

Chapter 3

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.

In the preceding chapters, the disaster–development relationship has been outlined and the extent of disaster risk and the key variables of human vulnerability found at the international scale have been reviewed. In this chapter, the analysis is expanded by providing more concrete evidence for the ways in which failures in development configure and prefigure patterns of disaster risk.

The central message of this chapter is that the strategic integration of disaster risk management within development planning can make a significant contribution to meeting the MDGs.

The choice of topics to be covered is guided by the evidence presented in Chapter 2. The variables of urban growth and agricultural land use were associated with vulnerability and the first task of this chapter is to use urbanisation and rural livelihoods as lenses through which to examine the disaster and development relationship. Neither urbanisation nor rural livelihoods are static phenomena and for each a key dynamic pressure is discussed — economic globalisation for urbanisation and global climate change for rural livelihoods.

The analysis of vulnerability undertaken by the DRI model is limited to those variables for which global datasets exist and can be compiled at the international level. Right now, a number of important development pressures, in which case study evidence suggests a close connection with disaster risk, do not have datasets of the necessary coverage and quality.

The second section of Chapter 3 aims to partially fill this gap by outlining the influence of violence and armed conflict, the changing epidemiology of disease (HIV/AIDS), governance and social capital on the disaster-development relationship.

Throughout the Chapter, case material and examples of good practice in overcoming development constraints are presented.

In a final discussion, the evidence provided in the Chapter is reviewed against the MDGs.

3.1 Risk Factors

In this section, an overview of two key variables that were associated with disaster risk in the DRI: *urbanisation* and *rural livelihoods*, is presented. For each, a critical dynamic pressure likely to shape the future characteristics of these variables is also examined.

For urbanisation, *economic globalisation* is discussed, and for rural livelihoods, *global climate change* is discussed.

In reality, both urbanisation and rural livelihoods will be impacted by economic globalisation and climate change while simultaneously interacting with each other through migration, financial flows and the transfer of information, goods and waste products.

In addition to urbanisation and rural livelihoods, the national HDI rank was associated with vulnerability to tropical cyclones in the DRI. In the analysis presented in this Chapter, the focus is on critical sectoral relationships rather than the broad background of human development. Consequently, HDI rank is integrated into the text, but not discussed as a separate theme. Similarly, rather than structure a discussion around environmental variables identified by the DRI (access to drinking water and man-made environmental degradation for drought hazard, and physical exposure for all other hazard types), they have been integrated into discussion throughout the Chapter. Environmental sustainability could be a theme for future editions of the Report.

3.1.1 Urbanisation

During the next decade, most of the world's population increase will occur 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. In developing countries, the number of cities with more than 1 million people has jumped sixfold since 1950. In the year 2000, the number of cities larger than 5 million was 41, and the United Nations believes this number will increase to 59 by 2015. This will add another 14 million people to the streets and homes of large cities. The complexity and sheer scale of humanity concentrated into large cities creates a new intensity of risk and risk-causing factors. This is a real challenge for planning and for the ability of the market to provide basic needs.¹

It is in small- and medium-sized towns that the majority of the urban population live. In 2000, more than half of the world's urban population lived in towns of less than 500,000 people.² Smaller cities contribute less pollution to global climate change, but show high levels of internal environmental pollution and risk.³ In smaller cities, very high rates of urban growth often coexist with a very limited technical and financial capacity to plan for and regulate urban expansion. That means that disaster risk considerations are very rarely factored into the urban development process.

The complexity of risk and vulnerability in cities suggests that dedicated high resolution data collection systems would be required in order to identify patterns of hazard, vulnerability and risk at a scale that can provide information for urban planning. For example, the national level disaster databases described in Chapter 2 point to house fire as a critical cause of death and loss in cities, a hazard type that is not highlighted in international databases.

The relationships between urbanisation and disaster risk are extremely complex and clearly context specific. Urbanisation does not necessarily have to lead to increasing disaster risk and can, if managed properly, contribute to reduce it. However, there are a number of key characteristics of the urbanisation process that can directly contribute to the configuration of risk.

Risk by origin

As was outlined in Chapter 1, cities may have been founded in highly hazardous locations for both political

and economic reasons. Lima, Peru for example, was a major political and economic centre in South America in the colonial period, but was founded in an area of very high seismicity. The city was severely damaged by destructive earthquakes in 1687, 1746, 1940, 1966 and 1970. This constitutes a case of *risk by origin* shared by other urban centres founded in the colonial period in Asia, Latin America and the Caribbean and Africa.

Increasing physical exposure

The urbanisation process leads to the concentration of population in cities and in districts within cities: both megacities and 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, informal settlements can explode. Some 50 percent to 60 percent of residents live in informal settlements in Bogota, Bombay, Delhi, Buenos Aires, Lagos and Lusaka; 60 percent to 70 percent in Dar es Salaam and Kinshasa; and more than 70 percent in Addis Ababa, Cairo, Casablanca and Luanda.⁴ In these conditions, everyday risks accumulate and prepare the way for disaster.

When cities are located in hazard-prone locations, this leads to a rapid increase in the number of people exposed to hazard — a phenomenon that has been described as physical exposure in the DRI.

Clearly, physical exposure itself does not explain nor automatically lead to increased risk. If urban growth in a hazard-prone location is accompanied by adequate building standards and urban planning that takes into account risk considerations, disaster risk can be managed and even reduced.

One way of planning to reduce urban risk is to compensate for losses in one neighbourhood by shifting patterns of production, consumption and servicing to nearby unaffected districts. This is difficult in the cities of Low and Middle Human Development countries, where more than half of the urban population may be living in illegal and unserviced neighbourhoods.

Despite less than half of Asia's population being urban, this world region includes six of the 10 largest cities in the world. Its importance as an urbanising region is set to increase as Asia and the Pacific has the highest urban population growth rate (2.7 percent) of any world region.⁵

BOX 3.1 EARTHQUAKE HAZARD AND DWELLING CONSTRUCTION STANDARDS: ALGERIA AND TURKEY

Algeria and Turkey are both recorded as having high vulnerability to earthquakes in the DRI. As Medium Human Development Countries with large urban populations exposed to earthquake hazard, they exhibit many of the characteristics of other countries at risk from earthquake hazards.

Lack of appropriate construction standards and failure to implement those standards that do exist are often cited as proximate causes of building failure and human loss from earthquakes in urban areas. In 2003, an earthquake causing more than 2,200 deaths hit Algiers and surrounding towns. Building collapse caused many deaths. It was found that public sector buildings (with the important exception of primary schools) were better constructed than buildings (mainly homes) in the private sector. This may be expected in a city with a sizeable informal housing sector, but the ability to construct appropriately in the public sector suggests that capacity does exist for safe building to be undertaken in the city.

Research following the Marmara earthquake in Turkey in 1999 has shown that high competition for contract design work and low levels of remuneration have reduced engineers' willingness to develop professional competence in disaster-proofing. Design engineers tend not to inspect on-site construction, allowing modifications that can compromise the buildings' resistance to earthquakes. The inability of municipalities to employ sufficient numbers of well-trained and paid personnel to inspect building work contributes to this dilemma. One possibility is to transfer construction supervision to the private sector with costs being carried by developers.

Source: Özerdem, A. (2003), and Government of Algeria (2003); www.proventionconsortium.org/articles/innovations.htm

The significance of both disasters and urbanisation for development in Asia has led to a number of innovative urban disaster risk management initiatives.

A number of projects have been implemented in the Philippines. For example, a project to reduce the vulnerability of two cities to natural hazards, beginning with the mitigation of floods in Naga City and followed by multi-hazard mitigation in San Carlos. In addition to hazard mapping and mitigation planning, the project emphasizes land-use planning, the formation of disaster management standards and the training of urban professionals. This is one of nine national demonstration projects initiated by the Asian Urban Disaster Mitigation Programme (AUDMP). Other projects are underway in Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Sri Lanka and Thailand.⁶

Social exclusion

Compared to rural areas, risk accumulation in cities is shaped by greater levels of social exclusion and the market economy.⁷ Social exclusion is tied to the high number of migrants at risk among rapidly expanding

BOX 3.2 COMMUNITY PARTICIPATION AND THE URBAN ENVIRONMENT IN RUFISQUE (SENEGAL)

Through community participation, nine low-income communities in the small Senegalese town of Rufisque were able to break the cycle of local risk accumulation and turn a public nuisance into a public asset.

Risk stemmed from a lack of sanitation. Much residential land lies below sea level and ground water sources of drinking water are easily polluted by sewerage from pit latrines. Together with the pollution of open spaces by excrement, dirty flood water and sewage has had a devastating effect on the health of the population, especially the children. Statistics prior to 1990 show high incidences of diarrhoea, dysentery and skin diseases.

Change began during the 1980s, when a government/INGO project was implemented to reinforce the coast and prevent loss of houses from coastal erosion. During this time, it became clear that the community was capable of joint action to improve the area. Today, through community efforts aided by Environmental Development Action in the Third World (ENDA-Third World) and The Canadian Host Country Participation Fund, and in collaboration with the Rufisque Local Authority, sanitation problems are well on their way to being solved. Horse-drawn carts collect rubbish and low-cost, narrow plumbing pipes dispose of waste water and sewage. Sewage, waste water and refuse all end up in a purification and recycling centre where young people treat and combine them to form compost for use in market gardens. The scheme is run by local management committees, which are democratically elected. Local people handle technical aspects and women and young people are active at all levels. In addition, most of the funding comes from the community itself and credit, initially provided by international funding, will soon no longer be necessary as it will be replaced by a local revolving credit system.

The local community actively participates in the scheme and women are prominent in all of this. Along with the other benefits, the project has enormously reduced the workload of women, compared to the situation before the scheme began. The safe disposal of rubbish, the elimination of excrement as a source of disease, the reduction of flies and mosquitoes and their accompanying diseases (such as malaria), have all improved both ecology and health. At the community level, the sanitation scheme reinforces the independence of the community and increases a sense of citizenship through training and interaction between various groups.

Above all, this example of urban governance and disaster risk reduction reveals a successful solution well suited to low-income areas.

Source: Gaye and Diallo (1997)⁸

urban populations. Social ties may be strong, but nevertheless tend to be less deeply held than those of rural communities. The market for goods in the city means little can be acquired without money, contrasting with rural areas, where it is often possible to obtain construction materials, water and food without the need of first earning money.

Little is known of the detailed interaction of multiple hazards with livelihoods and coping strategies in

cities. Work by PeriPeri and the Disaster Mitigation for Sustainable Livelihoods Programme, based in the University of Cape Town in South Africa, is one initiative that is seeking to generate knowledge in this area for Southern Africa.⁹ This is a first step in identifying the different qualities of disaster risk that affect different social groups, defined for example by age or gender, and for including those individuals most at risk in development planning programmes.

Migrants to the city are often at high risk from disaster. The functioning of land and property markets and inability of land-use planning to cope with rapid population growth means migrants frequently locate in hazard-prone locations. For example, in peripheral squatter settlements located in ravines, on unstable slopes or in flood-prone areas, or else in dense inner city slums.

Poor or non-existent sanitation, high unemployment and underemployment, deficient health and education services, insecure land tenure, crime and violence, and other factors configure a panorama of everyday risk.

For individuals caught up in the immediate concerns of daily survival, disaster risk management is often not a priority. However, at the scale of the city and over the medium- to long-term, sustainable development rests on the successful integration of disaster risk management into development planning. This is beginning to be recognised, for example, in the 1996 Habitat Agenda 'Disaster Prevention, Mitigation and Preparedness, and Post-disaster Rehabilitation Capabilities'.¹⁰ Municipal government will have a central role to play in strategic planning for disaster risk at this scale.

Modification and generation of hazard patterns

Through processes of urban expansion, cities transform their environments and their surrounding hinterlands and may generate and create new hazard patterns. For example, seismic hazard may be significantly greater on reclaimed wetlands and on landfills than in other areas of a city. The destruction of mangroves in coastal areas may increase hazard associated with storm surge. The urbanisation of watersheds — through settlement, land use change and infrastructure development — may modify the hydraulic regime and destabilise slopes and increase flood and landslide hazard.

Additionally, in cities the hazards of natural origin interact with those of technological and man-made origin. Inadequate waste disposal in riverbeds and ravines may cause floods. Refuse tips may themselves become hazards, as occurred in the Philippines in 2000 (killing 300) and Bogota in 1997. When natural hazards affect industrial plants, the resulting contamination and pollution may constitute additional and more serious hazards. In other words, cities are not just affected by hazards, they can be generators of hazards.

In Calcutta and Baroda, a project by the Asian Urban Disaster Mitigation Programme (AUDMP), Baroda Citizens Council (BCC), assisted by Urban Studies Centre and Times Research Foundation with input from the Government of India, has identified numerous manufacturing and hazardous materials storage sites that magnify natural hazard in densely populated urban areas of the two cities. The project consists of hazard mapping and vulnerability assessment, the development of guidelines for incorporating technological hazards into urban development planning, and implementing a mitigation strategy and emergency preparedness plan.¹¹

As it transforms the natural environment in and around cities, urbanisation generates and magnifies hazard problems. Quito exemplifies this relationship well as unplanned urbanisation and environmental degradation are compounding the hazards faced by a city population whose vulnerability and exposure are also increasing.

Between 1960 and 1995, the population of Quito quadrupled while its land area has also exponentially increased. The mountainous topography, where unplanned peri-urban settlement takes place, makes it difficult and expensive for the state to provide drinking water, sewerage, paved roads, electricity, waste collection and other services. The rate of deforestation through urbanisation has reached 247 hectares per year or more, increasing the instability of slopes and landslide hazard. Approximately 3,200 tons of solid waste per year is disposed of in ravines, obstructing drainage and increasing flash flood hazard. Brick manufacturing accounts for the destruction of another 116 hectares of forest per year while access roads also destabilise mountain slopes. The increased incidence of floods, flash floods, landslides, erosion and debris flow is being generated by the urbanisation process as the city configures its own risk scenario.¹²

Increasing physical vulnerability

In low- and middle-income countries, city governments have often proved ineffective in regulating the process of urban expansion through land-use planning and building codes. Unregulated low-income settlements, where land values are lowest, often occupy the most hazard-prone locations. Low building standards may reflect a lack of control and supervision in middle-income areas and the lack of resources to build hazard-resistant structures in low-income areas.

Hazard-prone locations are often preferred by the poor as a way of reducing everyday risks by gaining greater accessibility to urban services and employment, even though natural hazard risk may be increased. In central Delhi, a squatter settlement in the floodplain of the Yemuna River has been inhabited for more than 25 years. The settlement floods annually, but this is seen as the price to pay for living in the centre of the city at low cost.¹³

Rapid urban growth may also be accompanied by the physical and economic deterioration of established city areas, which were not necessarily risk-prone originally. Cities are not static and different areas fulfil different functions over time. The vulnerability of low-density residential areas in central locations can rapidly increase due to overcrowding and lack of maintenance as the former owners move to the suburbs and the area is transformed into a mixture of commerce and low-income rental housing. In Manila, the Philippines, for example, local flooding is concentrated in such densely populated areas and compounded by limited access to garbage collection, sanitation and drinking water.

The overcrowding and deterioration of inner city slum areas in Lima, Peru has been identified as a critical process of seismic risk accumulation in that city.¹⁴

Cultural assets at risk

Historical architecture is an important part of cultural heritage. This is valuable in itself, but also plays a role in economic development through helping to attract foreign investment or strengthen the tourism sector. The old centre of Quito provides an example of national architectural heritage at risk from disaster. The colonial architecture — that makes central Quito a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site — is

BOX 3.3 THE HURRICANE RESISTANT HOME IMPROVEMENT AND INSURANCE PROGRAMME FOR INFORMAL HOUSING IN THE CARIBBEAN

Small Island Developing States have some of the highest risk to tropical cyclones. Despite this, property insurance is generally not available to low-income households in the Caribbean. This is due to a combination of lack of legal property title, non-standard housing construction and affordability.

During the mid-1990s, the Caribbean Disaster Mitigation Project (CDMP) in collaboration with the Cooperative Housing Foundation introduced a Hurricane Resistant Home Improvement Programme in Dominica, Saint Lucia, St Kitts/Nevis and Antigua and Barbuda. Working through local NGOs, a training programme was initiated for building contractors, artisans and others working in the formal and informal building sectors. More than 145 local craftsmen were trained in safer construction techniques in Saint Lucia and Dominica. Safer construction manuals and minimum standards checklists were developed to guide retrofitting and home improvement work. NGOs also worked with local actors to establish a revolving loan fund to extend credit to low-income households to finance retrofitting work.

By 2001, the Saint Lucia safer housing programme had disbursed 43 home improvement loans and as of 2002, 371 homes have benefited from the programme. Although property insurance is generally not available to low-income households in the Caribbean, retrofitting was used to convince a local insurance broker to offer a group-based insurance programme for the beneficiaries of the scheme. Loan officers were trained in valuing the property and assessing the level of risk, which helped in keeping the underwriting costs low and making this innovative entry from the formal property insurance sector into the informal housing sector a reality.

Source: Vermeiren (2000), USAID (2001)¹⁵

as exposed to earthquake and volcanic hazard from the La Pichincha volcano as the low-income communities that live among the historical buildings in the overcrowded and poorly maintained city centre. The municipal government recognises this risk and has integrated architectural heritage into its disaster preparedness plan.

Urbanisation of new regions

Urbanisation can also configure new risk patterns over wide areas of territory as new economic relations unfold and communications links are developed. The construction of roads that link previously isolated areas to markets can trigger a rapid process of urban growth and territorial transformation — leading to a configuration of completely new risks that were not present previously. For example, the earthquakes that occurred in the Alto Mayo, Peru in 1990 and 1991; Limon, Costa Rica in 1991; and the Atrato Medio, Colombia in 1992; exposed new patterns of risk through urbanisation in regions that had a history of seismic activity, but which had never experienced earthquake disasters of this type before. Rapid expansion

of urban corridors, for example, along China's coast are actively reshaping patterns of exposure.

Disasters, such as the one associated with the landslide of Chima in La Paz, Bolivia in March 2003, point out the ways in which urbanisation can configure disaster risk. Landslide hazard had been shaped by mining activity that over time had weakened the stability of the hillside of Cerro Puculama. At the same time, the population of Chima was made up of temporary migrants dedicated to mining activities and with high levels of social and economic vulnerability. In this context, the heavy rains that provoked the landslide only transformed a scenario of pre-configured disaster risk.¹⁶

Access to loss mitigation mechanisms

Small hazard events that do not grab headlines destroy poor people's livelihoods and homes. Local floods, fires and landslides are a common occurrence in many cities. For low-income communities, risk is tied to a hazardous living environment with limited access to emergency services, sanitation or drinking water. For middle-income communities, scope exists for affordable housing insurance (whether arranged through a NGO, government agency or a commercial company) to act as a mechanism for spreading risks and losses if disaster strikes. Box 3.3 discusses a programme aimed at building resilience to risk by extending access to household insurance to low-income groups in the Caribbean.

There are many more examples of participatory urban risk reduction driven from the bottom up.¹⁷ Box 3.4 presents a case study of a participatory approach to urban risk management in Angola, which points towards the possibilities for bringing local actors, the government and private sector together in risk reduction.

According to the World Disasters Report, 'effective and accountable local authorities are the single most important institution for reducing the toll of natural and human-induced disasters in urban areas. An increasingly urbanised world actually holds the potential to greatly reduce the number of people at risk from hazards, but only if urban governments become more accountable to all their citizens'.¹⁸ This echoes work on urban governance that also argues for the key role to be played by municipal government as a champion for governance — linking public, private and civil society actors in the city and bridging the gap between international and national level actors on the one

BOX 3.4 THE LUANDA-SUL SELF-FINANCED URBAN INFRASTRUCTURE PROGRAMME, ANGOLA

In 2000, The Luanda-Sul Self-Financed Urban Infrastructure Programme in Angola won a Dubai International Award for Best Practices in Improving the Living Environment.

The programme succeeded in integrating the aims of reducing everyday hazard with those of enhancing development opportunities. Daily life hazards for residents were reduced through extending access to urban infrastructure. This included the construction of 70km of pipes providing drinking water, 23km of drainage, 12km of power lines, and 2,210 houses and adequate shelter for 16,702 people. Development gains were made in the process of enacting the programme by providing livelihood opportunities, enabling local participation and engaging the private sector.

The programme was initiated in 1995 as a partnership between Government agencies, the private sector, community-based organisations and the population living in temporary settlements, many of whom have been displaced by war.

Finance for the project came from three sources. First, the sale of land tenure rights derived from the allocation of public land for private development. Second, taxes raised from the sale of goods and services. Third, investments made by the private sector. The willingness of private investors to become involved in the programme was made possible through the Government issuing guarantees for private investments. The programme involved an initial investment of US\$ 30 million and a subsequent investment of US\$ 14 million.

The community participated in the design and planning of the programme and members were given the first option to buy land. Technical and human resources came from a team of urban and infrastructure experts. In addition, some 4,000 jobs were created in the implementation phase of the programme.

The process involved the identification of suitable land for urban development, the acquisition of the land from landowners by the state, the legislation of the status of the land according to a land-use plan and the mobilisation of capital investment by the private sector. Infrastructure development includes community facilities, schools, commercial establishments, an industrial estate and a hospital.

Continuity is provided as the programme is now part of the Luanda Master Plan, supported by the World Bank.

Source: <http://www.sustainabledevelopment.org/blp/awards/2000winners/summary.pdf>

hand, and urban or community level organisations on the other. Box 3.5 presents a successful urban governance regime case study that has reduced risk in Manizales, Colombia.

A dynamic pressure: economic globalisation

‘We believe that the central challenge we face today is to ensure that globalisation becomes a positive force for all the world’s people’.

This extract from the statement of the Heads of State and Government of the United Nations in the Millennium

BOX 3.5 URBAN GOVERNANCE FOR URBAN DISASTER RISK MANAGEMENT, MANIZALES (COLOMBIA)

Earthquakes are a recurrent hazard for Manizales. In the late 19th century, authorities banned the use of inherited colonial building technology and Manizales developed its own earthquake-resistant building style using local materials. This wall-building bahareque technique, based on wooden elements and local bamboo, has become the predominant method of construction in Manizales. Colombia’s national earthquake-resistance building code today recommends using this building technique in publicly subsidized homes after structural studies were made in the local university. The success of this technique was evident during the massive earthquake of 1938, which did not damage the city significantly. Similarly, the earthquakes of 1962, 1964, 1979, 1995 and 1999 caused only minor or moderate damage.

Since the 1980s, the city has had a municipal disaster prevention system in place, based on municipal development and land-use plans, that incorporates disaster risk management as a strategic and political cornerstone. Disaster preparedness has become part of the city’s culture. Prevention-related information and education activities are conducted regularly in schools. Drills are held periodically to ensure that awareness and alertness remain high. The mayor has a disaster risk advisor for inter-agency coordination and the city employs a team of professionals who work at scientific research centres. All residents who take steps to reduce the vulnerability of their homes receive a tax break as an incentive. A collective and voluntary housing insurance scheme has been promoted by the city. It is added to local bimonthly tax payments, with the aim of covering the tax-free lower socio-economic strata, once a defined percentage of taxpayers paying for the insurance has been achieved. Seismic micro-zonation has enabled the local administration to estimate the expected annual losses of its public buildings and insure them selectively.

The city administration of Manizales has produced a disaster risk plan that aims to translate state-of-the-art theory into practice, transfer best practices from current experiences in other places, focus on local participation and sustainability, and build in local ownership. Broader integrated risk management activities have reinforced a number of themes and issues related to organisational structures and inter-organisational coordination for risk identification and reduction, preparedness, response and recovery.

Source: Cardona et al (2002); http://www.alcaldiamanizales.gov.co/Manizales_Alcaldia/Informacion/Gesti3n+del+Riesgo/

Declaration was accompanied by a recognition that global economic and political ties — for the first time in history — offer an opportunity to fully confront global poverty.

Economic globalisation is not a new phenomenon, but the characteristics of the present form are distinctive from those of previous centuries. Shrinking space, shrinking time and disappearing borders are linking people’s lives more deeply, more intensely, more immediately than ever before.¹⁹

Today’s version of economic globalisation consists of the creation of new markets, the development of new

tools of communication, a global forum for negotiating economic interests (the World Trade Organization or WTO), and the elaboration of new rules relating to trade, services and intellectual property supported by powerful enforcement mechanisms.

From the point of view of disaster risk, 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 relations and subsequent geographies of risk.

Niche territories that may offer competitive advantages in a given economic sector may experience very rapid economic and urban growth, while other territorial niches enter into an equally rapid decline.

Given that the decisions that generate such conditions (such as free trade agreements) are taken at the international level and without detailed knowledge of the territories potentially affected, it is not surprising that risk patterns are generally not considered.

Strengthening mechanisms for collecting accurate, detailed information on risk patterns at the global level would help attempts to factor risk considerations into investment decisions. But at the same time, the fast-changing and turbulent nature of markets means that globalisation adds a new, unpredictable and troubling dimension to risk at the local level. This, and the lack of channels for local consultation and participation in global economic decision-making, makes disaster risk reduction planning increasingly complex and challenging.

In the best of cases, investors undertake risk assessments when considering location in order to minimise risk to their investment. However, the impact of that investment on the shaping of new risks in the surrounding region is rarely considered.

There is need for disaster risk assessment to be integrated into development planning. There are particular opportunities for integrating risk assessment into the planning of large-scale infrastructure projects and private sector investments where environmental and social impact assessments are commonplace. Such projects are often supported by the World Bank or regional development

banks. In both cases, there exists an opportunity to build risk assessment into development planning.

There have been many examples where past investment in large-scale power, irrigation and transport infrastructure has led to reconfigured and increased disaster risk. A contemporary example is a US\$ 4 billion investment in an oil pipeline between Chad and Cameroon, with funding from the World Bank agreed in 2003. The project brings a major boost to the Chadian national exchequer. However, the distribution of social costs and benefits in terms of disaster risk has not been examined. In these early stages, the potential for human development and the lowering of Chad's high relative vulnerability to drought that this financial boost could support, has not been fulfilled. The massive size of the development has caused inflation, doubling the price of basic foods and increasing risk of food insecurity among the poor. While it is hoped that such effects are temporary, they will clearly impact on people's well-being, health and livelihood security.

Economic globalisation can provide opportunities for the enhancement of livelihoods and life quality in those places receiving new inward investment. However, without appropriate government oversight, investment can encourage economic and residential development in hazardous places.

In Central America, disaster risk reduction is being considered in some ongoing regional investment programmes. CEPREDENAC has played a pioneering role in recording and analysing links between development policy and disaster risk.²⁰ New investment contexts, such as those being opened up by Plan Puebla Panama (a vast infrastructure construction project that covers nine states in south-southeast Mexico and the seven Central American republics) are being studied. One of the eight initiatives of the Plan Puebla Panama is the Mesoamerican Initiative for Disaster Prevention and Mitigation. This initiative aims to include risk reduction concerns at the different stages of development planning.²¹

Such initiatives are not the norm. Encouraging governments and investors to formally take account of disaster risk in their decision-making might be a first step in raising the profile of disaster in corporate social responsibility, as well as promoting the responsibility of employers for human rights and environmental stewardship in and beyond the workplace in order to prevent the accumulation of disaster risk.

Disasters can greatly disrupt trade. This can be felt through flooding, droughts or tropical cyclones affecting the export of primary commodities, which form the primary source of foreign exchange earning for a number of countries. Flooding in Bangladesh has affected garment-manufacturing units in export-processing zones of Dhaka and Chittagong and damaged the country's biggest export sector. In Bangalore, India flooding and public demonstrations in its aftermath undermined the efforts of the authorities to present an image of the city to global investors of an international centre for the high-tech industry.²²

Globalisation has greatly concentrated financial and data processing functions and subsequent disaster risk in urban centres. Disaster events that strike at key centres of the global exchange system for information, money and material resources, are particularly feared because they have the potential to create havoc throughout a vast web of interconnected states and societies.

The interconnectedness of contemporary global society has become apparent most recently through the impact of international tourism on disaster response in the

Caribbean. Tourism and agriculture are the mainstay of Caribbean island economies — sectors with high vulnerability to natural hazards.²³ There is a perception in tourism-dependent island economies that national disaster declarations — a pre-requisite for accessing international humanitarian assistance funds — will create a negative economic impact on the tourism industry, creating greater economic losses than the storm itself and prolonging the recovery period for the tourism sector. This has led to reluctance from governments to declare national disasters following disaster events. In turn, disaster relief agencies that require they only intervene in declared disaster situations have had to reconsider their policy.

The challenge of globalisation is to ensure that measures are in place to promote equity and opportunities for those households that find their former livelihoods constrained and their risks increased by the rapid flows of capital made possible by global information networks and investment mechanisms. The current globalisation of economies and ongoing regional integration processes²⁴ are creating new threats to and opportunities for human security.²⁵

BOX 3.6 WORLD BANK AND GOVERNANCE, POVERTY REDUCTION STRATEGY PAPERS

In responding to critiques of the structural adjustment process, which often led to high levels of social dislocation and exacerbated inequality and poverty, the World Bank has repackaged its development aid lending strategy through national Poverty Reduction Strategy Papers (PRSP).

Today, 21 countries have finalized three-year PRSPs and more than 30 other countries have begun progress in this direction. The PRSP approach helps to strengthen a focus on pro-poor strategies, encourages more consultation amongst stakeholders, provides a focus for strategic programming, highlights the importance of accurate poverty measurement, and encourages alignment of donor assistance in individual countries. However, in spite of progress being made, questions remain concerning the quality of stakeholder participation, country ownership of the process and necessary capacity building, the coordination of international assistance behind PRSPs, and the unrealistic timeframe of three years that was imposed by PRSP framework for sustainable poverty reduction to be realized. As a recent United Nations Conference on Trade and Development (UNCTAD) publication noted, effective poverty reduction will require policy

which moves 'beyond adjustment policies and anchors PRSPs, which are three-year plans of action, within long-term development strategies'.

The implications of PRSP for disaster-development relationships have yet to be concretely explored, but the early stages of an evolving development approach is an appropriate time to consider more seriously the role of disaster in development and particularly poverty reduction. Can the PRSP move disaster risk reduction forward?

One interesting case is Madagascar, a poor island-economy in the Indian Ocean sharing many development concerns with countries in sub-Saharan Africa. It had a per capita GDP of US\$ 260 and an extreme poverty headcount of 62 percent in 2000. It is frequently exposed to natural hazards, such as tropical cyclones, floods and droughts. The evidence presented in chapter 2 shows that this country has the thirteenth highest national population exposed to tropical cyclones, and has a higher than average relative vulnerability to droughts. Recently, within the context of the preparation for the Madagascar PRSP (2003), policy-makers have started paying increased attention to the role of shocks as a factor causing and perpetuating

poverty. This was especially so after a six-month long political crisis (see note 1 below), which contributed to a 6 percent increase in the national extreme poverty rate. As a result, the PRSP incorporates risk and vulnerability considerations into poverty analyses. And in strategic planning, such as land planning, agriculture and transports, effectively integrates disaster risk and development policy.

Note 1: The crisis was the result of the disputed presidential election in December 2001. For six months, the country had two parallel governments, each with its own central bank and administration. Clashes between the two parties led to the destruction of key infrastructure and claimed about a hundred lives. The domestic instability also led to the isolation of the economy, freezing of Madagascar's assets abroad, a suspension of foreign exchange trading and a closure of the T-bills market for several months. The lower estimate of the cost of the political crisis alone increase to 11 percent of GDP. This led to the discontinuing of many social services and caused widespread suffering (CAS, 2002). The shock also had a powerful negative impact on jobs, income and prices.

The transforming power of international financial investment for disaster risk can be seen in the mushrooming of business parks, free trade zones and transportation infrastructure to facilitate international trade and investment. Concentrated investment provides an opportunity for disaster risk reduction to be part of the development process. But time and again this has not been the case. The deepwater port in Dominica was designed to handle international trade. One year after construction, Hurricane David hit the port and required repairs equivalent to 40 percent of the original construction costs. Building disaster-proof design elements into the original plan would only have added 12 percent to construction costs.²⁶

New global and regional markets will very possibly intensify current trends, such as urbanisation and marginalisation of rural areas that shape disaster risk. Through structural adjustment policies, the World Bank/International Monetary Fund (WB/IMF) have played a significant role in shaping macro-economic policy and restructuring urban and rural livelihood opportunities and basic needs provision by the state.²⁷ More recently these institutions have taken on board the need for a pro-poor stance. This policy shift and its implications for disaster risk are explored in Box 3.6 (see previous page).²⁸

To prevent these inequalities from further polarising the world into those at risk and those who are not, the opportunities and benefits of globalisation need to be shared much more widely. This can only happen with stronger governance.

3.1.2 Rural livelihoods

The World Bank estimates that 70 percent of the world's poor live in rural areas. There is a great variety in the structure of rural economies and societies and their interaction with the environment. These dynamics shape local experiences of development and disaster risk and warrant against any easy generalisations. However, there are recurrent themes that characterise the ways in which flawed development can increase vulnerability and risk in the countryside.

Rural poverty

The absolute lack of assets and the precarious economies of many rural livelihoods is one of the key factors that configures risk to hazards such as floods and drought.

In severe droughts in the *sertao* of northeast Brazil, poor landless labourers are the first to reach a critical stage of asset depletion and be forced into either publicly funded emergency programmes or else into migration. Small landholders are often forced into selling their land to pay off debts created by the deficit in production and the need to buy food and basic necessities. Large-scale landowners, on the contrary, have better access to groundwater as well as credit.

The rural poor, who are most at risk, are often no longer subsistence peasants. In Haiti, for example, less than 30 percent of income in rural areas is derived from agriculture.²⁹ Instead, rural dwellers depend on complex livelihood strategies, including seasonal migration or inputs from remittances sent from relatives living in cities or overseas (see Box 3.18).

Many rural communities have sophisticated coping strategies that enable them to live and prosper in potentially hazardous environments. Shifting cultivation, nomadic cattle herding and intensive rice cultivation are three examples of specific agricultural systems that are well attuned to particular socio-environmental contexts.

Vulnerability can arise when the pressures that have shaped such coping systems over many generations rapidly change. Climate change is a key force that underlies such change and is discussed at length in the following section. Other driving forces for instability are increasing or decreasing populations, changing markets or local environmental degradation. Geographical information systems provide an opportunity for mapping the changing relationships between socio-economic, environmental and disaster risk variables, and can guide proactive disaster risk reduction planning.

The loss of adaptive capacity often comes from socio-economic structures that restrict flexibility in livelihood systems. In response, rural development initiatives have focused on programmes to foster livelihood diversity. Initiatives have included rural microfinance, cooperative production and marketing, and increasing the value added onto rural production through local skills training. Box 3.7 provides an account of the contribution of rural microfinance in building resilience to disaster stress in Bangladesh, a state with high exposure and vulnerability to tropical cyclones and flooding.

BOX 3.7 MICROFINANCE FOR DISASTER RISK MANAGEMENT IN BANGLADESH

Microfinance programmes include mechanisms for extending savings and insurance services to low-income groups.

Microfinance instruments can reduce risk by helping poor households diversify their income by source and season, and also by earner by providing earning opportunities for women. Diversifying income-earning opportunities and building assets through microfinance help poor households to offset disaster risk. If risk does materialise as disaster, microfinance can help again through loan forgiveness or rescheduling, enhancing the targeting of relief programmes through microfinance networks, improving the flow of information among the clientele of microfinance organisations, and the empowerment of women. An important feature of microfinance is its capacity to build social capital as expressed in specific mitigation measures.

The Bangladesh Floods, 1998

The role of microfinance services in responding to disaster risks was first demonstrated in Bangladesh during the 1998 floods. Approximately 100,000 square kilometres was inundated for two- and one-half months, affecting 30 million people. Damages to standing crops, livestock and houses virtually suspended the rural economy. During the floods, in addition to relief work

coordinated by the government and military, microfinance workers were able to help recovery by maintaining contacts with local scheme members. Workers carried money with them and provided immediate interest-free consumption loans so that the members would not go hungry. Different programmes, as discussed below, provided a number of specific financial services.

The Grameen Bank set up a Disaster Mitigation Task Force at the central level. It prepared and implemented a rehabilitation programme, which included new loan products and loan assistance for housing rehabilitation and agricultural production. The Bank gave fresh loans to members who had five to 10 installments remaining in the repayment schedule. The borrowers who had already paid half or more of their loans were eligible to take new loans for the amount that they repaid.

Two large NGOs with microfinance programmes were also involved:

The Bangladeshi Rural Advancement Committee extended loans to 240,000 families to support the repairing and rebuilding of homes. It also purchased 364 tons of rice in the open market and sold it at subsidized rates to group members.

The Proshika took up an emergency rehabilitation programme worth Tk50 million, through which

100,000 affected families were provided an interest-free loan of Tk500 each. It also supported a credit programme worth Tk30 million for aman, vegetables and winter crop cultivation.

In addition to these credit operations, all the programmes took up a number of relief and recovery activities, independent of their credit operations. For example, they set up medical centres and distributed food, drinking water, milk and medicine. They also agreed to support a number of activities in the non-farm sector, which would help the people affected by floods to resume their economic activities.

A number of factors contributed to the effective intervention of microfinance programmes in the 1998 floods. Programmes with good leadership responded quickly to the situation, availed of existing disaster mitigation funds or developed alternative fundraising strategies to meet the demand for resources. The involvement of committed field staff was also very important. Close monitoring allowed for the collection of information on the damage to assets and income of clients and loss of programme income as a result of potential drops in savings and repayment. On the basis of this information, programmes projected capital requirements for loans during the rehabilitation period.

Source: Vatsa (2002)

Environmental degradation

Often the poorest in rural areas occupy the most marginal lands and this forces people to lead precarious and highly vulnerable livelihoods in areas prone to drought, floods and other hazards. The densely populated agricultural communities of coastal Viet Nam and on the 'bunds,' or islands, in the delta of the Ganges in Bangladesh, are examples.

In some Central American and Andean countries, settlement of previously sparsely populated areas has been used as a strategy to overcome rural poverty in other areas of a country. However, the subsequent destruction of tropical forests to make way for agricultural production that is often poorly adapted to the new ecosystem, can lead to the generation of new patterns of flood, drought, fire and landslide hazard. This in turn increases the impoverishment of the migrants. At the same time, migration breaks the cultural relationship between the rural population and their environment, meaning that people are unaware of and unable to manage the hazards in their new environment.

Market pressures and government policies may also increase risks in rural areas. Subsidised cultivation of crops with a high demand for water in arid areas can increase drought hazard over time. The cultivation of coca for the lucrative drug market has led to the massive destruction of tropical forests in Colombia (more than 100,000 hectares are under coca cultivation), increasing flood, drought, fire and landslide hazard.

In the Islamic Republic of Iran, the negative effects of the severe drought that affected the country from 1999 through 2002 were magnified by non-climatic factors. In 2000, it was estimated that there were losses of US\$ 1.7 billion in livestock and crop production. In 2001, it was estimated that these losses increased to US\$ 2.6 billion. Additional effects of the drought included displacement from rural to urban areas, deterioration of public health and outbreak of water borne diseases, increased unemployment, the disappearance of wetlands of international significance, and increases in related hazards such as fires, wind and soil erosion, flood and landslide hazard. While severe deficits

of precipitation occurred over a three-year period, meteorological drought was magnified by the inappropriate use of water resources for irrigation and drinking. Irrigation water efficiency is only 35 percent, which suggests that two thirds of the water is lost. Per capita water usage in Tehran is 239 litres per day, compared to 120 litres per day in Western European countries. More than 25 percent of drinking water is lost in eroded pipes. Rangelands were being used for grazing three times more than their peak capacities in a non-drought year, resulting in severe degradation as well as accelerated soil erosion. The cultivation of high water-consuming plants, such as sugar beet, in arid areas is a further factor that depletes water resources.

Free trade and fair trade

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. In Nicaragua and Guatemala, the most impacted communities following a drought in 2001 were seasonal farm workers in depressed coffee-growing regions.

Ethiopia's rural economy depends on coffee revenues for a large part of its income. Fifty-four percent of the

country's exports come from coffee, so the current coffee price crisis is having a significant impact on the national economy. Ethiopia's export revenues from coffee declined from US\$ 257 million in 2000 to US\$ 149 million in 2001 — a 42 percent reduction in just one year. This drop in income is nearly twice the US\$ 58 million granted the country in debt reduction under a World Bank programme for Highly Indebted Poor Countries.

Fluctuations can be felt directly by those who extract a livelihood from the sale of primary resources (farmers, fishermen and foresters), but also by the rural landless who are reliant on selling their labour and may be the first to suffer in an economic downturn.

Isolation and remoteness

Those rural economies that are isolated from the global economy do not suffer from world market price fluctuations, but are not necessarily any less at risk. While in good years, dependence on local resources will insulate communities, in times of stress isolation tends to limit choices for coping strategies and may increase vulnerability. Reciprocal relationships, where wealthier individuals or households provide work or gifts for more food insecure groups, has been noted as an important risk reduction strategy in rural Asia and Africa.³⁰

BOX 3.8 CAN FAIR TRADE REDUCE RISK?

Economic development strategies oriented towards primary commodity exports can offer substantial benefits for local development. These strategies can also be held hostage to fluctuating world commodity prices or terms of trade negotiated with partners in bilateral or regional trade agreements. Fair trade offers the potential for guaranteed prices, often above minimum market rates. Fair trade also seeks to provide for the empowerment of all partners. This can mean the promotion of collaborative decision-making and the setting aside of resources for enhancing social development or ecological protection. For those communities facing disaster risk, access to higher and more predictable levels of income can help build resilience. Where social empowerment and ecologically sustainable development is practiced, the gains are magnified even more by enhancing the capacity to cope with natural hazard and avoid disaster.

Kuapa Kokoo is a Ghanaian cocoa growers cooperative which in 1998 joined forces with

Twin Trading, The Body Shop, Christian Aid and Comic Relief to found The Day Chocolate Company. Kuapa Kokoo own one third of the shares in the company and two elected farmer representatives sit on its board.

Kuapa Kokoo sells about 1000 tonnes of yearly output to the European fair trade market. This means that, providing their production methods meet internationally audited conditions, the producers receive a guaranteed price for their goods and the security of long-term trading contracts. In the case of cocoa, recent prices on the world market have fallen as low as US\$ 1,000 per tonne. In comparison, on the fair trade market they receive US\$ 1,600 per tonne, plus an extra US\$ 150. Even if the world market price reached US\$ 1,600, the fair trade price would still include the extra US\$ 150 on top of the world market price. Therefore, as well as the benefits that the farmers receive through being part of Kuapa Kokoo, they also benefit from the premium price paid for their cocoa on the fair trade market.

Kuapa Kokoo also has supported income-generating activities for women to supplement their incomes and to make them less dependent on men, as well as provide money for the family during the off-season while the cocoa is growing. For example, a project has been set up to make soap from the potash produced from burnt cocoa husks. This soap is then sold internationally, generating additional income from the waste cocoa materials.

Despite transaction costs, there is a growing waiting list of villages wanting to join Kuapa Kokoo. Training is all done in-house and the cooperative employs more than a dozen society support and development officers as part of its operations team. The buying and logistics as well as management systems have been gradually regionalised and by the 1999-2000 season, Kuapa Kokoo was operational in five cocoa-growing regions, with about 460 village societies and 35,000 farmer members. The proportion of women farmers has increased from 13 percent to nearly 30 percent.

Source: www.ico.org; www.oxfamamerica.org; <http://www.divinechocolate.com/kuapa.htm>

Deficient rural infrastructure, together with its vulnerability to hazard impacts, can increase livelihood risks and food insecurity in rural areas. During the 2002 food crisis in Mozambique, northern Mozambique was actually producing a surplus of food while the southern part of the country was experiencing a dramatic shortfall in cereal production. The weakness in the country's north-south communication, aggravated by the effects of floods on roads and bridges, meant that it was too costly to transfer the cereal surplus of the north to address the food crisis in the south. The destruction of crops during disaster or the loss of agricultural labour power that prevents cultivation (as in the case of households and families who have lost members to disease such as HIV/AIDS or to armed conflict), can ultimately lead to a crisis in food security for the household or community. As discussions regarding data used to present losses from drought in the DRI have indicated however, such crises are rarely a straightforward result of temperature or rainfall extremes.

In an open and equitable society, food can be accessed from elsewhere, bought from the international market or sourced from donors before food crises develop.

It is in those places where physical access is restricted that the greatest risk prevails. Physical access may be hindered because of physical barriers, such as floodwaters and high winds that can prevent emergency response or longer-term food aid arriving at the right time. But physical access can also be interrupted by human intervention, such as armed conflict, intentional or accidental diversion of aid, and in the worst cases, can be used as a political or military strategy.³¹

The use of land mines results in the loss of productivity of farmlands, removal of vast tracts of arable land from safe use for decades and disruption of transportation and agricultural markets (for example, in Angola).

A dynamic pressure: global climate change

'Populations are highly vulnerable in their endowments and the developing countries, particularly the least developed countries...have lesser capacity to adapt and are more vulnerable to climate change damages, just as they are more vulnerable to other stresses. This condition is most extreme among the poorest people'.³²

Climate change brings with it long-term shifts in mean weather conditions and the possibility of the increasing

BOX 3.9 FROM REGIONAL VULNERABILITY TO VULNERABLE PEOPLE: CHANGING CONCEPTUALISATIONS OF RURAL VULNERABILITY IN ETHIOPIA

Policies apparently aimed at combating rural vulnerability can sometimes be biased against those most at risk. Until recently, this was the case in Ethiopia. Government food aid was distributed at the regional level, based on accumulated knowledge of areas known to have suffered from chronic drought and food insecurity in past years. This was regardless of the spatial and temporal changes in vulnerability among affected regions over time or in relation to particular drought characteristics. In the 1995-1996 harvest period for example, 63 percent of the regions receiving aid had populations that already had access to at least the requirement of 1,680 kilo calories per person per day.

Ineffective targeting stems from an inability in the system of regional scale, food insecurity assessment to differentiate local needs. The responsibility for fair distribution is held at the national level, where the motives for aid giving can be shaped by many factors peripheral to farmers' needs.

The Government's rationale for basing food aid disbursement on regional measures of vulnerability is founded on a history of regionally specific famine affecting the north, particularly in 1974 and 1982-1984. There are also socio-economic similarities among people in specific areas in terms of income and economic constraints. Yet, it has been demonstrated that the actual relationship between food availability and food aid receipts in Ethiopia is not conditioned on localised need. The attention given to similarities obscures the specific vulnerabilities of the north's sub-regions.

Learning from these experiences in 2001, a draft handbook for use by practitioners in the field was agreed to by international and national agencies on the Food Aid Targeting Steering Committee. There is now an emphasis on differences in vulnerability at the community level — an outcome of both a policy change and collaboration among early warning organisations.

This has amounted to a shift in policy from the recent past. Previously, drought, vulnerability and food insecurity in Ethiopia were appraised through the lens of international agreements, the changing priorities under national political transitions, and concepts of sovereignty, nationhood and ethnicity. These perspectives had the effect of producing policies and strategies that, in effect, de-emphasized the situation of vulnerable people while targeting analysis and response to the region and nation. Now the pattern is changing. The vulnerability of people as well as regions are receiving the attention they deserve.

Source: Stephen, Linda (2002)

frequency and severity of extreme weather events. The latter is perhaps more threatening to agricultural livelihoods. A multi-agency report on poverty and climate change³³ identified specific challenges for Africa, Asia, and Latin America and the Caribbean and cross-cutting themes shaping vulnerability in small island states. Some of these are shown below:

- Key challenges for Africa include droughts contributing to a decrease in grain yields and sea

- level surges affecting most of Africa's largest cities.
- In Asia, some northern areas might experience increased agricultural productivity. However, for more populated central and southern Asia, sea level surges and increased intensity of tropical cyclones could result in the displacement of tens of millions of people from low-lying coastal areas.
- For Latin America, a mixture of increases in flooding, droughts and tropical cyclone activity will change risk profiles.
- Small island states will be especially prone to stresses attributed to sea level surges, including loss of land, dislocation of people, salinisation of freshwater aquifers and damage to highly productive coastal mangrove and coral ecosystems.

Taken together, the effects of climate change increase uncertainty and the complexity of risk for everyone, ranging from

poor, small-scale farmers to wealthy agriculturists. While the developed nations of the world produce the majority of greenhouse gases, the burden of impact will be more severe on developing countries as they have larger vulnerable populations and are less equipped to deal with extreme weather events.

Changing natural hazard risks related to climate change will alter disaster risk patterns. Of hydro-meteorological hazards potentially affected by climate change, floods, storms and droughts present the most widespread direct risk to human assets.

Flooding and landslides, pushed by heavier rainfall, and by surging sea levels in coastal areas, may become increasingly common. With sea levels predicted to rise by up to nearly one metre in the coming century, heavily populated areas of low-lying land — such as southern

BOX 3.10 CLIMATE CHANGE AND DISASTERS: TOWARDS AN INTEGRATED CLIMATE RISK MANAGEMENT

The scientific evidence that the climate is changing due to greenhouse gas emissions is now incontestable. It is equally well accepted that climate change will alter the severity, frequency and spatial distribution of climate-related hazards. However, even while the modelling of the linkages between global climate change and particular extreme climate events becomes increasingly sophisticated, it is still not possible to predict with any degree of confidence how particular climate events will behave in the future in specific locations. Even with regular and much better understood climate phenomenon like ENSO, considerable regional and temporal variations in impacts are observed from event to event.

The lack of capacity to manage and adapt to climate-related risks is already a central development issue for countries with low-lying coastlines or exposed to hydrometeorological hazards. The lack of capacity to manage the risks associated with current climate variability (on a season-to-season and year-to-year basis) will be magnified in countries exposed to global climate change. Here, disaster risk reduction will have to contend with additional pressures stemming from the complexity and uncertainty of global climate change. The challenges of climate change might best be met by building on current disaster risk reduction capacity. Such a synthesis of concerns reduces the likelihood of overlapping responsibilities and increases the cost efficiency of disaster and climate change risk reduction. Medium- and long-term adaptation must begin today with efforts to improve current

risk management and adaptation. Responses to the local and national consequences of global climate change can benefit from current best practice in disaster risk reduction.

Current approaches towards managing disaster risk and adaptation to climate change fail to address the issue for different reasons. First, disaster risk is still predominantly focused on response to disaster events and fails to address the configuration of hazards, vulnerabilities and risks. Next, disaster risk reduction continues to be structured around specific hazard types rather than generic patterns of human vulnerability. This does not match with experiences of hazard which prevail in contexts more and more typified by concatenation, synergy and complexity. Third, focus on the impact of future climate change on risk fails to make the connection with currently existing climate-related risk events and patterns. At the same time, both approaches are divorced both in concept and in terms of the institutional arrangements and programming mechanisms at the national and international levels.

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. Addressing and managing climate risk, as it is manifested in extreme events and impacts

today, will help to strengthen capacity to deal with future climate changes.

Integrated climate risk management would address both the hazards and vulnerabilities that configure particular risk scenarios. This could range in scale from actions to manage the local manifestations of global climate risk to global measures to mitigate hazard (for example by reducing greenhouse gas emissions) to reducing vulnerability by increasing the social and economic resilience of vulnerable countries (for example, SIDS). Integrated climate risk management would need to include elements of anticipatory risk management (ensuring that future development reduces rather than increases risk), compensatory risk management (actions to mitigate the losses associated with existing risk) and reactive risk management (ensuring that risk is not reconstructed after disaster events).

Integrated climate risk management could provide a framework to allow the disaster community to move beyond the still dominant focus on preparedness and response. In the adaptation to climate change, this could stimulate a move beyond the design of hypothetical future adaptation strategies. In some regions, such as the Caribbean and the South Pacific, synergy such as this is already being achieved. However, urgent actions must be taken at the international, national and local levels if integrated climate risk management is to move from a concept to a practice and serve to reduce risks and protect development.

Bangladesh, the Nile delta, parts of eastern China and many atoll islands of the South Pacific and Indian Oceans — face a bleak future. So, too, do the long stretches of low-lying coasts in western Africa from Senegal to Angola, in South America from Venezuela to Recife in Brazil, and much of the coastlines of Indonesia and Pakistan.

The damages associated with the regional climate impacts of El Niño provide some early indication of those that could accompany the regional consequences of global climate change.

The last strong cycle of El Niño appeared in mid-1997 and continued through 1998. A large number of countries in Central and South America and the Asia-Pacific region were severely affected by El Niño-related floods and droughts. Estimates of global economic loss range from US\$ 32 billion to US\$ 96 billion.³⁴

The difference is that El Niño is a periodic event while climate change will generate lasting and cumulative stresses and shocks.

Climatic disturbances that change hazard profiles demand changes in coping strategy. Drought is a case in point. This hazard type, potentially under the influence of global climate change, has probably affected more households in southern and western Afghanistan than the recent conflict.³⁵

In adjoining Pakistan, the drought in the Baluchistan and Sindh provinces were reported to be the worst in the country's history. In Iran, a 50 percent to 96 percent decrease in rainfall during the 1998-1999 winter season caused the loss of 37 percent of annual wheat production and 63 percent of annual barley production. Low water flows in the Tigris and Euphrates rivers basins in Iraq meant irrigated as well as rain-fed agriculture suffered.³⁶

People have been living with drought in these and other regions for millennia. Whether and how their distribution and frequency will be affected by global climate change is not known. Nor is the extent to which traditional coping strategies, such as seasonal migration, will be useful under these changing conditions of hazard.

Where the dynamics of global climate change and economic globalisation are seen to interact, the shifting nature of

BOX 3.11 SMALL ISLAND STATES, VULNERABILITY AND CLIMATE CHANGE

The future impact of sea level rise on small island states includes substantial coastal flooding, salination of soils and drinking water, and the destruction of coral reefs and mangrove stands vital for fishing and coastal protection. In extreme cases, low-lying atolls in the Pacific, including those of Kiribati, the Marshall Islands and Tuvalu may be submerged.

Climate change may also bring greater risk of drought to Pacific small island states. In the 1997-1998 El Niño, Fiji lost half its sugar crop. Existing risk from tropical cyclones and related flooding may also be increased. Caribbean islands are not threatened by submergence, but are at high risk from sea level rise and climate change creating a more hazard-prone environment. Empirical evidence suggests an overall drying tendency for the eastern Caribbean. The Association of Small Island States has had some success in lobbying the international community. Through the United Nations Framework Convention on Climate Change (UNFCCC) and 1997 Kyoto Protocol, adaptation is starting to receive attention, in recognition that climate change impacts are increasing and changing hazard profiles today. Modest progress has been made with the establishment of a fund for non-Annex 1 countries and a special programme of assistance for least developed countries that will help eligible small island states.

In the Plan of Implementation of the World Summit on Sustainable Development, 2002, a special section on small island states encouraged the international community to assist in 'mobilizing adequate resources and partnerships for their adaptation needs relating to the adverse effects of climate change, sea level rise and climate variability, consistent with commitments under the United Nations Framework Convention on Climate Change'.

Source: World Disasters Report (2002), Challenger (2002), UN (2002)³⁷

hazard and disaster risk becomes even more apparent. The contribution of local disaster datasets to understanding the local distribution of impacts will assist in tracking the evolution of risk as climate change unfolds.

It remains to be seen what links the interaction of economic globalisation to global climate change. Some contemporary interactions are being felt in Ethiopia, where drought in 2002-2003 combined with extremely low world prices for coffee have produced a double crisis for the national economy and for small farmers, farm workers and their families.

Climate change increases the uncertainty faced by vulnerable communities through a widening range of future climate variations and hazards. This is not a hypothetical risk to be addressed several decades into the future, but a real increase in risk that is presently threatening lives and livelihoods.

As local climates become more unstable, farmers have greater difficulty knowing what and when to

plant and harvest. Risk of crop, and hence, livelihood failure increases. While rural communities may have adapted their livelihoods over centuries and developed sophisticated coping strategies to deal with local risks, unexpected hazards such as unseasonal storms or droughts invalidate those strategies and increase risk.

Combined with the additional uncertainty caused by economic globalisation, which may suddenly invalidate the economic viability of local production, climate change makes local risk coping strategies increasingly difficult and the option of successful risk management more challenging.

3.2 Cross-Cutting Themes in Disaster-Development

The themes to be discussed in this section are: violence and armed conflict, disease, governance and social capital.

These themes have been mentioned in the preceding discussions, but are critical to shaping patterns of disaster risk and therefore deserve additional scrutiny. The themes are no less important than urbanisation, rural livelihoods, globalisation or climate change. They are presented here to flag their cross-cutting influence.

A lack of internationally comparable and verifiable data on these themes, or the difficulty of meaningfully reducing complex processes into numerical values, forced their exclusion from the DRI model in its search for socio-economic variables that could be associated with natural disaster losses. Despite this, their influence on development and disaster risk seems clear and it is hoped that future runs of the DRI might be able to include such variables. This is a second reason for wanting to present an exposition of their relationship to disaster risk here.

3.2.1 Violence and armed conflict

During the 1990s a total of 53 major armed conflicts resulted in 3.9 million deaths (nearly 90 percent of them were civilians).³⁸

In 2002, there were approximately 22 million international refugees in the world and another 20 million to 25 million internally displaced people. Even before additional risk factors, including gender, class, ethnicity,

age or disability are taken into account, the very fact of being a refugee or an internally displaced person raises vulnerability.³⁹

When the displaced settle in squatter settlements in cities, they are often exposed to new hazards because dangerous locations (river margins, garbage dumps, steep slopes) are the only places where they (and the urban poor) can find shelter. In other cases, internally displaced people and refugees are often forced to degrade their immediate environment to obtain resources such as firewood, even though this may magnify landslide, fire and flood hazard. The environmental impact in Guinea of 600,000 refugees fleeing from conflicts in Sierra Leone and Liberia in the late 1990s was considerable. In formalised camps, they often run the risks of epidemic disease.⁴⁰

The economies of war fuel violent conflicts — control over natural resources exploitation and the production of illegal drug crops are dominant contexts — but are interwoven with social instability and economic poverty that diminish the capacity of people to cope with disaster risks.⁴¹

A vicious circle appears when as the state's capacity to address everyday hazard and disaster risk diminishes, so does its legitimacy in the eyes of its citizens — resulting in yet greater isolation, corruption and in some cases, ultimate collapse.⁴²

Many areas suffering from complex political emergencies are also subject to periodic natural hazards.

The provisional analysis of drought undertaken in the DRI noted armed conflict and governance as factors that can turn low rainfall episodes into famine events. The 2002 food crisis in Southern Africa may have been triggered by drought. But in countries like Zimbabwe and Angola, the impact of the drought must be understood and responded to within the context of political instability and conflict.

At the turn of the 21st century, Afghanistan suffered three years of drought and a major earthquake on top of decades of armed conflict, creating a particularly acute humanitarian crisis.

The volcanic eruption in Goma, in eastern Democratic Republic of Congo, is a similar example of a rapid-onset