural livelihoods as development contexts that shape disaster risk. Consequently, further analysis was structured around these two development factors.

**If disaster risks are to be managed and reduced, change in development policy and planning is required at the national level.**

More effort should be given to the collection of sub-national disaster data. This will help build datasets and indicators with a national level of observation and a local scale of resolution that can enable the visualisation of complex patterns of local risk. For example, the accumulation of risk over time, in specific locations, and when catastrophic hazard events trigger multiple secondary hazards and numerous small-scale disasters. This kind of information is important for factoring disaster risk considerations into development policy at the national level. Locally specific data can also highlight the ways in which natural and man-made hazards (such as house fires) interact, allowing further refinement of policy.

**A multi-hazard DRI is an achievable task.**

The multi-hazard model is built from the socio-economic variables associated with individual hazards. The multi-hazard DRI is innovative in breaking away from a hazard-centred analysis of risk to one that has integrated analysis of risk that draws on vulnerability factors. There is scope in the model for the better integration of vulnerability variables (such as armed conflict) and hazards (such as volcanoes and landslides) as data becomes available. Future work should also seek to incorporate an assessment of the extent to which national policy has included risk

reduction and the impacts of such policy on disaster risk. Finally, it is hoped that the global multi-hazard DRI will pave the way for national level studies that combine disaster and socio-economic information.

### **III. Development: Working to Reduce Risk?**

For many people across the globe, development does not appear to be working. The increasing number and intensity of disasters with a natural trigger are one way in which this crisis is manifest.

Two key variables were associated with disaster risk in the DRI: *urbanisation* and *rural livelihoods*. For each, a critical dynamic pressure likely to shape the future characteristics of these variables was also examined. For urbanisation, we analysed *economic globalisation*, and for rural livelihoods, we analysed *global climate change*. However, a number of additional important development pressures - violence and armed conflict, the changing epidemiology of disease (HIV/AIDS), governance and social capital - did not have datasets of the necessary coverage and quality to be included in the DRI at the time of its calculation, and so are included to provide a stronger qualitative analysis.

**During this decade, population increase will occur most rapidly in urban areas in the countries of Africa, Asia and Latin America and the Caribbean, with more than half of the world population becoming urban by 2007.**

The average size of the world's 100 largest cities increased from 2.1 million in 1950 to 5.1 million in 1990. The complexity and sheer scale of humanity concentrated into large cities creates a new intensity of risk and risk-causing factors, but it is in small- and medium-sized towns that the majority of the urban population live. Smaller cities contribute less pollution to global climate change, but show high levels of internal environmental pollution and risk. Therefore, urbanisation is a real challenge for

planning and for the ability of the market to provide basic needs that can allow development without creating preventable disaster risks.

**Urbanisation does not necessarily have to lead to increasing disaster risk and can actually, if managed properly, help reduce it.**

There are a number of factors that contribute to the configuration of risk in cities. First, history is important. For example; when cities have been founded in or expanded into hazardous locations. Second, the urbanisation process leads to the concentration of populations in risk-prone cities, and risk-prone locations within cities. This is true in megacities and in rapidly expanding small- and medium-sized urban centres. When populations expand faster than the capacity of urban authorities or the private sector to supply housing or basic infrastructure, risk in informal settlements can accumulate quickly. Third, in cities with transient or migrant populations, social and economic networks tend to be loose. Many people, especially minority or groups of low social status, can become socially excluded and politically marginalised, leading to a lack of access to resources and increased vulnerability. The urban poor are often forced to make difficult decisions about risk. Living in hazardous locations is sometimes 'chosen' if it provides access to work, for example; in the city centre.

Urbanisation can also modify hazard patterns. Through the process of urban expansion, cities transform their surrounding environment and generate new risks. The urbanisation of watersheds can modify hydraulic regimes and destabilize slopes, increasing flood and landslide hazard.

As centres of cultural value expressed through the man-made environment, cities are also sites where the collective quality of life can be undermined if historic buildings are lost to disaster.

Urbanisation also has the power to radically shape disaster risks at the regional scale. Major investments in infrastructure and productive facilities, the development of new urban areas and trade corridors, and the unplanned urbanisation of new regions are all examples of modalities through which urbanisation can shape risk in broad territorial areas.

**Urbanisation is affected by dynamic pressures, such as economic globalisation.**

Globalisation and the growing interconnectedness of global society means that catastrophic events in one place have the potential to affect lives and public policies in distant locations. At the same time, globalisation also has the power to shape new local economic relationships and subsequent geographies of risk. Given that the decisions that generate such conditions (such as free trade agreements) are taken at the international level and without detailed knowledge and data of the territories potentially affected, it is uncommon that existing risk patterns are taken into account.

Economic globalisation can provide opportunities for the enhancement of livelihoods and the quality of life for those people and places benefiting from new investments. To prevent these investments from creating large inequalities and further polarising the world into those who are at risk and those who are not, the opportunities and benefits of globalisation need to be shared much more widely. The introduction of Poverty Reduction Strategy Papers as coherent guidelines for national development planning offers a tool for enhancing the place of equity for poverty and vulnerability reduction in development. Working to reduce inequality and vulnerability within the context of a globalising economy requires strong international, national and local governance.

**Rural livelihoods: About 70 percent of the world's poor live in rural areas.**

There is great variety in the structure of rural economies and societies and their interaction with the environment. However, there are recurrent themes that characterise how development shapes risk in the countryside. Rural poverty is one of the key factors that shapes risk to hazards such as a flooding or drought. The rural poor, who are most at risk, are often no longer subsistence peasants. Instead, rural dwellers depend on complex livelihood strategies, including seasonal migration or inputs from remittances sent from relatives living in cities or overseas. These new survival strategies are reconfiguring risk in the countryside.

Often the poorest in rural areas occupy the most marginal lands and this forces people to rely on precarious and highly vulnerable livelihoods in areas prone to drought, flooding and other hazards. Local ecological and environmental changes as a consequence of agricultural practices can itself create risk. For example, deforestation to make way for agricultural production often leads to soil erosion, loss of nutrients and eventually, the marginality of agriculture. In some circumstances, these processes can lead directly to the generation of new patterns of flood, drought, fire or landslide hazard.

For the majority of rural communities connected to the global economy, livelihoods are vulnerable to fluctuations in world commodity prices. When low commodity prices coincide with natural hazards, rural livelihoods come under high stress. However, those rural communities isolated from the wider market are not necessarily any less at risk. Instead, the pathways through which risk is configured are different. In particular, isolation tends to limit choices for any coping strategy.

**Rural livelihoods are affected by dynamic pressures such as global climate change.**

Global climate change brings with it long-term shifts in mean weather conditions and

the possibility of the increasing frequency and severity of extreme weather events – the latter is perhaps more threatening to agricultural livelihoods. Taken together, the effects of climate change increase uncertainty and the complexity of risk for everyone, including landless labourers, small-scale farmers, wealthy agriculturists and people whose livelihoods serve the rural economy.

While the developed nations of the world produce the majority of greenhouse gases, the burden of impact will be more severe on developing countries. They have larger vulnerable populations, national economies dependent on agricultural production and are less equipped to deal with extreme weather events.

The lack of capacity to manage and adapt to climate-related risks is already a central development issue in many developing countries, particularly in Small Island Development States. The lack of capacity to manage risks associated with current climate variability will likely also inhibit countries from adapting to the future complexity and uncertainty of global climate change.

Finally, where the dynamics of global climate change and economic globalisation are seen to interact, the shifting nature of hazard and disaster risk becomes even more apparent and hard to predict.

If development is to be advanced in countries affected by climate risks and if development is not to aggravate climate change risk, an integrated approach to local climate risk reduction needs to be promoted. Successful risk reduction approaches already practiced by the disaster risk community should be mainstreamed into national strategies and programmes.

**Violence and armed conflict, disease, governance and social capital are also important factors of risk.**

These themes have not been included in the analysis of vulnerability factors in the DRI exercise because of statistical constraints, but the themes are no less important.

During the 1990s, a total of 53 major armed conflicts resulted in 3.9 million deaths. The analysis undertaken in the DRI suggests that armed conflict and governance are factors that can turn low rainfall episodes, for example, into famine events. This is particularly the case in complex emergencies. At the turn of the 21st century, some countries suffered episodes of drought, earthquake or volcanic eruption on top of years of armed conflict, causing a particularly acute humanitarian crisis. Little or no attention has been paid to the potential of disaster management as a tool for conflict prevention initiatives, in spite of some encouraging experiences.

Epidemic diseases can be seen as disasters in their own right. They also interact with human vulnerability and natural disasters. There is a great deal of variation in the relationships between disease, disaster and development. Hazard events such as flooding or temperature increase in highland areas can extend the range of vector-borne diseases, such as malaria. HIV/AIDS and other diseases can exacerbate the disaster risks brought on by climate change, urbanisation, marginalisation and war. With HIV/AIDS, the able-bodied, adult workforce who would normally engage in disaster-coping activities is too weak from the disease. Or they are already dead, leaving households composed of the elderly and very young, who often lack labour capacity or knowledge.

Governance for disaster risk reduction has economic, political and administrative elements:

- Economic governance includes the decision-making process that affects a country's economic

activities and its relationships with other economies.

- Political governance is the process of decision-making to formulate policies including national disaster reduction policy and planning.
- Administrative governance is the system of policy implementation and requires the existence of well functioning organizations at the central and local levels. In the case of disaster risk reduction, it requires functioning enforcement of building codes, land-use planning, environmental risk and human vulnerability monitoring and safety standards.

There is more to good governance than reorganizing the public sector or redividing the responsibilities between different tiers of government. While governments bear the primary responsibility with regard to the right to safety and security, they cannot and should not shoulder these tasks alone. At national and international levels, civil society is playing an ever more active role in forming policies to address risk. The private sector also has a role to play in moving towards sustainable development that incorporates an awareness of disaster risk - a role that could be enhanced.

This Report offers a number of case studies for good practice in governance for disaster risk reduction. Over the last decade, the number of regional organizations addressing risk management issues has grown. In addition to developing their own expertise and policy initiatives, regional organizations can provide continuity to help maintain national level progress in development and disaster risk management.

At the national level, mainstreaming disaster risk reduction with development policy is a key challenge. The need for strong intervention following a disaster is recognised. The challenge now is to increase the focus on disaster risk reduction as a central element of ongoing development policy. A more integrated



approach calls for collaboration between government agencies responsible for land-use planning, development planning, agricultural and environmental planning and education as well as those organisations responsible for disaster management.

This approach requires decentralised disaster risk planning strategies that can empower communities and open the window for local participation. The most vulnerable in society are also often those most excluded from community decision-making and in many cases this includes women. Enabling participation in these circumstances requires a long-term commitment to social development as part of vulnerability reduction programmes.

The importance of a gendered perspective on risk and the opportunities raised by risk reduction for a gender-sensitive approach to development can be seen from encouraging experiences of civil society groups active in risk reduction and disaster recovery.

Within reforms, legislation often remains a critical element in ensuring a solid ground for other focal areas, such as institutional systems, sound planning and coordination, local participation and effective policy implementation. But the road of legal reform is not easy and not always sufficient to facilitate change. Legislation can set standards and boundaries for action, for example, by defining building codes or training requirements and basic responsibilities for key actors in risk management. But legislation on its own cannot induce people to follow these rules. Monitoring and enforcement are needed.

In recent years the concept of *social capital* has provided additional insights into the ways in which individuals, communities and groups mobilise to deal with disasters.

Social capital refers to those stocks of social trust, norms and networks that people derive from membership in different types of social collectives. Social capital,

measured by levels of trust, cooperation and reciprocity in a social group, plays the most important role in shaping actual resilience to disaster shocks and stress. Local level community response remains the most important factor enabling people to reduce and cope with the risks associated with disaster. But community ties can be eroded by long-term or extreme social stress.

The appropriateness of policies for enhancing the positive contribution of civil society depends on developmental context. For many countries in Africa, Latin America and Asia that have undergone structural adjustment and participatory development, the challenge may not be so much the creation of a non-governmental sector as is coordination.

#### **IV. Conclusions and Recommendations.**

This Report supports six emerging agendas within disaster risk reduction. These are summarised here.

##### **1. Appropriate governance is fundamental if risk considerations are to be factored into development planning and if existing risks are to be successfully mitigated.**

Development needs to be regulated in terms of its impact on disaster risk. Perhaps the greatest challenges for mainstreaming disaster risk into development planning are political will and geographical equity. These are problems shared through environmental management and environmental impact assessment. How to attribute responsibility for disaster risk experienced in one location that has been caused by actions in another location? Justifying expenditure in risk reduction will become easier as valuation techniques (including the DRI) that are available for indicating the positive contribution of risk reduction investments in development become more refined.

##### **2. Factoring Risk into Disaster Recovery and Reconstruction.** The argument made

for mainstreaming disaster risk management is doubly important during reconstruction following disaster events.

**3. Integrated Climate Risk Management.** Building on capacities that deal with existing disaster risk is an effective way to generate capacity to deal with future climate change risk.

**4. Managing the Multifaceted Nature of Risk.** Natural hazard is one among many potential threats to life and livelihood. Often those people and communities most vulnerable to natural hazards are also vulnerable to other sources of hazard. For many, livelihood strategies are all about the playing off of risks from multiple hazards sources – economic, social, political, environmental. Disaster risk reduction policy has to take this into account and look for opportunities for building generic as well as disaster risk specific capacities.

**5. Compensatory Risk Management.** In addition to reworking the disaster-development relationship, which this Report hopes to make a contribution towards, a legacy of risk accumulation

exists today and there is a need to improve disaster preparedness and response.

**6. Addressing Gaps in Knowledge for Disaster Risk Assessment.** A first step towards more concerted and coordinated global action on disaster risk reduction must be a clear understanding of the depth and extent of hazard, vulnerability and disaster loss.

Specific recommendations towards this end are to:

- a. Enhance global indexing of risk and vulnerability, enabling more and better intercountry and interregional comparisons.
- b. Support national and subregional risk indexing to enable the production of information for national decision makers.
- c. Develop a multi-tiered system of disaster reporting.
- d. Support context driven risk assessment.