# Climate change and disaster management

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*Climate change, although a natural phenomenon, is accelerated by human activities. Disaster policy response to climate change is dependent on a number of factors, such as readiness to accept the reality of climate change, institutions and capacity, as well as willingness to embed climate change risk assessment and management in development strategies. These conditions do not yet exist universally. A focus that neglects to enhance capacity-building and resilience as a prerequisite for managing climate change risks will, in all likelihood, do little to reduce vulnerability to those risks. Reducing vulnerability is a key aspect of reducing climate change risk. To do so requires a new approach to climate change risk and a change in institutional structures and relationships. A focus on development that neglects to enhance governance and resilience as a prerequisite for managing climate change risks will, in all likelihood, do little to reduce vulnerability to those risks.*

**Keywords:** adaptation, climate change, disaster reduction, international cooperation, Millennium Development Goals, poverty, resilience, risk, sustainable development, vulnerability

## Introduction

Disasters triggered by natural hazards are killing more people over time and costing more. This is the trend revealed by data collected by the Center for Research on the Epidemiology of Disaster (CRED) in Belgium (EM-DAT, 2005) and by the world-wide re-insurance industry. The world's poorer nations are disproportionately affected (Munich Re Group, 2002; IFRC, 2003), and the most vulnerable and marginalised people in these nations bear the brunt. The data show that economic losses have risen sevenfold since the 1960s, with reported losses of USD 659.9 billion in the 1990s. Two-thirds of these economic losses were reported were accrued by more developed countries (MDCs). However, deaths are concentrated in less developed countries (LDCs). The International Federation of Red Cross and Red Crescent Societies (IFRC) reports that between 1992 and 2001, 27,464 and 594,899 fatalities occurred in MDCs and LDCs respectively (IFRC, 2002). The ratios are striking: between 1991 and 2001, in countries with low human development indexes (HDI), there were 1,052 deaths per disaster and only 23 deaths in countries with a high HDI. Although MDCs suffer substantial economic ramifications, this masks the real impacts on poorer nations. In the case of MDCs, the data are a reflection of the value of infrastructure and assets at risk, not of development potential. For states with a very low gross national income (GNI), even a small economic loss is critical. Economic losses in developing countries can be very significant in slowing human development.

There may be issues surrounding the validity of the data (Quarantelli, 2001), but the trend is unmistakable. The increase in the occurrence of disasters is impacting

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disproportionately on the poor (Wisner et al., 2004). This is a challenge for the international community. If the Millennium Development Goals (MDGs) are to be realised in a sustainable fashion then reducing the impact of disasters is an urgent priority (Middleton and O'Keefe, 2001; DFID, 2004a; UNDP, 2004a; Wisner and Walker, 2005).

The data mentioned above refer to losses stemming from natural disasters of all types; however, there is mounting concern about the impacts of disasters related to climate change. Climate change brings with it long-term shifts in mean weather conditions and the possibility of increasing frequency and severity of extreme weather events. The Intergovernmental Panel on Climate Change (IPCC) notes:

> *Populations are highly variable 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* (IPCC, 2001, section 2.8).

Most disasters, or more correctly, hazards that lead to disasters, cannot be prevented. But their effects can be mitigated. What is clear is that disasters are conditioned by human activities. Hazards may be natural in origin, but it is the way in which societies have developed that causes them to become disasters (Maskrey, 1993; Hewitt, 1996; Bhatt, 2002; Wisner et al., 2004).

Planning to reduce the impact of disasters is not new. The international community has made substantial effort to reduce the impact on people and livelihoods of disasters with both natural and technological triggers. Many techniques to prepare for, to reduce potential losses from, and to respond and adapt to, hazards have been developed (UN/ISDR, 2004). Disasters can erase the benefits of development investments, and poorly planned development interventions may become a source of hazard. Therefore, disaster planning is a necessary step and is needed to realise the MDGs and sustainable development. These are elements of a consensus that was reaffirmed at the World Conference on Disaster Reduction (WCDR) in Kobe, Japan, on 18–22 January 2005. Also at that meeting climate change was recognised as posing an immediate and long-term threat to the achievement of the MDGs and sustainable human development, and, as such, should be an integral part of disaster planning (UN/ISDR, 2005).

Since climate change is a source of multiple hazards that threaten long-term development actions by the international community, the consensus and planning approaches that have linked development and disaster should extend to climate change. This paper shows that this extension has not yet taken place and argues that it is urgent that it does occur.

## Approaches to disaster management

The focus of disaster management is to reduce the risk posed by actual and potential hazards (Alexander, 2002b). Hazards can be broadly grouped into three areas: natural; technological; and complex emergencies. Although this is a broad categorisation of

hazard, it should be recognised that new forms of hazard are constantly emerging, including terrorist movements, novel technologies and genetically modified organisms. Hence, disaster management needs to change and evolve to cope with these new and emerging threats (Kent, 1999; Feinstein International Famine Center, 2004; O'Brien and Read, 2005). Climate change, while not a new phenomenon, is also included in the category of emerging threats and has been described by UK Chief Scientist Sir David King as a greater threat than terrorism (King, 2004). Two different response regimes have evolved to address the problems associated with the different categories of hazard often with little cross-fertilisation or sharing of knowledge between them. One utilises risk assessment as a starting point, while the other begins with a needs assessment.

## Natural and technological hazard

The principal focus of planning for natural and technological hazards is risk assessment and reduction. Efforts to prevent and plan for natural and technological disasters have arisen from the need to protect society from hazards that are prevalent in the area of governmental jurisdiction. This approach to risk reduction and civil protection has been developed through legislation, the defining of institutional responsibilities and the allocation of financial resources (top down), coupled with local responses and community involvement (O'Brien and Read, 2005; Alexander, 2002a). Such a comprehensive approach to multi-hazard planning is a feature of the strategy of Organisation for Economic Co-operation and Development (OECD) countries and has evolved from extensive research into both natural and anthropogenic disasters (Lindell and Perry, 2003; Alexander, 2002b; McEntire et al., 2002; Mileti, 1999; Tobin, 1999). Disaster planning is based on risk assessment and lessons learned, which are codified into a set of risk management and emergency plans designed to enable effective and efficient policies and practices. This approach to risk management can be effective in areas prone to natural hazards, such as flood plains, storm corridors and seismically active zones. In Australia, Japan, the US and other MDCs, preparedness and mitigation strategies, combined with high coping capacity (a function of income, savings and insurance), ensure that, although events may cause extensive damage, mortality rates are usually low and communities are able to recover quickly.[2] Examples include the recovery of Florida, US, from numerous recent hurricanes (Tobin, 1999), the decade-long recovery of Kobe, Japan, from the 1995 Great Hanshin-Awaji earthquake (Toshihisa et al., 1999) and the recovery of Darwin, Australia, from the destruction of 70% of its building stock by Cyclone Tracy in 1974 (Blong, 2004). The ultimate aim of planning is disaster risk reduction, with the final outcome being a decrease in losses and a speedy return to normality. To work effectively, this holistic approach to planning requires accountable, democratic government institutions, financial support, political will and the trust of civil society.

In LDCs, such an approach to risk and disaster management also exists, at least on paper. It involves commissions and institutions at the national, sub-national, regional and municipal level, which have proliferated since the beginning of the International Decade for Natural Disaster Reduction (IDNDR) (1990–99). There had been

another flurry of similar institution building during the 'environment decade' of the 1970s, during which institutions were developed to monitor and protect the human environment from pollution. Implementation, however, lags behind institutionalisation and planning in many of these countries.

One must also juxtapose 'top down' disaster management in both MDCs and LDCs with the self-protection efforts made by households and communities themselves—actions based on local knowledge and the activities of the institutions of civil society that work on natural and technological hazards from 'the bottom up' (Cannon, 2000; Wisner et al., 2004; UN/SDR, 2004; Wisner and Walker, 2005).

## Humanitarian and complex emergencies

In complex and rapidly changing environments, often triggered by violent conflict, government agencies responsible for social protection may not be able to gain access to civilian populations. International refugees may well require support in remote and inaccessible border areas. Internally displaced persons (IDPs) often place heavy demands on local governments and the host population. The response to these cases by the international community—United Nations (UN) agencies, international organisations like the IFRC and international non-governmental organisations (NGOs)—is to complement government efforts to bring relief to those affected.

In such complex emergencies, planning takes the form of a needs assessment and the delivery of goods and services to meet requirements. Human demand for water, food, shelter, sanitation, healthcare, security and, somewhat later, for children's education, perhaps job training and counselling, is balanced against available resources (Wisner and Adams, 2003; UNICEF, 2005). Appeals for aid are formulated. Resources are allocated and results are tallied up in periodic evaluations. Meanwhile, in parallel, in an ideal situation, peacemaking and conflict resolution are occurring, so that eventually repatriation and resettlement become possible.

Humanitarian interventions typically deal with immediate relief, whereas longer-term recovery and development are the remit of other agencies (although some humanitarian entities are involved in both spheres). Increasingly, the humanitarian sector is driven by the need to show results. In complex and chaotic environments, with multiple agency involvement (and possibly intense international media attention), responsibility for success or failure can be very difficult to determine (Hofmann et al., 2004). There is a danger that this focus on results can exacerbate the problem of linking relief and development efforts. The humanitarian and development sectors have different agendas and operating modes, yet they have a shared interest in human well-being. The humanitarian sector often can be typified as neutral and 'state-avoiding', whereas the development sector relies on the state as a partner (Harmer and McRae, 2004). The activities of the humanitarian sector are guided by recognised standards, such as the Humanitarian Charter and Minimum Standards in Disaster Response (Sphere Project, 2005). This externally guided approach, although focused on needs and rights, does raise concerns about appropriateness, as the humanitarian system is 'largely ignorant of the views of the affected people as to the assistance being provided' (Hofmann et

al., 2004, p. 32). By contrast, the principal vehicle for the development sector is the Poverty Reduction Strategy Papers (PRSPs) whose mandate is to ensure stakeholder participation, though there are doubts regarding the value and depth of participation (Stewart and Wang, 2003).

Despite difficulties in bridging the divide between relief and development, it is crucial to attempt the span to close the gap. Better cooperation between practitioners and researchers in these fields is not impossible, yet there is a need for more effective communication between the sectors, particularly in protracted crises. With the prospect of increasing frequency of climate change-related disasters, both rapid onset, such as floods, or slow onset, such as drought and famine, maintaining and increasing communication will be a challenge, since agencies will be increasingly over-stretched and hence will possibly revert to type. If so, future events will continue to dwarf the number of those that have become, as UN Secretary-General Kofi Annan put it in a 2005 interview, hidden or forgotten (BBC, 2005).

## Climate change

Climate change can be described as both a complex and protracted hazard and as such does not sit comfortably in either of the current response regimes outlined earlier. It is a natural phenomenon but one that is caused by anthropogenic emissions of greenhouse gases. Climate change is a multifaceted (from drought to flood) and multidimensional (from local to global) hazard that has short-, medium- and long-term aspects and unknown outcomes.

What we do know is that climate change is intensifying the hazards that affect human livelihoods, settlements and infrastructure. It is also weakening the resilience of livelihood systems in the face of increasing uncertainty and frequent disasters (Masika, 2002). The disease ecology and geography of some human, livestock and plant diseases are changing. Population movements in response to climate change may also result in new exposure to hazards. Climate-displaced persons may suffer complex emergencies and strife as they flee with disregard for clan, tribal and national boundaries. Furthermore, climate change can increase vulnerability to unrelated, non-climatic hazards. An urban earthquake, for example, hitting when the elderly population is already suffering from the kind of heatwave that claimed 35,000 lives in Europe during 2003, would be much more stressful for such vulnerable groups (Earth Policy institute, 2003). Alternatively, an earthquake during a drought may come at a time when reservoirs and water pressure are too low to combat fires adequately (Scawthorn, 2000). One recent study presented a scenario in which an earthquake destroyed dikes separating salt and fresh water in the Sacramento River delta in northern California, which is a major source of water for Los Angeles. Such an earthquake scenario would create technological drought, a situation that would be all the harder to deal with in a warmer climate (Reisner, 2003).

The UK Department for International Development (DFID) argues that climate change increases the urgency to integrate risk management into development interventions and points out that the impacts of climate change-related disasters are multifaceted.

Not only can they lead to loss of life and the destruction of homes, infrastructure and livelihoods, but they can also cause significant financial damage, which can impede or compromise development. The losses caused by Hurricane Mitch to Honduras and Nicaragua in 1998 totalled more than the combined gross domestic product (GDP) of both countries, setting development back 20 years (DFID, 2004b).

The risks associated with future climate change will be determined by the interaction of hazards and vulnerability—as will other types of risk. LDCs are more vulnerable to climate-related disasters and those countries unable to cope with current climate-related disasters will be the most poorly equipped to deal with the adverse impacts of climate change (Adger and Brooks, 2003). Of equal concern are the highly skewed costs of adaptation to climate change at global and local scales. The long-term and uncertain nature of climate change impacts means the susceptibility of societies and the costs of adaptation draw attention to some pertinent debates about social and inter-generational equity (Adger et al., 2001). MDCs produce the majority of greenhouse gases but the ramifications will be felt most by the poorest nations. The impacts will be severe, yet LDCs lack adaptive capacity.

## A holistic approach?

The final outcome documents of the WCDR have provided a 'green light' for a comprehensive approach to risk management, which would integrate natural hazards mitigation, 'routine' development efforts, such as investment in initiatives aimed at realising the MDGs, and efforts to address climate change. The question is, however, what approach to planning is compatible with all three and provides a bridge among natural hazards mitigation, sustainable human development and adaptation to climate change? The answer is that climate change adaptation needs to become part and parcel of comprehensive risk management, as argued above. The irony is that planning for climate change impacts to date, resembles far more the 'needs assessment and delivery' approach that has evolved in the planning toolbox of humanitarian assistance in conflict and post-conflict situations. The reasons for this are not completely clear, but one lies with the bureaucratic division of labour within the UN system and within between bilateral donor organisations and their scientific advisors (Walker and Wisner, 2005). Another reason may have to do with the relative lack of attention paid to drought and other 'creeping disasters' by the international disaster management community (Vlek, 2005). Drought was not even included in the mandate of the International Decade for Natural Disaster Reduction (1990–99) until it was half way over.

The underlying drive of disaster management is to reduce risk both to human life and to systems important to livelihoods. Risk to human populations is a function of the frequency of a hazard event, its severity and people's vulnerability (Wisner et al., 2004). Vulnerability depends on many factors that influence the amount of damage and the loss of human life that a particular hazard can cause. These variables include exposure, physical susceptibility, socio-economic fragility and lack of resilience (Cardona et al., 2004). Vulnerability, and hence risk, is socially determined, and Wisner et

al. (2004) therefore conclude that vulnerability is made up of 'the characteristics of a person or group and their situation that influence their capacity to anticipate, to cope with, resist and recover from the impact of a natural hazard' (Wisner et al., 2004, p. 11).

Since risk is a function of both hazard and vulnerability, and hazards are, at least to some extent, known and constant, vulnerability appears to be the main factor that distinguishes between those who suffer loss and those who escape it. A common issue is whether vulnerable people contribute to their own predicament by making uninformed or unwise choices. For example, does one not 'choose' to live in a flood-prone area? This presupposes that choice is available. This is not always, or even commonly, the case. In Africa, Asia and the Pacific, Latin America and the Caribbean, rapid and unplanned urbanisation has placed some 600 million urban dwellers in life- and health-threatening homes and neighbourhoods (Hardoy et al., 2001). For many, the choice to relocate or remove themselves from this situation simply does not exist, leading to a position where disasters, or potentially disastrous situations, are created. Hazards, such as floods, are natural events; however, disasters are not natural. In Latin America, it has been common for some time to define disasters as 'failed development' (Manizales Declaration, 2004).

The IDNDR raised the profile of the social and economic causes of risk and led to a growing realisation that using technological and engineering approaches to mitigate losses deals only with symptoms, not causes. A consensus emerged between the middle of the IDNDR (around May 1994) and the 2005 WCDR that reducing risk requires long-term engagement in the development process.

This international effort to raise the profile of disaster and flag the relationship between disaster and development sees risk management as an integral component of sustainable development. This is reflected in the call by the World Summit on Sustainable Development (WSSD)—held in Johannesburg, South Africa, on 26 August–4 September 2002—for disaster reduction strategies with a two-fold aim: to enable societies to be resilient to hazards while ensuring that development efforts do not increase vulnerability to hazards. The WSSD concluded that:

> *An integrated, multi-hazard, inclusive approach to address vulnerability, risk assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the twenty-first century* (UN, 2002; UN/ISDR, 2003).

Disaster reduction has thus emerged as a core element of sustainable development. Development investments and projects can either increase or reduce vulnerability to hazards. Investments and development activities are almost never risk-neutral. It is at the nexus between sustainable development and policy that the aims of the disaster, development and climate change communities intersect. Risk reduction is the shared objective, but it is the promotion of resilience that offers the opportunity for more holistic and proactive responses.

Adaptive capacity is strongly linked to resilience. The United Nations International Strategy for Disaster Reduction (UN/ISDR) has adopted the term resilience (UN/ISDR, 2001) and defines it with reference to natural hazards as:

> *The capacity of a system, community or society to resist or to change in order that it may obtain an acceptable level in functioning and structure. This is determined by the degree to which the social system is capable of organizing itself and the ability to increase its capacity for learning and adaptation, including the capacity to recover from a disaster* (UN/ISDR, 2002, p. 24).

This definition is similar to that of vulnerability above, but it is applied to an entire socio-technical system, whereas earlier, vulnerability was defined in terms of households and groups. In this similarity lies one plank in a bridge that needs to be built between the conceptual world of the climate change community and that of the hazards community.

Resilience captures what should underpin holistic risk management. By this we mean a paradigm that includes adaptation to climate change, hazard mitigation and sustainable human development, as discussed previously. Resilience does not focus on what is missing in a crisis (needs and vulnerabilities) but on what is already in place (resources and adaptive capacities).

Applying the notion of resilience to climate change impacts is a matter of finding out how people will cope and helping them to identify where help is needed so as to enable, complement and supplement their coping efforts. This involves specific hazard and vulnerability assessments as well as the identification of coping capacities. In MDCs there are already examples of this approach being taken. The UK Climate Impacts Programme (UKCIP, 1998) has began scenario building and is actively attempting to identify what changes are likely to occur, including precipitation, shifts in vegetation, extreme heat events and sea level rises. With regard to the latter, areas have already been identified where managed retreat from coastal areas will be part of the development framework for those locations. In a similar vein, the UK National Health Service (NHS) is using IPCC predictions to undertake studies aimed at protecting the frail and elderly in the event of extreme hot weather, as occurred in 2003, for instance, when deaths in London among people aged over 75 rose by 60% (NHS, 2004). In LDCs, alternative policy focused studies are under way to identify how local people and government institutions are likely to cope with climate-related changes in rainfall, crop yields, agricultural and livestock pests and diseases, river regimes, disease vector habitats (such as that of the malarial mosquito), fresh water and marine fishery productivity, coastal storms and sea level rise (UNDP, 2004b).

## Climate change and risk management

We return now to the definition of risk as a function of hazard and vulnerability. Climate-related hazards include more frequent and severe droughts, floods and storms, in addition to a large array of human health hazards and complex biological impacts on the productivity and stability of livelihoods that depend on natural resources. Climate-related vulnerability is the set of social, economic, political and physical factors that determines the amount of damage a given event will cause and also the capacity to anticipate, cope

with, resist and recovery from that damage. Risk to populations arises from the interaction of these hazards and vulnerabilities.

Risk is offset by resilience, and patterns of risk will differ with changing natural hazards driven by climatic variability. More destructive cyclonic storms may become more common (Emanuel, 2005). Longer-term sea level rise will have major impacts on low lying land. Extreme temperatures will heighten the problems of drought-prone areas—there is already evidence that impacts are exhausting the coping capacity of many communities (ADB et al., 2003; UNDP, 2004a; VARG, 2005; Dilley et al., 2005).

When dealing with climate-related risks, the starting point for adaptation measures that build and reinforce resilience is an understanding of current vulnerability to climate variability and extremes (VARG, 2005). Here one must distinguish between short- and medium-term adaptations of livelihood systems and human settlement and the longer-term natural, biological adaptation of ecosystems. Article 2 of the 1992 United Nations Framework Convention on Climate Change (UNFCCC) states that:

> *The ultimate objective . . . is to achieve . . . stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system . . . within* ***a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner*** (UNFCCC, 1992) (emphasis added).

Signatories to the UNFCCC and the 1997 Kyoto Protocol have accepted that climate change brings with it many potential hazards, such as rising sea levels, increased storm and flood frequency, the spread of infectious diseases, declines in biodiversity and reduced availability of food and water. These impacts are a danger to human life and sustainable development. Hence, the logical connections between the UNFCCC and the aims of sustainable development are clear. While the main aim of the convention is the stabilisation of greenhouses gas concentrations at a safe level, and its main method is emissions reduction, recognition of climate change as a cause of hazard adds weight to the efforts of the UN/ISDR and other bodies to address disaster reduction in the context of sustainable development.

Although the UNFCCC argues for the avoidance of dangerous climate change, the *Third Assessment Report* of the IPCC claims that deciding what constitutes dangerous climate change is a value judgment beyond the remit of the IPCC and perhaps of science itself (Smith et al., 2001). Dessai et al. (2001) point out that there is no universally recognised framework or process for determining what constitutes a dangerous level of climate change, and for whom. They conclude that both the external risk (determined through scientific analysis) and internal risk (determined by individual or community perception of insecurity) should play a role in defining dangerous climate change and believe that participatory assessments belong among the tools for identifying what level of climate change is dangerous. One sees here a parallel with the rising importance of community-based, participatory risk assessment when dealing with natural hazards.

## The role of capacity

Climate change projections are scenario based and hence contain uncertainties. What constitutes danger will have to be a political decision. In reality, national governments will take the lead in identifying the dangers both to communities and to livelihoods that are likely to manifest and in developing strategies to cope with, and adapt to, changing circumstances. If Dessai et al. (2001) are correct then there is an urgent need to develop the tools that will enable that analysis to be undertaken so that at least any debate will be informed. It is also a priority to build the capacity of civil society to engage in such a national discussion, bringing the diversity of local conditions, impacts, vulnerabilities and capacities to the attention of national leaders. This is particularly the case for poorer nations, many of which are currently experiencing the impacts of climate change. Magrath et al. (2004) observe in *Up in Smoke?* that several African countries are already having to deal with the ramifications of accelerated climate change, not to mention several of the Small Island Independent States (SIDS) (Pelling and Uitto, 2001; Kelman, 2005). There is an urgent need to ensure that socially widespread capacity to evaluate climate change risk is developed.

Earlier we distinguished between risk management in MDCs and LDCs. How will this divide affect the feasibility and quality of national dialogues on climate change? As O'Brien and Read (2004) point out, civil protection in the UK has evolved from a long tradition and is now embedded throughout institutional structures. Thus the UK government is institutionally capable of adopting a proactive approach to a number of long-term problems that climate change will present. Although the all-hazards approach to risk management concentrates on the near future, typically up to 10–15 years, with established institutions and capacities it may be possible to stretch out the model to accommodate the much longer time horizons for climate change: 50–100 years. The same is true of many other MDC governments.

The situation in LDCs is different. Externally assisted capacity-building programmes for disaster risk management do include an institutional strengthening component, but in general these efforts are often narrowly focused on the creation of disaster-specific legislation, administrative arrangements and institutional structures (UNDP, 2004a). They are often centralised and do not necessarily result in enhanced capacity in disaster risk management at the grassroots or local level. The existence of a national disaster organisation in the capital city may represent progress in nations where disaster risk-related organisations and legislation were previously weak or absent. But they may have little impact on risk accumulation processes in remote provinces or districts.

This raises some difficult issues. MDCs are resilient and should be able to cope with climate change, provided that the transformations are not more extreme and/or rapid than IPCC scenarios envisage. This resilience is a direct function of both capacity and economic prosperity. For LDCs, the capacity to cope is much less certain. As Adger et al. (2001) note, equity issues that have often arisen in debates on carbon emissions reduction also need to be addressed in the context of adaptation to climate change. A much clearer focus on capacity-building is needed. This, coupled with greater access to northern markets to stimulate economic development, should begin to tackle the

equity problem and enable LDCs to enhance indigenous capacity to identify climate change-related risks and to develop adaptation and coping strategies.

Capacity-building comes down to resources and commitments to ensure that these resources are effectively utilised. This is a formidable challenge. Many of the richer nations have not as yet met their international development assistance obligations. Hilditch et al. (2005) show that many OECD member states are failing to commit 0.7% of GNI to overseas aid. In 2003, the percentage ranged from 0.15 for the US and 0.20 for Japan to 0.92 for Norway (World Bank, 2005). This shortfall, combined with problems of debt and unfavourable terms of international trade, does not augur well for the LDCs, particularly the least developed, highly indebted countries, as they struggle with climate change.

In such a resource-poor situation, ad hoc, need-driven relief may continue as a response to the increasing impacts of climate change in LDCs, although the rational (and long-run cost-effective) approach would be to invest in building capacity and resilience. A good example is the difference between the millions of US dollars spent by donors on famine relief in Niger during 2005 (a drought situation) and limited donor enthusiasm for Senegal's proposal to build a 'green wall' against the encroaching Sahara Desert—precisely what China has been investing in as it protects Beijing and the 2008 Olympics from the Gobi Desert to the north (Aloisi, 2005). While disaster management has evolved from a relief and response approach to a risk management approach with a greater focus on reducing vulnerabilities (and increasing coping capacities), initiatives aimed at mitigation and prevention are still few and poorly financed. The contrast is striking when compared with what is spent by donors and development banks on relief ('humanitarian assistance'), including post-disaster reconstruction (Yodmani, 2001).

One further concern is the lack of recognition and inclusion of disaster risk in PRSPs. This could result in a situation where developmental activities aimed at tackling poverty could inadvertently create new risks. Of equal concern are post-disaster recovery programmes that rush to re-establish the status quo ante without any evaluation of whether the earlier development activity itself was a factor that increased disaster vulnerability, or whether recovery investments could become a risk factor (Susman et al., 1983; Kreimer and Arnold, 2001; Burton and van Aalst, 2004). The rush to rebuild after the 2004 Asian tsunami and likely rush to repair the damage caused by Hurricane Katrina to New Orleans, US, are cases in point.

## Institutional context

There are a large number of bodies—governmental, non-governmental, public and private—involved in disaster management. There are many others that have a direct interest in disaster risk reduction, including the humanitarian and developmental sectors. But the two principal organisations with a mandate to coordinate the effort to reduce the level of disaster risk associated with accelerated climate change are the UNFCCC and the UN/ISDR.

The UNFCCC is a legal entity established by treaty in 1992. Decision-making is the responsibility of the Conference of Parties (COP), a body comprising the signatories to the convention. Protocols agreed by the COP are binding on UNFCCC signatories. COP is a policymaking and implementing body with a focus on mitigation (reduction of greenhouse gas emissions) and adaptation. It is well resourced.

The UN/ISDR is very different. It is a partnership of organisations that have an interest in reducing the risks posed by all hazards and is united and coordinated by a small and poorly funded secretariat in Geneva, Switzerland.

Although the UNFCCC and the UN/ISDR are different, they do have an overlapping agenda: reduction of the risks associated with accelerated climate change. Their approaches are also different. The UNFCCC takes a mitigation and adaptation approach. Although the UN/ISDR is also committed to addressing the root causes of natural hazard risk in theory, in practice, member nations have emphasised preparedness and only to some extent have they built on local knowledge and capacity (that is, resilience). In actual fact, the work of both the UNFCCC and the UN/ISDR suffers from institutional weakness. Institutional weakness at the national level can prevent effective communication between those parts of government that should cooperate on disaster management and climate change. Institutional weakness may also hinder effective dialogue with those communities most likely to be affected by climate variability.

At the international level, cooperation between the UNFCCC and the UN/ISDR has so far been limited to information exchange. Since they have a shared agenda, more cooperation should be possible. The UNFCCC has greater resources. Could these not be shared with the UN/ISDR in programmes of common interest? For example, they could develop a common model of risk management predicated on capacity-building and resilience. The UNFCCC could use resources and mechanisms available through the Special Climate Change Fund. One recent decision taken by COP9 supports 'capacity-building, including institutional capacity, for preventive measures, planning, preparedness and management of disasters relating to climate change' (COP9, 2002).[3] In this particular matter, the UNFCCC has the resources, while the UN/ISDR has the network and capacity.

## Closing comments

A new approach is needed to underpin the incorporation of risk management into work on climate change and the introduction of climate change into natural hazards and development planning. The approach needed is one that is capable of dealing with the long-term transformations that climate change may bring and the ways in which people respond, both at the national, regional and local level. The key concepts in that new approach should be capacity-building and resilience. We have shown that comprehensive risk management, as it has evolved in the field of natural hazards planning over the past 20 years, provides the basis for such a new paradigm. A conceptual bridge exists when one considers the shared understanding of risk as a function of hazard and vulnerability, and when, in addition, one considers the conceptual and practical overlap between notions of vulnerability and resilience.

Adaptation to climate change may involve some very difficult political choices. For instance, long-term changes to land use are likely to be required (affecting agriculture and forestry, the use of coasts, estuaries and river resources and settlement patterns and infrastructure). It may be necessary to instigate a process of managed retreats from those areas that will become unusable, involving relocation to areas that offer security and opportunity. To deal with such serious matters, national decision-making will require strong, sustainable and accepted institutional structures and a population and civil society educated in the issues and alternatives.

There are examples of proactive approaches to the long-term challenges that accelerated climate change presents. But LDCs are unlikely to have the capacity or resources to respond similarly. Risk management in MDCs has its focus on risk reduction and prevention. For LDCs, the focus has generally been on relief. This difference reflects economic disparity. Risk management cannot, of itself, address the underlying causes of poverty. But if approached from the standpoint of resilience, it can help to build those structures that will enable a greater degree of self help. It is about helping people to help themselves. The mechanisms, resources and capacity do exist. The challenge is in trying to find the means of developing closer linkages, such as between the UNFCCC and the UN/ISDR.

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## Endnotes

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[2] The recovery of New Orleans, US, from the catastrophic impacts of Hurricane Katrina (August 2005) may turn out to be an exception.

[3] Decision 5/CP.9, Section 2c.

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