

important to recognise that this has been stimulated by the emergence of national and regional institutions dedicated to research, training and application in disaster prone countries. Many of the contemporary approaches to risk management and reduction, now being discussed and advocated at the international level, have grown out of disaster reduction research and application by developing country researchers and institutions. Since the early 1990s, a growing literature has emerged in Latin America and the Caribbean, Asia and Africa.<sup>19</sup>

The creation of regional organisations and networks manifests the growing maturity of this process. These organisations and networks now have an important influence on international policy.

## 1.6 Is Sustainable Human Development Achievable Under Natural Disaster Risk?

The UNDP emphasis on human development has informed the way in which development is conceived of in this Report. Human development is about more than the rise or fall of national incomes. It is about having space in which people can develop their full potential and lead productive, creative lives in accordance with their needs and interests. People are the real wealth of nations.

Fundamental to human development is building human capabilities: the range of things that people can do or be in life. The most basic capabilities for human development are to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community. Without these, many choices are simply not available and many opportunities in life remain inaccessible. The stress and shock felt by those vulnerable and exposed to natural hazards will impact in myriad ways on the capacity of people to achieve and enjoy human development gains. Levels of human development will also shape people's capacity to be resilient in the face of hazard stress and shock.

UNDP Human Development Reports (HDR) recognise the role played by disaster risk in shaping human

### BOX 1.4 MAHBUB UL HAQ ON THE MEANING OF HUMAN DEVELOPMENT

The basic purpose of development is to enlarge people's choices. In principle, these choices can be infinite and can change over time. People often value achievements that do not show up at all, or not immediately, in income or growth figures: greater access to knowledge, better nutrition and health services, more secure livelihoods, security against crime and physical violence, satisfying leisure hours, political and cultural freedoms and a sense of participation in community activities. The objective of development is to create an enabling environment for people to enjoy long, healthy and creative lives.

Source: Mahbub ul Haq<sup>20</sup>

development. Disaster risk has been a concern of regional thematic works including: *El Estado de la Region* published in 1999 and covering Central America, *Building Competitiveness in the Face of Vulnerability*, published in 2002 by the Organisation of Eastern Caribbean States, and *El Impacto de un Huracán*, published in 1999 in Honduras. More generally, given the close relationship between disaster risk and human development, the HDR series often discusses concerns relevant to disaster risk reduction though in a less systematic manner.<sup>21</sup>

### 1.6.1 Disaster-development linkages

The primary focus of *Reducing Disaster Risk: A Challenge for Development* is on the relationship between human development and disaster.<sup>22</sup> In order to clarify the ways in which disaster and development interact, it is helpful to distinguish between the economic and social elements of human development. These components are interdependent and overlapping. Nevertheless, it is useful to think of the ways that these two elements, and their constituent institutional and political components, are shaped, retarded and sometimes accelerated by disaster. Similarly, one can analyse the ways in which economic and social

### BOX 1.5 DISASTER RISK, HUMAN DEVELOPMENT AND THE MDGs

The interaction of **economic development** with disaster risk has direct consequences for the meeting of MDG 1 (eradicate extreme poverty and hunger), 6 (combat HIV/AIDS, malaria and other diseases) and 7 (ensure environmental sustainability).

The interaction of **social development** and disaster risk has direct consequences for the meeting of MDG 3 (promote gender equality and empower women) and 8 (develop a global partnership for development).

TABLE 1.1 DISASTER-DEVELOPMENT

	Economic Development	Social Development
<b>Disaster limits development</b>	Destruction of fixed assets. Loss of production capacity, market access or material inputs. Damage to transport, communications or energy infrastructure. Erosion of livelihoods, savings and physical capital.	Destruction of health or education infrastructure and personnel. Death, disablement or migration of key social actors leading to an erosion of social capital.
<b>Development causes disaster risk</b>	Unsustainable development practices that create wealth for some at the expense of unsafe working or living conditions for others or degrade the environment.	Development paths generating cultural norms that promote social isolation or political exclusion.
<b>Development reduces disaster risk</b>	Access to adequate drinking water, food, waste management and a secure dwelling increases people's resiliency. Trade and technology can reduce poverty. Investing in financial mechanisms and social security can cushion against vulnerability.	Building community cohesion, recognising excluded individuals or social groups (such as women), and providing opportunities for greater involvement in decision-making, enhanced educational and health capacity increases resiliency.

development (and their constituent processes) work directly or indirectly to decrease or increase disaster risk.

Table 1.1 sets out these complex interactions schematically, which are discussed below and form the context for the following chapters. Social development includes social assets such as inclusive governance, but also the health and educational infrastructure that enables participation. Economic development concerns economic production and its supporting infrastructure, for example transport networks to enable market access and the integrity of natural resources for the sustainability of resource-dependent livelihoods.

### *Disasters limit economic development?*

Disasters can wipe out the gains of economic development. In 1982, Hurricane Isaac destroyed 22 percent of the housing stock in the Tongan archipelago.<sup>23</sup> Reconstruction costs to correct damage to water, sanitation, energy, telecommunication, roads and railway infrastructure from flooding in Mozambique in 2000 will cost US\$ 165.3 million.<sup>24</sup> These accounts are dramatic, but the constant drain on resources from everyday disasters similarly limits the development potential of millions of people around the world. In Viet Nam, in "normal" years, flooding destroys an average of 300,000 tonnes of food.<sup>25</sup>

Catastrophic disasters result in the destruction of fixed assets and physical capital, interruption of production and trade, diversion and depletion of savings and public and private investment. While absolute levels of economic loss are greater in developed countries due to the far higher density and cost of infrastructure

and production levels, less-developed countries suffer higher levels of relative loss when seen as a proportion of Gross Domestic Product (GDP).

The 2001 earthquakes in El Salvador and Seattle in the United States resulted in losses of around US\$ 2 billion each. While this scale of loss was easily absorbed by the U.S. economy, it represented 15 percent of El Salvador's GDP for that year.

Larger countries, with a greater geographical spread of economic assets relative to the spatial impact of disasters, are more able to avoid direct loss and minimise downstream, indirect or secondary losses. In 1995, Hurricane Luis caused US\$ 330 million in direct damages to Antigua, equivalent to 66 percent of GDP. This can be contrasted with the larger economy of Turkey that lost between US\$ 9 billion and US\$ 13 billion in direct impacts from the Marmara earthquake in 1999, but whose national economy remained largely on track.<sup>26</sup>

Not only the size of a nation's economy, but also the proportion of its land area exposed to hazard will determine disaster risk. This partly accounts for the high vulnerability of small island developing states. Almost three-quarters of the island of Montserrat was made uninhabitable by a volcanic eruption in 2001. Today only 36 percent of the pre-disaster population remain, supported by the United Kingdom.

A lack of diversity in the economy can also undermine security, whether it be of a household or nation. The importance of diversification for rural livelihood

sustainability has long been recognised as a mechanism to cope with changing market conditions and climatic fluctuations. There is a tension here between the dictates of global trade, which pushes countries towards specialisation, and the insecurity that a lack of diversity brings. This is particularly so for countries “specialising” in primary commodity exports that may also be at risk from drought, flooding or tropical cyclones. This is exemplified by reduced agricultural production in Africa in the 1997 El Niño year. The most significant declines were in Botswana, Lesotho, Malawi, South Africa, Swaziland and Zambia.<sup>27</sup>

But the relationship between economic size, diversity and risk is not simple. The lowest income countries are not necessarily the most vulnerable from an economic perspective. This group, including Burkina Faso, Ethiopia, Malawi and Swaziland, typically have agrarian economies. Although vulnerable to drought, once rains return recovery can be fast and attracts high levels of donor support. A study of drought impacts showed that intermediate economies with some diversification (such as Senegal and Zimbabwe) have been more vulnerable as economic impacts cross into manufacturing sectors. Impacts also linger, as recovery of the manufacturing sector is slower than in agriculture and may not attract so much donor attention.<sup>28</sup>

At the local level, disasters can seriously impact household livelihoods and push already vulnerable groups further into poverty. The loss of income earners, through death or injury, the interruption of production or access to markets and the destruction of productive assets, such as home-based workshops, are all examples of ways in which disasters affect local and household economies. Often such impacts are accumulative as the impact of everyday and frequently occurring small-scale hazards erodes livelihoods over a period of time. The capacity of a household or local community to absorb the impact and recover from a major natural hazard will be seriously limited if already weakened over time by a series of smaller-scale losses.

### *Disasters limit social development?*

A population that has been weakened and depleted by natural disaster, particularly when this coincides with losses from HIV/AIDS, malnutrition or armed conflict, will be less likely to have the organisational capacity to maintain irrigation works, bunds in fields for water harvesting, hillslope terraces, community

wood lots or shelter belts. Without these social assets, communities become more vulnerable.

In addition to the loss of social assets themselves, there are many examples of disaster events destroying the gains of the health, sanitation, drinking water, housing and education sectors that underpin social development. Examples include the El Salvador earthquake in 2001, which badly damaged 23 hospitals, 121 health care units and 1,566 schools; or the cyclone that hit Orissa, India in 1999, which led to the contamination of drinking water wells and damaged many schools in the direct impacts of a single event.<sup>29</sup>

Potentially negative consequences for social development do not stop with direct impacts. In the aftermath of a disaster or during the escalation of a slow-onset disaster, such as a drought or complex political emergency, problems with governance mean that aid budgets can be skewed towards the recovery of one group or sector as opposed to another. The result is a reduction in social equality.

A review of livelihoods and governance conditions that led to high losses in the Orissa cyclone in 1999 has pointed to corruption at all levels, unnecessary bureaucracy, political rivalry and an apathetic civil society as pressures that contributed to vulnerability.<sup>30</sup>

Disaster response may also be a time when democratic institutions come under pressure. After the 1985 earthquake in Chile, a traditional civilian response threatened to undermine a dictatorial government.<sup>31</sup> The response was demobilised through repression and the state took over.

Women suffer additional stresses in disaster situations and also bear a disproportionate burden of the additional domestic and income-generating work necessary for survival following a disaster event. When women are exposed to these additional stresses, the level of social development is reduced. However, over the long run, it is also possible that the net result is an increase in their economic and political participation — generating an increase in social development.

The exclusion of women from local decision-making circles in Bangladesh led to women and girls being unwilling to use hurricane shelters. Current, inclusive decision-making bodies have improved the social

position of women and the management of hurricane shelters has been reformed — encouraging greater use among women.

### *Economic development increases disaster risk?*

There are many examples of the drive for economic growth generating disaster risk. This is as true for individuals as it is for international business. The massive forest fires in Indonesia in 1997 that caused air pollution in neighbouring Malaysia were partly caused by the uncontrolled use of fire by farmers wishing to expand production of a major export crop, palm oil. Tourist developments that fringe Barbados may inadvertently be adding to their own risk as waste water and recreational sports contribute to the denudation of coral reefs, which act as a first line of sea defence against storm surges.

Hurricane Mitch in 1998 generated a wide-ranging reflection on the relationships between poverty and environmental degradation. The notion of “Reconstruction with Transformation” was coined by governments in negotiations with external aid donors. In aiming to build a changed development path into the reconstruction effort, this carried with it an explicit recognition that pre-disaster development priorities had led to high levels of risk and human vulnerability, eventually culminating in a humanitarian disaster triggered by a tropical cyclone.

It is the rules of governance that promote particular development paths that also shape patterns of risk and disaster loss. In Izmit, Turkey, systemic corruption played an important role in contributing to the failure of building regulation, sub-standard construction and high rates of building failure during the 1999 earthquake.

Contemporary disaster risk can be linked to historical development decisions and to development decisions taken by actors in distant places. Disaster risks associated with global climate change, or the pollution of rivers by industrial and household effluent that increases the vulnerability of downstream rural communities, exemplify these relationships operating at different scales.<sup>32</sup>

The gaps of time and place between development gain and disaster risk accumulation and the ability of some people to shift their risk onto others while enjoying the benefits of development, are not fully understood and need further examination to assist policy formation.

Globalisation will undoubtedly lead to new risk factors and modify or build on previously existing risk.

Economic development does not need to contribute to the conditions that undermine human and environmental sustainability and increase disaster risk. To move forward, there must be a clear understanding of the interaction of development plans with disaster risk.

### *Social development increases disaster risk?*

It is hard to imagine that increases in social development (improved health, sanitation, education, the participation of women in society, etc.) can increase the risk of disasters. The only possible situation that would actually place social development as a causal factor in disaster risk is one where people are forced to expose themselves or others to risk in order to fulfil their (or others) needs or desires.

Rapid urbanisation is a case in point. The growth of informal settlements and inner city slums when fuelled by international migration (for example, from East Africa to Johannesburg or from Central America to cities in the United States) or internal migration from smaller urban settlements or the countryside to large cities, has led to the burgeoning 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 infrastructure sites. Some 600 million urban dwellers in Africa, Asia, Latin America and the Caribbean live in life- and health-threatening homes and neighbourhoods as a result of poor quality housing and inadequate provision of basic needs.<sup>33</sup>

In many cases, individuals will be seeking opportunities not only to improve their own quality of life, but also to enhance the health and educational attainment of their children and be prepared (or forced) to accept enhanced disaster risk today, for greater prospects for their children tomorrow. However, even this example needs consideration, as it is not increases in social development *per se* that accounts for growing risk, but the unassisted efforts of the economically marginal and politically excluded to gain access to basic human needs that has forced them to accept environmental risk.

### *Economic development reduces disaster risk?*

For economic development to proceed without increasing disaster risk, development planning needs

to reconcile three potentially conflicting drivers for development. First, the generation of wealth, which can raise the basic level of human development. Second, the distribution of wealth, which can enable even the poorest to overcome human vulnerability. Third, the externalities of wealth creation (waste, pollution, destruction of environments or human culture), which need to be controlled to prevent the loss of the fundamental assets on which human life depends and gains meaning.

The mainstreaming of disaster risk assessment into existing development instruments is critical in achieving economic development without generating new risks. This includes opportunities for building on existing risk impact assessment tools and examining opportunities for integration into activities such as housing and infrastructure development, industrial and agricultural development and the introduction of new technologies. This requires a two-pronged strategy. On the one hand, risk information can be used through instruments such as land-use planning and building regulations to increase the resistance, safety and sustainability of development interventions. On the other hand, it is necessary to evaluate the possible impacts of economic development in terms of risks in other locations and for other social groups.

The Klang River Basin Flood Mitigation and Environmental Management Project in Malaysia is a good example of development oriented towards risk reduction. The Klang River Basin is rapidly urbanising and its population is more than 3.6 million, with major portions of agricultural land being converted for urban use. Frequent flooding and degradation of the riparian environment have been escalating as urbanisation continues. An Environmental Master Plan is planned to direct environmental management. The plan aims to improve river water quality and provide flood warning and protection.<sup>34</sup>

Operating during the reconstruction phase of a disaster event, the Market Incentives for Mitigation aims to mobilise the resources of the World Bank and the insurance and reinsurance community and to apply the tools of commercial loss management to the design and maintenance of critical development investments. The goal is to let governments shift funding from emergency relief and reconstruction activities to more effective and sustainable disaster mitigation investment.<sup>35</sup>

An additional component to this agenda is to identify mechanisms for promoting the use of such tools in low- and middle-income countries experiencing rapid growth in populations-at-risk and the import of new and potentially hazardous technologies or waste.

At the local level, one possibility for building resilience comes from microfinance programmes. Microfinance has been shown to enhance development opportunities by providing individuals with access to credit. The Grameen Bank in Bangladesh has a long-standing commitment to supporting small-scale enterprise in this way. During the periodic floods that caused widespread destruction in Bangladesh in 1988 and 1998, losses were reduced amongst high-risk groups like agricultural communities by providing a mechanism for families to diversify income-earning activities across seasons.<sup>36</sup>

### *Social development reduces disaster risk?*

Social development goals are key in shaping governance regimes for disaster risk management set within a developmental agenda. To reduce disaster risk, governance must be sensitive to the needs of those at risk from disaster with a natural trigger, and able to facilitate timely, equitable and strategically coherent decisions in resource mobilisation and disbursement.

The physical infrastructure underpinning social development includes health and education. Improved health and educational status help reduce vulnerability and can limit human losses in a disaster. Following the direct impact of a disaster event, a better-nourished, healthier population in which children have all been vaccinated will do much better in homes, shelters and camps set up for those displaced by disasters.

A literate and better-educated population — including girls and women — is better able to partner with experts in designing ways of protecting urban neighbourhoods and rural communities. Such an educated population also responds better to warnings and other public service announcements. The importance of extending educational opportunities to girls and women is noted in the MDGs and has been shown to improve the delivery of disaster risk reduction.

Gram Vikas, a rural development organisation, has been working in Orissa, India since 1979. In 1994, officials met resistance from women while implementing a

project designed to provide drinking water to the village of Samantrapur. The women's attitude was understandable. They had been excluded from the local decision-making process. Integrating women into local decision-making was a precursor to project success. To enable this, women were offered training in basic literacy, health care and income generation. Women are now included in maintaining water supply and toilet blocks in the village and have a greater stake in the politics of the village more generally.<sup>37</sup>

Social development points to the importance of social cohesion, inclusiveness and open participation in decision-making. Achieving such objectives is a major challenge in many communities at risk from disaster. Social capital is often used to refer to the type and thickness of bonds in a community. Projects that can enable people to build social capital for collective good can reduce vulnerability. Though some forms of social capital can be more ambiguous — as in clientelistic relationships — or negative — as in drug gangs.

A community's quality and quantity of social capital may change over time. The impact of disaster with a natural trigger on social capital is uncertain. Comparative work on armed conflict has identified a vicious circle where the loss of interaction between social groups inhibits the flow of information, further undermining trust and restricting future collective action. This has been identified as a weakness in

reaching resolution in post-conflict societies,<sup>38</sup> and in building democracy and economic development more generally.<sup>39</sup>

The Dominican Disaster Mitigation Institute has facilitated the building of social capital in vulnerable communities in the Dominican Republic. A long-term strategy has been adopted where training sessions on leadership are interwoven with meetings on disaster preparedness. A number of communities have established women's and neighbourhood associations as a result. Community leaders have learned how to organise the community, establish a goal, and accomplish it.<sup>40</sup>

### *Can disaster risk enhance social or economic development?*

The possibility of disasters having a positive outcome is not considered in Figure 1.2.

Notwithstanding this view, the recovery process can be an opportunity for building disaster risk reduction mechanisms into post-disaster development planning. Disaster-development relationships can be reconsidered and development priorities can be rethought. Importantly, it is not just local actors, but national and international actors who should be involved in these reflections.

Disruptions caused by disasters can open political space for alternative forms of social organisation. Often this is a negative experience, as with looting, but there is the possibility for more egalitarian forms of organisation to manifest. Support for such organisations is one way in which new development priorities might be carried forward beyond the immediate response period.

An example of a positive response to disaster is the Citizens' Disaster Response Network in Manila, which campaigns for greater transparency in government and grassroots participation in development decision-making. Its origin is in an ad hoc coalition of organisations that came together under the umbrella of the Support Disaster Victims Campaign after the eruption of Mount Mayon in 1984.<sup>41</sup>

During the disaster recovery and reconstruction periods, flows of foreign currency into a disaster-affected country from aid, debt relief, insurance, private transfers and remittances can produce an apparent improvement in national balance-of-payments, and provide the financial means for enacting new development priorities.

#### **BOX 1.6 GOVERNANCE AND DISASTER RISK**

Governance is a critical area for innovation and reform in achieving disaster risk reduction within human development. It is important to identify those governance tools that will be likely to simultaneously benefit disaster risk reduction and human development. This would include a presumption for equality in participation in decision-making across genders, religious and ethnic groups, casts and economic classes. An awareness of the need to engage with the local knowledge of at-risk individuals and groups as well as respect for scientifically informed knowledge will improve risk management and development planning efforts.

It is also important to identify governance reform that might inadvertently contribute to the generating of human vulnerability. Social networks are often in competition with one another and though this is not a bad thing in itself, when disaster or development aid is fed through and strengthens clientelistic networks this can foster corruption and inequality, further entrenching disaster risk.

The theme of governance is not followed up in Chapter 2 and the analysis of the DRI through a lack of internationally available data. However, it is returned to in discussion in Chapter 3.

However, positive macroeconomic and livelihood effects tend to be limited to a short period of reconstruction. Following Hurricane Gilbert in 1988, Jamaica experienced a boom that reduced a potential external current account deficit of US\$ 253 million to only US\$ 38.3 million. The two main contributors to this were reinsurance flows of US\$ 413 million and foreign grant aid of US\$ 104 million. But the boom was short-lived and as reinsurance and grant aid sources of finance dried up, the impact of the disaster on Jamaica's productive capacity was felt. The following year, Jamaica recorded a current account deficit of US\$ 297 million.<sup>42</sup>

These examples show the importance of using the disaster response and recovery periods as opportunities for reflecting on the root causes of disaster, and recasting development priorities to reduce human vulnerability and natural hazard. Simply reinventing pre-disaster conditions is a wasted opportunity. This is as true for the institutions of governance as it is for physical infrastructure.

## 1.7 How 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. For example, Mozambique faces a regular cycle of droughts and floods: 1976-1978 (floods), 1981-1984 (drought), 1991-1993 (drought), 1996-1998 (floods), 1999-2000 (floods).<sup>43</sup>

In acknowledging the importance of disaster as a development constraint, there is a danger of seeing some countries as being by their very nature more disaster prone than others. Sub-Saharan Africa is popularly associated with drought, Central America with earthquakes and the Pacific and Caribbean islands with tropical cyclones. In each case, it is not geography alone that generates disaster risk. Rather, development processes have shaped human vulnerability and hazards paving the way for disaster.

In this section, several conceptual tools are presented that help to outline the ways in which inappropriate development can lead to disaster risk.

### *The history of international development underlies the disaster risk of today*

The roots of much disaster risk can be traced to historical development decisions.<sup>44</sup> Many of the world's largest cities have sprawled from sites chosen in the pre-colonial or colonial eras to cover areas exposed to earthquake, flooding and tropical cyclones. Such cities with coastal locations include Dhaka, Bangladesh; Mombassa, Kenya; and Manila, the Philippines. In Latin America, a desire to control indigenous populations or locate close to mineral resources led to a colonial preference for interior sites. Post-colonial population growth has led to a rapid expansion in populations-at-risk from earthquakes. Mexico City, Mexico and San Salvador, El Salvador are examples and the latter city remains despite being destroyed by earthquake nine times between 1575 and 1986.

### *Decisions taken today will configure disaster risk in the future*

The influence of past development on present disaster risk underlines the significance of contemporary decision-making for the disaster risk that might be experienced by future generations. This reinforces the importance of international cooperation to manage development. For example, in the need for the international community to negotiate to mitigate global climate change, and to support the adaptation strategies of those communities and countries most adversely affected by the impacts of global climate change. The rise of sea levels is placing great strain on coastal communities and climate change enhances the difficulty of planning development. In Fiji during the 1997-1998 drought, US\$ 18 million in food and water rations had to be distributed.<sup>45</sup>

### *Population movements are changing the context of disaster risk*

Mass migration from rural to urban settlements has resulted in the growth of city slums, many located on unsafe land and built with environmentally inadequate construction techniques. The marginalisation of poor rural families has led to their relocation on increasingly insecure agricultural lands. Poverty levels, or the absolute number of poor and destitute persons, have increased continually with dramatic effects in terms of increases in social risk and disaster vulnerability.

### *Development processes modify natural hazard*

Hazards are being reshaped and new hazards introduced by contemporary development trends. For example,