

# Chapter 6

Addressing the underlying  
risk factors



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# Introduction

This chapter reviews practice in five areas that address the disaster risk–poverty nexus: strengthening livelihood sustainability in rural areas, partnerships for urban and local governance, innovative financial mechanisms, environmental management, and community- and local-level disaster risk reduction.

The chapter does not comprehensively review practices in other areas that address the underlying risk factors, for example in social protection. Nor does it comprehensively review practices in each of the areas above but rather describes salient trends, which are illustrated by examples from different countries. However, the chapter does underline key practices that would make a significant difference if they were incorporated into policy considerations.

The chapter finds that it is possible to address the underlying risk factors that contribute to the translation of poverty into disaster risk and disaster impacts into poverty, and that many of the necessary tools and approaches are already being applied in practice across all regions, including in low-income countries. This has an important policy implication, since it is possible to reduce risks without waiting for high levels of economic development. It also means that there is much that can be done, even in low-income countries, to adapt to climate change.

## Summary of findings

### **1. Strengthening livelihoods increases resilience among rural communities.**

Strengthening livelihoods through natural resource management and the generation of microenterprises, infrastructure development and basic service provision can reduce risk and increase resilience, particularly in rural contexts.

### **2. Good urban and local governance: critical to reducing risk in urban settlements.**

Good urban and local governance is critical to the reduction of disaster risk in both cities and small urban centres. Competent and accountable local governance structures in partnership with an active civil society have developed innovative approaches to assure land supplies, provide basic infrastructure, secure land tenure and provide housing finance for poor households. Improvements in urban and local governance provide the foundation for incorporating disaster reduction considerations into urban development.

### **3. Adopting microfinance and microinsurance initiatives can increase resilience.**

Emerging practices based on microfinance, microinsurance and catastrophe financing do not necessarily lead to a reduction in disaster losses. However, they can increase resilience in both urban and rural areas and therefore can play a key role in avoiding the translation of disaster impacts into poverty outcomes.

### **4. Ecosystem services improve hazard regulation and provisioning services.**

Ecosystem services can be enhanced through a range of practices, including integrated planning, protected areas and payment for ecosystem services. This improves both hazard regulation and provisioning services for rural and urban communities.

### **5. Community- and local-level approaches increase sustainability of disaster risk reduction practices.**

Community- and local-level approaches, particularly when supported by effective decentralization processes and government–civil society partnerships, can increase the relevance, effectiveness and sustainability of disaster risk reduction across all practice areas, reduce costs and build social capital.

## 6.1 Strengthening livelihoods

As highlighted in Chapter 4, the poor deal with risk and insecurity, in the context of a range of different hazards, as a central part of their livelihood strategies<sup>1</sup>. Strengthening livelihoods and increasing their resilience is thus crucial to reducing both disaster risk and poverty, particularly in rural areas where livelihoods are sensitive and vulnerable to weather fluctuations and extremes.

Over the past decade, rural livelihoods have become increasingly supported by non-farm income earning activities (for instance, agroprocessing, small-scale trade and services)<sup>2</sup>. However, a significant proportion of the rural poor in Africa, Asia and Latin America still depend heavily on agriculture and farm-based activities<sup>3</sup>. While the livelihood strategies of rural poor households may vary across contexts they generally involve three complementary components: intensification of agricultural inputs where possible; income diversification from non-farm sources; and seasonal or permanent migration to other rural or urban areas.

While livelihood strengthening can have many dimensions, this section will review practices in two complementary areas that support and strengthen the livelihood strategies of the rural poor:

- *Natural resource management* and microenterprises implemented at the community level, particularly for the conservation and protection of ‘common resources’ (forest management, agroforestry, livestock rearing, beekeeping, water resource management, coastal protection and microcredit schemes).
- *Infrastructure development programmes and basic services provision* implemented at the local level with rural and peri-urban community involvement (watershed management, drought proofing, flood risk management, rainwater harvesting, cash for public works, construction of irrigation systems, canals, roads, disaster recovery and reconstruction, etc.).

It has not been possible in this Report to comprehensively review practice in a third area,

that of social assistance and protection, which includes different approaches to welfare provision including livelihood guarantee schemes, cash transfers, subsidies for public services, such as education and health, and others – although it clearly could play a key role in increasing household and community resilience to disaster impacts in developing countries.

### 6.1.1 Natural resource management

The rural poor are heavily dependent on natural resources and therefore most severely affected by deteriorating environmental conditions and by factors limiting resource access, including those associated with climate change. Resource access is often complicated through non-existent or ambiguous legal rights to the resources on which they are dependent, or because they have no feasible way to exercise their rights. Contradictions between traditional and contemporary systems of property rights are often at the root of livelihood and environmental insecurities, marginalizing the poorest communities. The regions affected by these conditions are also where environmental insecurity is most likely to lead to conflict<sup>4</sup>.

Natural resource management can positively affect both sides of the disaster risk–poverty nexus: reducing weather-related hazard and the vulnerability of agriculture, fisheries, forestry and livestock production while increasing resilience through strengthening incomes and the capacity to access assets. However, while success usually builds on strong community-level involvement, as in the case of urban governance, local and national government involvement is crucial to address issues concerning property rights and land and water management.

An instance of combining community action with government responsiveness can be found in the Mashreq and Maghreb project, which linked the Mashreq (Iraq, Jordan, Lebanon and Syria) and Maghreb (Algeria, Libya, Morocco and Tunisia) countries to combat desertification. The project catalysed the creation of community-based organizations to develop

‘negotiated action plans’ that set standards for land management in their domains. They also function as communication and advocacy channels to promote policy and institutional reforms affecting property rights, land and water management, marketing and credit<sup>5</sup>. Awareness of legal provisions for natural resource management and use can benefit communities in local decision-making with government development agencies<sup>6</sup>.

Watershed and forest management often offer another common entry point. Examples from China and Korea demonstrate particularly vigorous approaches to engaging communities in forest management as a part of flood risk reduction measures. Other countries have introduced measures to reduce the risk of devastating wildfires. Examples of using natural resource management to strengthen livelihoods are shown in Boxes 6.1–6.3.

## 6.1.2 Infrastructure development and basic services provision

Given the damage and destruction of housing and infrastructure, such as irrigation channels, roads, bridges and transport networks, in disasters, particularly in the case of manifestations of extensive risk, the links between infrastructure development, disaster risk and poverty reduction are explicit.

Safe infrastructure is critical to human, livelihood and asset security. At the same time, investment in infrastructure provision and rehabilitation is also an opportunity to generate additional employment and income in rural areas, which can increase household and community resilience.

The rehabilitation of local infrastructure is frequently included in post-disaster recovery and rehabilitation programmes. Box 6.4 offers an example of integrated livelihood and

### Box 6.1: Dryland agroforestry and livelihoods regeneration: towards more resilient communities<sup>7</sup>

Trees, shrubs and specialty crops have historically played a vital role in dryland agriculture in developing countries. Trees are preserved on farms because they are valued for fuelwood, construction material, fodder, medicines, cosmetics, enhancing soil fertility and shade. In the drylands of West Asia and North Africa trees have long been domesticated and orchards (e.g. olive, citrus, pistachio) are widespread. Contrary to expectations that urban expansion would result in deforestation, tree density increased in the surroundings of Kano, Nigeria from

1972 to 1985 as farmers protected and planted trees to meet the demands of the growing fuelwood market. Diversified crops, shrubs, trees, rangelands and other farm operations can also catalyse diversification in local agroenterprises. New ways to process and market foods create new opportunities for a wider variety of income-generating enterprises, creating a ripple effect that multiplies the benefits broadly through rural communities, making the environment and communities resilient to drought and desertification processes.

### Box 6.2: Good irrigation enhances climate change adaptation and boosts harvest in Peru<sup>8</sup>

The people of the village of Coyllur, in western Peru, are mostly farmers. Farming takes place on steep land, with few attempts to control erosion. Irrigation, where available, is by flooding with little terracing. Extensive clearance of indigenous vegetation has further destabilized the land. Intense rainfall in the wet season leads to extensive soil erosion and the destabilized slopes exacerbate landslide risk. The dry season is becoming lengthier, impacting on crop yields. Poor housing and a location in a high-risk area have led many people to migrate from the countryside to the city seeking employment. Those remaining have adopted increasingly unsustainable farming practices in a desperate bid to survive. There

is little or no remaining local knowledge of how to best cultivate steep land or of appropriate irrigation technologies.

A livelihood enhancement project by Practical Action demonstrated that low cost irrigation techniques make better use of water, increase production and generate higher returns. The techniques also help solve problems linked to slope cultivation, such as soil erosion, landslides and flooding. Demonstration plots showed that appropriate irrigation techniques promoted good water management, helped disease management, preserved soil nutrients and reduced risks of soil erosion that previously put their precarious infrastructure at risk.

**Box 6.3:**  
**Watershed**  
**restoration and**  
**development**  
**in Maharashtra**  
**State, India<sup>9</sup>**

In the semi-arid region of Maharashtra State in India, the Watershed Organization Trust is assisting poor, rural communities to increase their livelihood security by supporting watershed restoration projects. With rain-dependent livelihood systems, these communities survive on limited water supplies to feed their crop and livestock production and cottage industries. The combination of recurring droughts and human pressures on the surrounding land has degraded watersheds. Barren and eroded lands are unable to absorb and retain water, thereby accelerating surface runoff and soil erosion and inhibiting ground water recharge. The resulting decrease in soil fertility and water availability has created drought-stressed communities vulnerable to the impacts of climate change.

Working on a microcatchment basis, rigorous watershed restoration measures designed to regenerate and conserve microcatchments have been undertaken, including: soil, land and water management, e.g. trench building to control erosion,

improve soil fertility and enhance groundwater recharge; crop management; afforestation and rural energy management, e.g. ban on tree-felling – instead planting shrubs and grass to meet household fuel needs; livestock management and pasture/fodder development, e.g. grazing restrictions leading to the natural regeneration of grass and shrubs. These projects have been supported by other measures, including microlending, training in new techniques and the formation of self-help groups, to diversify livelihoods.

Increased soil cover, improved soil moisture regimes, increased well water levels, biomass regeneration and dramatic increases in fodder availability, milk production and vegetable farming are some of the results reported by participating villages. Coupled with microenterprise development and an increase in savings groups, these results have translated into more secure livelihoods, diversified asset bases and reduced exposure to climate-related shocks.

**Box 6.4:**  
**Support through**  
**rehabilitation**  
**and reconstruction**  
**activities for**  
**landslide- and**  
**flood-affected**  
**communities in**  
**Nepal<sup>10</sup>**

The monsoon floods and landslides that started in late August 2006 left about 16,000 families in need of assistance. To respond to the emergency situation, Rural Reconstruction for Nepal mobilized volunteers and resources to help the victims of the devastating floods and landslides in different districts of Nepal and is currently implementing a rehabilitation project in three districts: Achham, Banke and Bardiya. The main purpose of the project is to support those affected by the floods and landslides through rehabilitation activities.

Amongst other activities, the project supported repair and operation of community drinking water

schemes, 40 hand pumps were installed in Banke district, 6 schools were repaired and two irrigation canals were rehabilitated. Special consideration was given while re-establishing and reconstructing community infrastructure, in particular drinking water pumps, canals and culvers, so that women and socially marginalized and poor community members would have equal access to these resources. Consultations with women and disadvantaged groups were conducted before re-establishing drinking water pumps and irrigation facilities in terms of location and accessibility.

infrastructure rehabilitation within poor, flood-affected communities in Nepal.

Infrastructure rehabilitation can also be used as an ex ante strategy to reduce risk and increase resilience and security as outlined in Box 6.5.

The development and rehabilitation of local infrastructure is also supported through social funds. Social funds are community grant programmes that provide block grants for projects to build community assets such as community facilities, infrastructure or improved services,

including microfinance and microinsurance, to increase livelihood security and resilience for poor and vulnerable households (see Box 6.6). Social funds provide a flexible mechanism that can be adapted to undertaking a variety of projects<sup>14</sup>. The funds are typically guided by project management committees which bring together different stakeholders in the community and have the potential to play longer term roles in providing a community voice in local development decision-making. The use of social funds has grown over recent years. They now

**Box 6.5:**  
**Strengthening livelihoods in Sri Lanka and Bangladesh**

Plan Sri Lanka implemented a Small Tank Rehabilitation and Farming System project in drought-hit Anuradhapura district. Food insecurity in this region is high, leaving 30% of children under the age of 10 malnourished. The project improves water security by rehabilitating and restoring the physical structures of traditional age-old small tank<sup>11</sup> systems. Introducing crop diversification (to secure better incomes), home gardens (for better family food security and nutrition) and inland fisheries (for food and profit), the project positively affects the welfare and resilience of drought-affected families. The project engages government at district level through agencies related to agriculture, irrigation and district planning.

Bangladesh Disaster Preparedness Centre manages a project that concretely links risk reduction

with livelihood support at household level in very low-income, disaster prone neighbourhoods. The project makes sure that 50% of the beneficiaries are women. It funds skills development and provides investment in livelihoods activities on the condition that part of the income generated is used for household risk reduction measures such as raising the plinth of houses, strengthening structures, storing grain in attic rooms, etc. This programme is an interesting mix of government financial commitment (the Ministry of Food and Disaster Management directed their funds for rehabilitating flood victims to the project) and NGO implementation – a combination that has worked very well for the programme and beneficiary community.

**Box 6.6:**  
**Social funds for post-disaster recovery**

After Hurricane Mitch, the Honduras Social Investment Fund (HSIF) was used as the foundation for responding to requests from both local and central levels to help rebuild the country's critical local infrastructure. By simplifying the application procedure and increasing the use of standardized subprojects, HSIF was able to respond to the crisis very quickly. Similarly the Kecamatan Development Program (KDP) in Indonesia was adapted to support a variety of community infrastructure reconstruction and rehabilitation projects building on the established KDP network of 600 village facilitators and 35,000 village volunteers<sup>12</sup>. The Tanzania Social Action Fund has even made this role permanent through the establishment of community foundations that are formally registered and function as partnerships with local civil society organizations, the business community and local governmental agencies. By engaging a range of constituencies within the community it is thought that the community foundations will also help to mobilize additional local resources<sup>13</sup>.

represent a portfolio of US\$ 14 billion for the World Bank<sup>15</sup>, and similar programmes have been implemented by a variety of other agencies (sometimes under the name of community grants or block grants).

In conclusion, investment in rehabilitating or improving rural infrastructure has enormous potential to reduce disaster risk and increase household and community resilience, including but not exclusively in post-disaster contexts. However, significant challenges remain. As in the case of urban and local governance, disaster risk reduction considerations are not automatically factored into many initiatives due to a lack of awareness of hazard patterns and the cost of disaster impacts and the lack of formalized procedures to factor disaster risk reduction into investment decisions. Local governments and implementing authorities may not be accountable for ensuring the application of appropriate technologies for infrastructure development that make for safer environments and provide sustainable livelihood resources to the poor. At the same time, the maintenance of small-scale community infrastructure is often challenged unless full community ownership is ensured.

## 6.2 Partnerships for urban and local governance

Good urban and local governance is critical to the reduction of disaster risk in urban areas. If, as was examined in Chapter 4, urban disaster risk is configured in many developing countries in a context of unequal access to income earning opportunities, public services and basic infrastructure and poor urban and local governance, then two key underpinnings of reduced urban disaster risk would be more equitable access to employment opportunities and the presence of competent and accountable local governance structures to improve the provision of municipal services.

By generating higher incomes from more diversified sources individuals and households have a better chance of reducing risks by gaining access to safer housing in safer locations and safer jobs, accumulating assets and reserves that can be 'bankable' in times of disasters, and protecting assets at risk through insurance<sup>16</sup>.

However, higher or more diversified sources of income can only reduce disaster risk when accompanied by a planning and regulatory framework that proactively facilitates access to safe land, housing, infrastructure and services for the urban poor and that provides the secure tenure required to access finance and insurance.

Improvements in the provision of municipal services such as water, electricity, public health, drainage, sanitation and basic housing do not per se reduce disaster risk. Unless information

on hazard patterns and trends and the cost of disaster impacts are factored into land-use planning, building and infrastructure provision even the best and most innovative urban programme may fail to reduce disaster risk or even lead to its increase.

However, urban governments that are unwilling or unable to address fundamental issues of access to services and infrastructure for the urban poor are usually unable to address disaster risk. Good urban and local governance therefore is an essential platform for disaster risk reduction. Table 6.1 shows how disaster risk reduction practices can be incorporated into good urban governance practices.

It is estimated that the population of approximately 1 billion people who currently live in urban informal settlements in the developing world is growing by at least 2.5% per year. While not all residents of urban informal settlements are at risk from natural hazards, most risk from natural hazards in cities is concentrated in such areas. It is therefore fundamental that innovative efforts are made to upgrade existing informal settlements and that new growth is planned in a way that accommodates the poor and factors in disaster risk reduction considerations. Well-governed and sustainable cities are likely to have lower levels of disaster risk and be better adapted to climate change.

**Table 6.1:**  
**Disaster risk reduction practice incorporated in urban governance practice**

<b>Good urban governance</b>	<b>Disaster risk reduction</b>
Partnerships between community organizations and local governments to acquire land with secure tenure for low-income households	Hazard mapping used to identify safe sites for housing
Loan schemes for house-building and improvement	Technical assistance to introduce safe building standards as part of loan package
Improvements in sanitation and other infrastructure provision	Improved drainage in flood prone areas and public works to mitigate hazards
Participatory planning involving community organizations and local governments	Disaster preparedness and response plans and early warning systems
Public investments in schools and health facilities in low-income areas	Retrofitting existing facilities and ensuring that all new community infrastructure is built safely on secure sites

### 6.2.1 Good practice in urban and local governance

The experiences of Curitiba and Porto Alegre in Brazil, and many other cities in Africa, Asia and Latin America, show that if a city is well governed, it can grow successfully without risk prone informal settlements, inadequate vulnerable housing, non-existent services and infrastructure, and poor health, even when a majority of the urban population is poor.

The planning and regulatory frameworks put in place by city and municipal governments and their investments in infrastructure profoundly influence the scope and location of other investments, from large enterprises to small informal entrepreneurs, from large property developers to low-income households seeking land on which to build. In general, cities that have failed to put into place effective planning and regulatory frameworks are those with unrepresentative local governments lacking the resources to invest in essential infrastructure and services and where most local revenues go to recurrent expenditures or debt repayment. In contrast, cities and smaller urban centres that have successfully managed growth often have local governments that are more accountable to the citizens in their jurisdiction, within national government structures that have strengthened and supported local government capacities and infrastructure.

### 6.2.2 Decentralization, local democracy and civil society

Competent and democratic local governments often arise where decentralization programmes

have ensured more power and resources for the local level<sup>17</sup>. Several countries have made constitutional or legal changes that have increased the revenues of city and municipal governments and strengthened local democracies<sup>18</sup>, including Brazil, Colombia and India. Brazil has probably gone further than any other nation in developing new national institutions to support more effective urban governance<sup>19</sup>. There are also examples of national governments seeking to develop legal, institutional and financial frameworks to address urban poverty more effectively<sup>20</sup>.

Good urban governance is often underpinned by stronger local democracy. The introduction of elected mayors and councillors over the last 10–20 years has helped make many city governments more accountable and responsive to their citizens. However, it also usually reflects a dynamic and proactive civil society and the emergence of innovative partnerships between grassroots organizations, local NGOs and local government<sup>21</sup>. Good urban governance, therefore, is not only the result of elected mayors and councillors or national decentralization processes but also of civil society having avenues to participate in urban governance. This combination of national policies and programmes that encourage decentralization, strengthened local democracy, and an active civil society has held the key to a wide range of innovative partnerships that have favoured the urban poor. Table 6.2 provides a summary of the results of examples of such partnerships from all regions.

**Table 6.2:**  
**Innovative partnerships for urban governance**

Type of partnership	Examples
Participatory planning processes	Porto Alegre, Brazil helped to pioneer participatory budgeting, through which residents in each district of the city had the right to influence public investment priorities – a development facilitated by the strength of grassroots organizations within the city <sup>22</sup> . Participatory budgeting has now come to be implemented in many other cities both within Brazil and in other countries <sup>23</sup> , and shows how local governments and businesses can respond to local needs identified in participatory consultations <sup>24</sup> .
Planning urban expansion and service provision	Ilo, Peru has around 70,000 inhabitants. Despite the fact that the city's population increased fivefold between 1960 and 2000, there are no informal settlements. This is due to a local government programme, in partnership with low-income households, in which all new settlements have been developed within municipal and housing association programmes through which housing plots are provided with infrastructure and services and land titles.

Table 6.2: Innovative partnerships for urban governance (continued)	Type of partnership	Examples
	Planning urban expansion and service provision (continued)	Most of the population now has domestic connections for drinking water and regular solid waste collection. Over 5,000 houses have been improved and there has been a large expansion in public space. Most of this has been financed and implemented through partnerships between the municipal government and community-level management committees.
	Relocating and upgrading informal settlements	The Thai Government's Community Organizations Development Institute (CODI) channels government funds in the form of infrastructure subsidies and housing loans direct to community organizations formed by low-income inhabitants in informal settlements. Households in informal settlements can get legal land tenure by purchasing land with a government loan, negotiating a community lease or relocating to other land of the government agency or landowner on whose land they are squatting. CODI also provides loans to community organizations to loan on to their members to help build or improve their homes, and supports city governments to collaborate with urban poor organizations – for instance providing sites for those living in various 'mini' squatter settlements in their jurisdiction to relocate to, with the land provided on a 30-year lease. Overall, CODI has provided loans and grants to community organizations that reached 2.4 million households between 1992 and 2007.
	Appropriate land use and building standards	<p>Government-funded serviced-site programmes to official standards were too expensive for low-income groups in Namibia<sup>25</sup>. A new government policy, developed with the Shack Dwellers Federation of Namibia (a federation of savings groups formed mostly by low-income women) shows a willingness to overturn conventional approaches to standards and regulations, for instance in plot sizes and in infrastructure standards, to make their serviced sites more affordable to low-income households. Families are allowed to upgrade services as they can afford to make the investments, extending sewerage and water lines from mains provision into their homes. Groups that belong to the Shack Dwellers Federation have access to their own loan fund from which they can borrow for such service improvements.</p> <p>A similar partnership between government agencies and the Malawi Homeless People's Federation<sup>26</sup> also led to changes in official standards to reduce costs and make better use of land. The Federation is formed by savings groups; most savers are women who currently rent accommodation in existing slums. There are more than 100 savings groups with a membership of more than 30,000. The Federation's negotiation with the Department of Physical Planning in Lilongwe allowed agreement on plots of 150–200 m<sup>2</sup> (well below the official standard) and this meant that land originally allocated for 95 plots could produce 222 plots. This was also helped by reducing road width from the standard 12 m down to 9 m.</p>
	Providing basic infrastructure	In Pakistan the Orangi Pilot Project Research and Training Institute (OPP-RTI) supported the inhabitants of <i>katchi abadis</i> to plan, implement and finance the provision of basic sanitation – sanitary latrines in their houses, underground sewers in the lanes and neighbourhood collector sewers. The costs are reduced by about a fifth by eliminating contractors and modifying engineering, and can be covered by the inhabitants. OPP-RTI then supports local government to plan and finance the larger 'external' trunk sewers and treatment plants into which the neighbourhood sewers feed. Again, there is a strong focus on keeping down unit costs and building on existing systems (for instance mostly 'boxing' existing natural drains). In around 300 locations in Pakistan, communities have financed, managed and built their own internal sanitation systems. Local governments can also afford to install the external systems as they no longer have to fund the internal components and as OPP-RTI has helped them develop much lower-cost methods for planning and building trunk sewers. OPP-RTI has also helped government agencies convert natural drains into sewers and develop drainage plans for most of Karachi. Thus, community organizations and local NGOs have been able to transform planning and investment in sewers and drains in Karachi in ways that have brought major benefits to large sections of the low-income population. This was also done without a need for large loans from international agencies, which inevitably increase debt burdens.
	Incorporating disaster risk reduction into good urban and local governance	In a number of cities in Colombia disaster risk reduction has been incorporated as an integral part of improvements in urban and local governance. In Bogotá, for example, the city government has invested close to US\$ 460 million to retrofit and rehabilitate risk prone schools as well as include disaster risk reduction in the educational curriculum. Hospitals, bridges, fire stations and key governmental buildings have also been reinforced. These outcomes were possible through a combination of competent city government, community awareness and participation, and an accurate assessment of disaster risks in the city, the results of which were used in land-use plans, building codes and investment decisions. In Manizales, an innovative cross-subsidized insurance scheme called Predio Seguro, supported by the city government, has enabled poor households to obtain catastrophe insurance cover. The city government, in partnership with women's groups in informal settlements also invests in stabilizing slopes in landslide prone informal settlements <sup>27</sup> .

## 6.3 Innovative financing for disaster risk management

Emerging practices based on microfinance, including microinsurance and catastrophe financing, do not necessarily reduce disaster losses. However, they do increase resilience in both urban and rural areas and therefore can play a key role in avoiding the translation of disaster impacts into poverty outcomes. At the same time, there is evidence that if properly targeted they can be used to provide incentives for risk reduction measures.

Risk financing and other financial tools to manage disaster risk have existed for decades but primarily benefit upper- and middle-income families, large businesses and wealthy governments. Poor households, particularly those working in the informal economy and with irregular cash flows, typically have little access to such tools. Poor households in most developing countries have a limited ability to pay for insurance even when it is available. Most income is used to cover basic needs such as food and housing, and other kinds of insurance, such as health insurance, are usually given a higher priority by households than catastrophe insurance.

As a consequence, more than 40% of direct disaster losses are insured in developed countries, usually through compulsory insurance, whereas it is estimated that less than 10% of these losses are covered by insurance in middle-income countries and less than 5% in low-income countries<sup>28</sup>. The IADB, for example, estimates that only 10% of the population of South and Central America has access to credit and even fewer to insurance and other financial services<sup>29</sup>, while insurance penetration, measured as a percentage of GDP, is 1.4% in Latin America, compared to 3% in Europe and 5% in North America.

This lack of access to financial and risk transfer mechanisms compounds the risks faced by the poor and is a significant factor in the translation of disaster loss into increased poverty. As described in Chapter 3, households, communities and countries are left with limited sets of informal coping mechanisms. These often involve increases in high-interest debt, sales of

assets, delay of development opportunities or the adoption of low-risk, low-yield livelihood strategies, which generally do not stand up well against series of shocks<sup>30</sup>. While, in the case of large disasters, informal coping may be supported by post-disaster assistance from governments or humanitarian agencies it has been consistently documented over decades that this is often ad hoc, poorly targeted and short-term.

This section will review four kinds of risk financing tools that have strengthened resilience at different levels: microfinance, microinsurance, parametric crop insurance and catastrophe pools.

### 6.3.1 Microfinance

Due to the efforts of microfinance institutions (MFIs) such as the Grameen Bank, Bangladesh Rural Advancement Committee (BRAC) and now thousands of others in countries of all levels of economic development, microfinance now reaches more than 93 million poor clients<sup>31</sup> and has helped households in risk prone communities around the world to strengthen their livelihoods and increase their resilience. This success has been helped by the development of innovative structures such as self-help groups – small groups of 5–10 members living in the same community agreeing to share liability for individual loans. This reduces the risk to the MFI that loans will not be repaid and reduces the need for collateral.

Microfinance has been used to invest in livelihood activities and to improve or repair houses, actions that can reduce vulnerability and increase disaster resilience. It has also been integrated into post-disaster recovery contexts (see Box 6.7) where MFIs are often already active among affected households. Additionally, many microfinance programmes have specifically targeted women, who are often particularly vulnerable.

While there are immediate needs for funds after a disaster, there are also needs for longer-term credit for economic and livelihood recovery. With their long-term relationship with clients, MFIs can provide ready access to regulated lending, increase resources for recovery and

**Box 6.7:**  
**Microfinance**  
**in disaster**  
**recovery, Sri**  
**Lanka**<sup>32</sup>

By 2005 MFIs in Sri Lanka had more than 15 million deposit accounts (more than one per household) and 2 million outstanding loans in a country with a population of a little over 20 million. The Indian Ocean Tsunami significantly impacted MFIs operating in the affected coastal areas as many lost staff and clients in addition to critical materials such as client records. Many clients had lost livelihood assets and income sources and most transactions involved withdrawals rather than deposits. However, despite the early setbacks, MFIs ultimately proved a valuable resource to bolster resilience and speed the recovery of both existing and new clients. One of the first priorities for MFIs was to understand how their clients had been impacted, looking at

whether the borrower or primary income earner had died or was disabled, whether business assets were lost, whether the client's house was damaged, and whether the market for the business was significantly affected. The MFIs then restructured loans on a case-by-case basis for clients, generally only writing off loans when the borrower had been killed or permanently disabled. Since the tsunami a number of MFIs have instituted reforms to offer their clients more protection in future disasters, including revamping group-lending structures to reduce situations where one person's default can pull the entire group into default, and developing new products such as emergency or reconstruction loans to help clients cope.

re-catalyse local economic enterprise. There are many instances, in Bangladesh, El Salvador, India and Nicaragua for example, where MFIs have integrated loans for housing repair or reconstruction into their portfolios.

However, MFIs' effectiveness may be overestimated given a lack of understanding of the potential and limitations of microfinance among some international NGOs and humanitarian agencies that support post-disaster recovery. Efforts to expand MFI programmes too quickly create formidable challenges to operating efficiently and managing risks adequately, particularly as travel and staff compensation costs increase. Additionally, the failure to separate microfinance from relief activities may lead to confusion among clients between assistance provided as loans or grants and may undermine the viability of existing microcredit programmes<sup>33</sup>.

There are more fundamental questions regarding the success of microfinance in decreasing poverty, particularly extreme poverty<sup>34</sup>. However, to the extent that MFIs specifically include lending to reduce disaster risk, through home improvement or livelihood strengthening, both before and after disasters, they can increase household resilience and reduce vulnerability to disaster loss, particularly amongst the moderately poor<sup>35</sup>.

### 6.3.2 Microinsurance

Microinsurance has emerged as a potential solution for extending insurance coverage to poor households, providing access to post-disaster finance in a relatively fast, reliable and predictable manner, allowing the poor to protect their assets and mitigate their financial losses in the face of disaster. By providing immediate liquidity, microinsurance is also seen as promoting dignity and self-reliance, which reliance on humanitarian assistance so often undermines.

Microinsurance schemes have existed for a number of years, often building on informal cooperative or mutual models and insuring against funeral expenses, unemployment, accidents and loss of life. Existing schemes have also used a wide variety of distribution channels including community-based mutual savings, MFIs, credit unions, commercial insurance companies and government social protection services.

In recent years, microinsurance schemes have also been developed or extended to cover disaster risks. Many MFIs have begun to offer insurance on microcredit loans so that borrowers (and the MFIs) will not be indebted if their livelihood is damaged by a disaster. There are also examples of bundling with savings programmes, such as the Self Employed Women's Association microinsurance programme in India, which

allows its members to save for insurance through fixed deposits in savings accounts<sup>36</sup>.

Governments such as those of the Philippines and South Africa have initiated efforts to change regulations and policies to remove barriers to entry and facilitate broader participation of the private sector in providing microinsurance<sup>37</sup>. However, with the potential for large covariant losses, microinsurance for disaster risk often requires additional partnership with re-insurers to ensure adequate protection. Currently India hosts the greatest number of microinsurance schemes for disaster risk, in large part as a result of the adoption in 2002 of a new regulatory framework that requires insurance companies to increase their coverage in the “rural and social sectors”<sup>38</sup>. Taking a pro-poor stance has helped to shape the market and encourage private sector interest. While the creation of cross-subsidies means that wealthier clients must now cover additional operating costs, it does provide a route through which governments can address market failures to serve the needs of poor clients.

Nevertheless, experience in using microinsurance to protect against disaster risk has been limited and significant questions still remain about its long-term viability and ability to benefit wide segments of the poor. Even the low costs of existing microinsurance programmes can be too high to be affordable to very poor households, who must trade-off the costs of insurance against other needs from scarce incomes. Some organizations like the All India Disaster Mitigation Institute have tried to develop schemes that link microinsurance to other disaster risk reduction measures. However, so far efforts to establish discounts in insurance premiums as incentives for disaster risk reduction have not been viable in ways that preserve the base affordability of the microinsurance.

### 6.3.3 Weather index crop insurance

While most microinsurance schemes use traditional indemnity insurance, which pays insurance claims in response to specific losses, new index-based schemes, also called parametric insurance, have emerged covering weather risks for crops. Parametric insurance products, which

rely on the measurement of an objective and independent proxy, offer new opportunities to transfer the risks associated with crop or livestock loss, caused by droughts, extreme temperatures or extended floods.

Most schemes use rainfall levels (as measured in rain gauges at local meteorological stations) as a physical trigger. Farmers collect an insurance payout if the index is triggered regardless of the actual losses, simplifying administration and reducing the need for costly claims and adjustment procedures. However, for index insurance to be successful the trigger must be transparent, easily understood and well correlated with the losses experienced. If the trigger is not well correlated, even if an individual farmer’s losses are substantial, the index may not reach the trigger level and there is no payout.

Weather derivative crop insurance schemes in various forms have now been used in approximately 15 countries, including Ethiopia, India, Malawi, Mexico, Nicaragua, Peru and Ukraine, to protect against both severe rainfall and lack of rainfall, while a livestock scheme has been developed in Mongolia. Generally the contracts are written by insurance companies and sold by rural development banks, farm cooperatives or MFIs.

Index-based insurance can also provide greater incentives for risk reduction than indemnity insurance. Since payments are based on the index measure or trigger and not on actual losses to policyholders, the policyholders have an incentive to minimize their potential losses since they will still collect the payout<sup>39</sup>.

While crop insurance continues to spread in many locations around the world, the biggest constraint has been the availability of data from local or regional weather stations. As a result there have been recent efforts to develop new indexing methods that could potentially increase coverage. For example, the World Bank has worked with the Government of Mongolia to develop a scheme to track regional livestock death statistics as an index for insurance against the *dzud* winter freezes<sup>40</sup> and in Thailand it is testing the use of satellite data on flooding to develop an index-based flood insurance that would payout based on the percentage of land inundated and

the duration of the flooding in specific districts<sup>41</sup>. Box 6.8 highlights an innovative programme in Bolivia that uses production on specified reference plots of farmland as the index measure.

Other constraints include contexts where farmers may not have much incentive to participate because they have only limited liability for crop failure<sup>43</sup>.

For more case studies on risk financing tools, information is available in Appendix 2.

### 6.3.4 Catastrophe pools

The traditional model of post-disaster financing, relying on slow and unreliable assistance from the international community, the diversion of budget allocations from development to recovery, or raising new debt in expensive post-disaster capital markets, is increasingly inefficient as disaster occurrence and the magnitude of loss increases<sup>44</sup>. International assistance often offsets less than 10% of countries' disaster losses, reconstruction funding may take up to 12 months or more to mobilize and may not be allocated effectively

to address the most affected sectors and households. Resources are often diverted from development sectors to finance reconstruction, negatively impacting on development and poverty reduction. Without access to disaster insurance, homeowners run the risk of losing life-time or inter-generational savings tied up in the value of their homes while governments are typically exposed to tremendous budgetary uncertainty due to unpredictability of disaster relief and recovery expenditures.

New financial instruments, which have showed success in providing resources after disasters both to households in upper- and middle-income countries as well as to governments, include catastrophe pools, catastrophe bonds and lines of contingent credit.

Catastrophe pools provide a mechanism for catalysing the provision of insurance in markets where there have been impediments to private insurers offering disaster coverage, often due to ambiguity about the probabilities of loss, fear of large correlated losses, inadequate premiums and/or lack of ready demand for existing insurance products. Catastrophe pools typically combine a range of governmental, private sector and donor support – often focused on addressing distinct layers of risk – to engage market interest and establish a viable insurance fund. Catastrophe insurance pools provide immediate post-disaster financing proportionate to incurred losses. The pooling can be either among citizens in a particular country or set of countries or among governments to limit their own exposure to their sovereign disaster risk.

Experiences to date include the Turkey Catastrophe Insurance Pool (Box 6.9), the Caribbean Catastrophe Risk Insurance Facility (Box 6.10) and the Mexico Catastrophe Bond, which were stimulated by the experience of large-scale disasters such as the 1999 Marmara earthquake in Turkey or the 2004 hurricane season in the Caribbean. Other mechanisms include the provision of contingent credit lines to provide governments with immediate liquidity in the event of a major disaster. Colombia is the first country to secure such credit from the World Bank for a value of US\$ 150 million.

**Box 6.8:**  
**Fund for the mitigation of agricultural risk (Fondo de Mitigación del Riesgo Agrario), Bolivia<sup>42</sup>**

Fundación PROFIN has developed an innovative index-based insurance scheme that is being piloted in four provinces in the North and Central Altiplano regions of Bolivia. The scheme combines incentives for proactive risk reduction and a flexible, people-centered index mechanism. In this scheme the trigger is based on the “production levels of reference plots of farmland in areas that are geographically similar in terms of temperature, precipitation, humidity and soil type. The reference plots belong to farmers identified as good practitioners by their peers. The yields on these plots serve to indicate whether production levels have been adversely affected by weather, thus triggering an insurance payout, or by other factors within a farmer’s control. The reference farmers also serve as technical assistance agents to promote ideas for increasing yields and reducing disaster risks and impacts. The system encourages other farmers to match the reference farmers in implementing mitigation efforts to reduce the effects of drought, excess rains, hailstorms and frost because those farmers run the risk that their own plots will be significantly affected while the reference farmers’ plots will be less affected.

**Box 6.9:  
The Turkey  
Catastrophe  
Insurance Pool  
(TCIP)<sup>45</sup>**

The TCIP is an insurance pool that seeks to provide affordable insurance to homeowners, especially those in urban residential areas, and to reduce the fiscal exposure of the Turkish Government by accumulating funds for future disasters, sharing portions of risk within the country and transferring other portions of the risk to international reinsurance and capital markets. Proof of participation in the scheme is compulsory for land registry transactions such as when houses are sold. The TCIP started offering policies in September 2000. At that time, the Turkish Government also changed sections of its disaster law to remove the Government's commitment to provide post-disaster reconstruction assistance for housing lost to natural disasters, thus putting much of the responsibility back on homeowners.

The TCIP is managed as a private insurance company under the strategic guidance of the

Turkish Treasury. During the first 5 years of the pool's operations, the World Bank also provided a contingent credit layer that would have provided financial resources to the TCIP to meet claims if needed. Marketing and distribution of policies have been facilitated by a state-of-the-art Internet-based information system that has produced significant cost efficiencies in underwriting new policies. The policies are sold by private insurance companies who are paid a standard commission. As of July 2008, TCIP covered 2.8 million households, approximately 21% of the overall target market in Turkey and 31% in the Marmara region surrounding Istanbul. While efforts to keep costs low have made the insurance more affordable, uptake of policies in areas outside of Ankara, Istanbul and the western coast has been hampered by lower awareness of risk and lower levels of household income.

**Box 6.10:  
Addressing  
public/  
sovereign risks  
– The Caribbean  
Catastrophe  
Risk Insurance  
Facility (CCRIF)<sup>46</sup>**

The CCRIF is a regional insurance facility owned and operated by 16 Caribbean governments. The facility insures the governments against the impacts of catastrophic hurricanes and earthquakes and allows them to access liquidity at short notice using parametric triggers. For earthquakes the triggers are based on USGS data on the location, intensity and likelihood of damage to the member countries. For hurricanes the triggers are based on data from the US National Hurricane Center on hurricane paths and wind intensity.

Start-up activities have been supported by the World Bank and the Caribbean Development Bank

and the Governments of Canada, France and the UK. By pooling their risk the governments have managed to reduce their individual insurance premium by up to 40%.

To date the CCRIF has made payouts in response to two events – US\$ 418,976 to the St Lucian Government and US\$ 528,021 to the Dominican Government as a result of the magnitude 7.4 earthquake close to Martinique in November 2007, and US\$ 6.3 million to the Government of the Turks and Caicos Islands after Hurricane Ike in September 2008.

From this perspective, catastrophe pools would seem to provide an effective and transparent mechanism for offsetting losses, increasing resilience and for replacing, at least in part, traditional humanitarian and reconstruction assistance (although there is no guarantee that resources provided to governments that have insured their sovereign risk are used any more effectively than traditional recovery and reconstruction financing). They have the additional benefit of increasing awareness of risks, given the need to produce detailed risk estimates of the assets to be insured and given that purchasing insurance per se implies a level of risk

awareness and acceptance. In the case of SIDS, where opportunities to reduce asset risks are more limited and where economic resilience is lowest, catastrophe pools may provide a fundamental building block in the disaster risk reduction architecture.

However, experience to date also highlights their limitations. Successful applications to date are in upper–middle-income countries, such as the Caribbean nations, Mexico and Turkey, and it is unclear to what extent the approach can be extended to low-income and least developed countries. Catastrophe re-insurance capacity is certainly available for such countries,

given the relatively low level of asset exposure. However, the requisite start up costs, such as catastrophe risk modelling and data collection, can be expensive relative to potential revenues, while awareness of and capacity to pay for insurance may be low. Even in Turkey insurance penetration tends to be highest in wealthier areas such as Istanbul.

In low-income and least developed countries, and in many low–middle-income countries, support from the public sector and the international community will be required to create the necessary information platforms and domestic and financial infrastructure. These will normally have to be accompanied by a clarification of legal responsibilities for post-disaster assistance. The responsibility of governments to finance post-disaster recovery and reconstruction is often implicit, as the law usually does not clearly define their financial responsibilities. The perception that governments are responsible for covering household disaster losses and that the international community is responsible for covering sovereign disaster losses is a major barrier to a wider application of catastrophe pools to disaster risk financing. At the same time, the provision of direct insurance premium subsidies by the public sector tends to provide the wrong economic incentives,

benefiting high-risk policyholders to the detriment of low-risk policyholders<sup>47</sup>.

Given the parametric nature of most catastrophe pools, they typically address intensive risk manifestations and do not address the more frequently occurring but low-intensity losses associated with extensive risk. As highlighted in Chapter 3, the housing losses associated with extensive risk may be as high as 40% of total disaster losses in that sector.

To conclude, an effective risk financing strategy should layer catastrophe risk, applying catastrophe pools to transfer the risks associated with extreme events and intensive risk, using other mechanisms such as disaster contingency funds to cover the small, recurrent losses in infrastructure and services associated with extensive risk, and extending microfinance and micro-insurance to cover the housing and livelihood losses of poor urban and rural households.

Unfortunately, experience of disaster contingency funds is still mixed and has tended to show that the funds get diverted to other government priorities, in which case the losses associated with extensive risk manifestations are not covered at all and only increase the deficit of infrastructure and services faced by the urban and rural poor.

## 6.4 The management of ecosystem services

### 6.4.1 Approaches to ecosystem management

Resilient ecosystems are not only important for reducing disaster risks. They are critical to providing for sustainable livelihoods, in securing a reliable flow of goods and services, and in reducing vulnerability to an increasingly unpredictable climate. Building ecosystem resilience requires actions at different scales, with a wide array of stakeholders, and an understanding that different bodies of knowledge, including scientific, technical and local and traditional, are needed to understand

the effects of global environmental change on local ecosystems.

The global decline in many regulating and provisioning ecosystem services contributes to increasing hazard for poor urban and rural households as well as declining livelihood resilience. From this perspective, ecosystem management is an emerging practice that can potentially contribute both to the regulation of weather-related hazards as well as to the strengthening of livelihoods.

A schematic view of the costs and benefits of ecosystem management is given in Figure 6.1.

**Figure 6.1:**  
Costs and benefits of applying ecosystem management to disaster risk reduction<sup>48</sup>

<p><b>Restoration costs (RC)</b> <b>1st order costs</b></p> <p>Costs occurring from maintaining ecosystems, restoring damaged or lost ecosystems, and designing ecosystems in order that they deliver disaster regulating ecosystem services</p> <ul style="list-style-type: none"> <li>▪ Costs for developing ecosystem approaches that often diverge from conventional approaches</li> <li>▪ Costs for developing basis, e.g. data necessary for decision-makers to pursue new strategies</li> <li>▪ Costs for awareness-, knowledge- and capacity-building among involved stakeholders and civil society to support the ecosystem approach</li> <li>▪ Costs for implementing approaches, and for maintaining/monitoring implemented approaches</li> </ul>	<p><b>Benefits or avoided costs (AC)</b> <b>1st order benefits</b></p> <p>Costs that would have occurred from (economic, social and environmental) damage caused by natural disasters that could be reduced or avoided by the use of an ecosystem approach</p> <ul style="list-style-type: none"> <li>▪ Direct benefits resulting from using an ecosystem approach that reduce disaster risk, e.g. avoided loss of land through erosion through establishment of protective coastal vegetation</li> </ul>
<p><b>Opportunity costs (OC)</b> <b>2nd order costs</b></p> <p>Costs resulting from adopting an ecosystem approach – primarily economic benefits foregone due to alternate land use</p> <ul style="list-style-type: none"> <li>▪ Loss of benefits from using the ecosystem that were contrary to management of the ecosystem for disaster risk regulation, e.g. loss of income from logging in watershed areas that are now being reforested for the purpose of regulating flood and sediment flow</li> </ul>	<p><b>Co-benefits (COB)</b> <b>2nd order benefits</b></p> <p>Benefits resulting from adoption of an ecosystem approach</p> <ul style="list-style-type: none"> <li>▪ Indirect benefits that result from using an ecosystem approach, e.g. harvesting of products from trees planted and protected to prevent erosion and desertification</li> </ul>

In the case of ecosystem restoration, the avoided costs may significantly exceed the restoration costs. For example, planting and protecting 12,000 ha of mangroves by the IFRC in Viet Nam cost approximately US\$ 1 million but reduced the costs of sea dyke maintenance by US\$ 7.3 million per year. At the same time, the co-benefits may also greatly exceed the opportunity costs. For example, the Millennium Ecosystem Assessment estimated that the value of healthy coastal mangroves as nurseries, pollution filters and coastal defences is US\$ 1,000 to US\$ 36,000 for mangrove value versus US\$ 200 per hectare for shrimp farming<sup>49</sup>. In Malaysia, the economic value of mangroves as coastal defences

has been estimated at US\$ 300,000 per kilometre, taking into account the costs of hard engineering work to achieve the same protective effect<sup>50</sup>. In Switzerland, the economic value of forests in preventing avalanches is valued at US\$ 100 per hectare per year in open areas but up to US\$ 170,000 in areas with high-value assets<sup>51</sup>.

At the same time, ecosystems often provide important co-benefits if properly managed. Some of the most fertile agricultural land on the planet depends on regular flooding to recharge the soil with nutrients. Flooding can also recharge aquifers in semi-arid areas or transport vital sediments and nutrients to sustain coastal fisheries in other areas. Periodic fire is vital to

the health of some forest ecosystems. In these cases the co-benefits of protecting the ecosystem usually outweigh the opportunity costs. The best examples of ecosystem management are win-win strategies that simultaneously reduce hazard and increase livelihood viability for poor households, while providing broader global co-benefits in areas such as water and energy supply, air quality and climate regulation.

Managing the provision of ecosystem services is complicated for many reasons. While the benefits may appear obvious they are often shared by many people over the long term. Ensuring that private interests do not degrade these social benefits requires effective and long-term institutional, legal and administrative systems backed up with the resources and political support to be respected. There are many opportunities to engineer ecosystems to provide multiple ecosystem services. However, engineering ecosystems to ensure that they optimally produce services that are produced and consumed by different social groups and economic and political interests at different scales is usually a daunting governance challenge. Nevertheless, there are a number of different practices that applied appropriately or in combination can facilitate ecosystem management in a way that does reduce hazard and strengthen livelihoods.

#### **6.4.2 Environmental governance**

The broad area of environmental governance involves creating policy and regulatory frameworks and institutional structures to promote environmental sustainability. Often these frameworks specify levels of environmental protection and call for means to monitor and enforce that protection. One of the best known and most widely applied tools is the use of Environmental Impact Assessments (EIA) in project and investment planning and approval. Disaster risk considerations are now increasingly factored into EIAs. For example, the Caribbean Development Bank has integrated disaster risk into its EIAs and several Caribbean Community and Common Market (CARICOM) member countries, such as Guyana and Trinidad and

Tobago, have already formalized these changes in the EIA process.

#### **6.4.3 Integrated planning**

Integrated planning, in which both environmental and disaster risk considerations are factored into land-use and development planning, is another mechanism that can facilitate the management of ecosystems. This includes integrated coastal zone management, integrated water resource management, as well as specific initiatives such as the Mangroves for the Future initiative – a multi-country, multi-agency, multi-stakeholder initiative aimed at improving coastal zone management. The success of integrated planning is closely associated with the quality of governance and in most countries success has depended, as in other areas, on innovative partnerships between national agencies, local governments and civil society.

#### **6.4.4 Protected areas**

Protected areas legislation, and other methods of natural resource management to conserve and restore ecosystems, is another relevant tool. The promotion of natural floodplains and wetlands as cost effective measures for flood hazard mitigation is becoming increasingly accepted in a number of countries as an alternative to expensive hard-engineering measures such as canalizing rivers and building flood defence walls. Protected forests regulate the water cycle, can mitigate flood and drought hazard and contribute to the sustainability of rural livelihoods both through the provision of forest products as well as eco-tourism (see Box 6.11). Coastal afforestation and the protection and restoration of mangroves can complement sea walls to protect erosion prone coastlines.

#### **6.4.5 Environmental technology**

A range of new environmental technologies and innovations is being introduced by the private sector, NGOs and public sector initiatives that offer new soft or eco-engineering approaches to the management of ecosystems and hazards and of energy, as well as to the strengthening of rural and urban livelihoods. Examples include

**Box 6.11:  
Madagascar's  
watershed  
protection**<sup>52</sup>

Some previously degraded areas have been rescued and economic benefits have been quantified due to the consequent risk reduction. Deforestation in the eastern part of Madagascar had exacerbated flooding from annual monsoon rains. Then, in 1989, the National Environmental Action Plan created the Mantadia National Park including the watershed of the Vohitra River. In terms of reduced crop damage, the estimated 1997 value of the watershed protection was US\$ 126,700 – quite substantial considering the local economic situation.

technologies for water harvesting in drought prone areas, for managing temperature extremes in housing, fuel efficient stoves aimed to limit deforestation, decentralized microhydro and solar energy, and countless others. While the potential of technological innovation is enormous, major cultural and economic barriers often exist to their adoption by risk-averse poor rural and urban communities. As a result, while pilot projects abound, cases of mainstreaming and up-scaling are still the exception.

**6.4.6 Payment for ecosystem services**

Payment for ecosystem services (PES) is an environmental management tool that has been in existence since the 1990s. It involves placing a monetary value upon ecosystem services and then finding both 'buyers' and 'sellers'. The costs and benefits of the different kinds of provisioning,

regulatory and cultural ecosystem services are valued and systems are designed so that users pay for the services provided. For example, a protected watershed provides water for domestic consumption and hydro-energy for a nearby city but if the watershed were deforested for logging this would provide benefits for those who sold the wood. If logged the costs in terms of reduced availability and more expensive water and electricity would be paid for by the residents of the city. Using a PES approach, the opportunity costs of protecting the watershed would be paid for by water and electricity consumers (predominantly from peri-urban and urban areas), who receive co-benefits in terms of a secure and cheap supply of water and energy. PES could therefore potentially play a major role in supporting efforts to reduce hazard both in urban and rural areas as well as to increase rural livelihood sustainability (see Box 6.12).

However, the mainstreaming of PES is still in its infancy and many current PES programmes present serious obstacles to the inclusion of poor households<sup>55</sup>, given that they were originally designed to meet conservation rather than poverty reduction goals. The policy attention in many countries is indeed now shifting to identifying reforms needed to increase the potential of PES for poverty reduction and even in their current imperfect form, PES programs have managed to deliver some important benefits to low-income households, including the penetration of new markets for sustainable

**Box 6.12:  
PES in Costa  
Rica**<sup>53</sup>

In the Costa Rican programme of PES, forest landowners are paid a flat rate for protecting their forest. These payments are considered a compensation for the environmental services provided. The system acknowledges four types of services: protection of watersheds, biodiversity, carbon mitigation and scenic beauty/tourism. It does not value the actual services provided by a particular forest area, but rather pretends that all forests provide the same average of services and are thus eligible to the same payment. Also, it currently does not differentiate between areas of high vs. low risk of forest degradation or deforestation. The fact that the landowners'

demand for PES enrolment currently exceeds by far the availability of financial PES resources indicates that for some landowners the PES payments are much higher than actual conservation opportunity costs. It is likely that efficiency of the PES could be increased if payments were better aligned with opportunity costs and threats and if spatial priorities were established. A less standardized approach, however, would complicate the PES system and increase research and administration costs.

In Central American countries other than Costa Rica, PES mechanisms have been difficult to establish due to enduring institutional deficiencies, lack of legal land tenure and poor governance<sup>54</sup>.

timber, organic coffee and other agroforestry products. Like other forms of environmental income, PES may not be sufficient in itself to raise rural households out of poverty, but it can

become an important contributor to livelihood security due to the regularity of the payments and the incentive they provide to manage sustainable ecosystems.

## 6.5 Community- and local-level approaches to disaster risk reduction

The analysis presented in Chapter 3 highlighted that local areas exposed to the same hazard manifest very different patterns of risk. This indicates that while disaster risk is influenced by broader national and global factors such as the quality of governance or climate change, it is shaped at the local level. The way communities, municipal governments, enterprises and other local actors use and transform territory, natural resources, the built environment and other assets has an enormous influence on how hazard, exposure, vulnerability and resilience are configured in each locality and together define the social territory of risk.

Given that risk is configured locally and that disaster impacts are experienced locally, it is unsurprising that in all the different practice areas reviewed in this chapter, emphasis has been placed on the importance of engaging local stakeholders, civil society organizations and municipal governments in disaster risk reduction. This section will examine this engagement with community-based organizations and local government as a practice in its own right, one that cuts across all the other practice areas.

### 6.5.1 The emergence of community- and local-level approaches

Since the 1980s, there has been a growing interest in the practice of community-based or local-level disaster risk reduction (referred to here as C-DRM and L-DRM<sup>56</sup>). Interest in these approaches initially came from the pioneering work of NGOs in Asia and Latin America, which recognized that national disaster risk reduction policies, strategies and programmes frequently failed to address the risks faced by

the urban and rural poor, were uneconomic and often ineffective. Since the 1990s, C-DRM and L-DRM initiatives have been increasingly and enthusiastically promoted by bilateral and multilateral organizations and governments. In 1994, the Yokohama Declaration, from the first World Conference on Disaster Reduction, put an official seal of blessing on these approaches by stressing the importance of focusing disaster risk reduction efforts on poor communities<sup>57</sup>.

While in C-DRM the focus is on direct partnership with local community organizations, in L-DRM the focus is on working with and through local governments. As a practice C-DRM has taken root in all developing regions. L-DRM, in contrast, has evolved mainly in Latin America and to some extent in Asia. L-DRM and C-DRM approaches, however, are rarely mutually exclusive. Most L-DRM approaches rest on partnerships between local governments and community and civil society organizations. Similarly, the most successful C-DRM approaches are those that have managed to attract the support of local and national governments. Clearly the definition of what is or isn't local varies from context to context. As a mediator and arbitrator of different social interests and conflicts and as a key actor in environmental, territorial and sector planning and development, local governments can potentially play a huge role in disaster risk reduction. However, the strength or weakness of local governments varies enormously according to a country's territorial and political-administrative structure, the level of decentralization of government responsibilities and the availability of resources.

Most C-DRM and L-DRM initiatives are rarely explicit about how they would contribute to reducing poverty. But a common feature of almost all such initiatives is that they focus on poorer communities. In fact, the focus on addressing disaster risk in poor areas is so implicit that, in most cases, ‘vulnerable community’ is considered synonymous with rural or urban poverty. In practice, nevertheless, C-DRM and L-DRM initiatives often develop in areas with functioning and active community organizations or local governments, which are not necessarily the most poor or the most vulnerable.

C-DRM and L-DRM consist of applying a community- or local-level approach to a wide range of practices. A wide range of participatory tools and techniques, such as vulnerability and capacity analysis, have been developed and applied in support of C-DRM and L-DRM initiatives<sup>58</sup>.

C-DRM and L-DRM approaches have been applied to:

- the mapping and monitoring of hazard levels, using local knowledge to develop early warning systems
- hazard mitigation activities, such as the strengthening or construction of dykes, slope stabilization, the recovery of mangroves and, in urban areas, improvement of drainage
- improved ecosystem management, under local responsibility, including in some cases the use of PES mechanisms
- development of participatory land-use and development plans that incorporate disaster risk considerations
- strengthening of livelihoods, through promotion of employment and measures to increase agricultural productivity, water and food security and marketing initiatives
- application of microfinance and microinsurance to increase social protection and resilience
- strengthening of local governance, including the disaster risk reduction capacities of local governments
- the adoption of gender-sensitive approaches into disaster risk reduction practices.

A great number of community and local development initiatives also address many of the

underlying risk factors highlighted in this Report but are not labelled C-DRM and L-DRM.

### 6.5.2 Why community and local involvement is important

In principle at least, an engagement of civil society and local government in disaster risk reduction would seem essential for a number of reasons<sup>59</sup>.

If local stakeholders are not engaged in the design, implementation and management of disaster risk reduction, then the resulting policies, strategies and plans are less likely to respond appropriately to local conditions. For example, cases abound of projects to build hazard resistant but ecologically and culturally inappropriate housing, which ends up not being accepted by the local population<sup>60</sup>.

Similarly, if local organizations are not stakeholders in the management of facilities and infrastructure they are less likely to look after them. For example, investment in local infrastructure to reduce hazard, such as storm drainage or slope stabilization, without local involvement and ownership, often results quite quickly in a lack of maintenance and critical disrepair.

The cost of disaster risk reduction can often be dramatically reduced due to the mobilization of local resources, capabilities and knowledge. These assets are often not accessed by national or international organizations because they are either unaware of the potential or because the mechanisms that permit a dialogue with local, particularly poor, communities do not exist.

Local and community engagement contributes to building social capital, raises awareness of disaster risk and strengthens local capacities to address a wider range of development issues.

### 6.5.3 C-DRM and L-DRM in practice

Documented C-DRM and L-DRM initiatives address both sides of the disaster risk–poverty nexus. There are initiatives that focus on increasing resilience, avoiding the translation of disaster impacts into poverty outcomes; others that seek to reduce the translation of poverty into disaster risk; and yet others that seek to address both.

The vast majority of C-DRM and L-DRM initiatives currently concentrate on risk factors that can easily be addressed at the community- or local-level with small investments, for example, improvements in disaster preparedness and response, rather than those that require addressing more structural issues such as access to land or natural resource management (see Box 6.13).

The Disaster Preparedness European Commission's Humanitarian Aid Office, for example, has promoted a large number of disaster-preparedness projects where preparedness and response planning and early warning systems have often been complemented with local hazard mitigation schemes, for example building and strengthening dykes and stabilizing slopes. Despite a relatively modest investment (approximately € 80 million worldwide over the last decade) these projects have probably contributed significantly to a reduction in mortality and greater livelihood security in the areas where they have been implemented. While it is difficult to prove whether poverty has been reduced, it is reasonable to assume that if they

had not been implemented, poverty in the areas concerned might have been worse.

A growing number of C-DRM and L-DRM initiatives, however, address the vulnerability of livelihoods, the decline of ecosystems, the lack of social protection, unsafe housing, the improvement of governance and other underlying risk factors (see Box 6.14). Others aim to factor disaster risk considerations into local land-use and development planning, for example initiatives supported by Swiss Development Cooperation and by the World Bank in Central America, by GTZ in Peru or by local governments in Colombia.

#### 6.5.4 Limitations and potential of C-DRM and L-DRM

Despite its apparent advantages, experience of C-DRM and L-DRM over the last quarter century illustrates that the approach has many limitations in practice.

In principle both C-DRM and L-DRM are described as processes through which disaster risk reduction issues are addressed and local capacities strengthened. In other words, an underlying rationale of both approaches is that there is empowerment of and ownership by local stakeholders, either at the community or municipal level that should lead to a sustainable reduction in disaster risks over time<sup>63</sup>.

In practice, however, most initiatives are programmes and projects that are implemented at the community or local levels rather than with community or local ownership. Most initiatives have been promoted by NGOs and other supra-local organizations and have been delivered as relatively short-term projects or programmes, which while they are certainly disaster risk reduction activities, rarely generate the organizational and institutional underpinning that sustainable processes would require. Often, when the project or programme ends the process also ends, indicating that local ownership and involvement may be shallower than it appears. Those cases where sustainable local processes have emerged tend to be where national governments have decentralized both responsibilities and resources to the local level, as done in cities in Colombia such as Manizales or Bogota. For

#### Box 6.13: Reducing flood risk through a job creation scheme<sup>61</sup>

Heavy rains occur regularly in the West African state of Liberia, yet drainage systems have not been maintained for decades due to factors including lack of funds, years of neglect and misrule, and the civil war. As a result, flooding has triggered recurrent disasters in both rural and urban settings.

Cleaning the drains was not a priority for government officials or citizens. Only after the international NGO Mercy Corps raised the possibility of cash-for-work options did government officials embrace the idea. In September 2006, a one-year project was launched in five counties to clear and rehabilitate drainage systems to significantly increase the flow of rainwater and reduce the risk of localized flooding and related health problems.

The project met the double objective of creating income (it generated more than 17,800 days of employment) and achieving work that benefited the public, including providing clean water through water well rehabilitation and improving market access by clearing roads and constructing small bridges.

**Box 6.14:**  
**Stabilizing**  
**livelihoods**  
**through**  
**community-**  
**based**  
**preparedness,**  
**India<sup>62</sup>**

Exposed to floods, tropical cyclone or drought almost every year, Malda district in the State of West Bengal, in east India is also plagued by low agricultural production and lack of jobs. This situation has exacerbated migration, malnutrition and other related problems that increase vulnerability to disaster. Marginal farmers and landless labourers, who form over 70% of the district's population, are the most affected.

In February 2006, World Vision India, in partnership with the Government of India and UNICEF, initiated a project aimed at strengthening community disaster preparedness and mitigation, while providing wealth creation and income diversification opportunities. Targeting 15,000 vulnerable farmers and marginalized persons, with a special focus on children, the project worked to improve livelihoods as a disaster risk 'safeguard'. Focused support was provided through the following four strategies:

- *Awareness of disaster response and preparedness measures* was significantly enhanced through the distribution of learning materials to elementary school children. Local Relief Action Teams were formed with village volunteers, including women and youth, who are now trained in first aid, rescue and coordination with the local government structures in times of disaster.

- *Livelihoods and infrastructure development* was initiated to address some of the immediate economic and physical barriers to disaster resilience. Vulnerability assessments were conducted and 50 families were assisted with access to income generation activities, including women-headed households. The project also involved the community in the restoration of ponds, installation of tube wells, digging of open wells, construction of roads and the building of two relief centres.
- *Working with children's clubs* to enable community members to access disaster preparedness materials and drill exercises through children. This activity ensures that preparedness reaches all households – including illiterate households that cannot make use of educational materials.
- *Relationships have been established with the local government* through ongoing meetings and communications on the project. This has ensured the cooperation of the local government and provision of ongoing support for community capacity-training sessions.

The project's success is now being replicated in 92 villages – thus integrating poverty reduction and disaster risk reduction in World Vision's programme strategy.

example, in Bangladesh and Cuba success in disaster preparedness and response, leading to a real and drastic reduction in mortality due to tropical cyclones, builds on solid local organization but in both cases it has received sustained support from the national level.

While C-DRM and L-DRM can be applied to all areas of disaster risk reduction, in practice most of the success reported is in the area of improved disaster preparedness and response. In La Masica, Honduras, an effective locally managed early-warning system resulted in no mortalities during Hurricane Mitch, while neighbouring areas where local capacities had not been strengthened suffered hundreds of deaths. It was a similar case when the 2004 Indian Ocean tsunami struck the coast of Tamil Nadu. UNDP's strengthening of local capacities in the village of Samiyar Pettai led to a greatly reduced impact.

In disaster preparedness and response the required investments are relatively small and the benefits immediately visible, at least when

the next disaster strikes. At the same time, local preparedness and response capacities can generally be strengthened without addressing underlying risk drivers such as land-tenure and access to resources, which generally lie outside community and local government control. Success in addressing these drivers through community-based and local-level approaches has been far more limited, precisely because so many of the factors that need to be addressed are beyond the capacities of local stakeholders to address.

The most successful programmes – while community- or locally based – have developed broader partnerships with governments and other supra-local stakeholders (see Box 6.15). Many of the underlying risk drivers cannot be addressed by community organizations or local governments on their own. Partnerships with national agencies permit scaling-up of initiatives to go beyond individual communities and localities to address problems that affect wider areas, such as watersheds and coastlines. They enable

the investment of resources that are unavailable locally and increase continuity and sustainability as initiatives move from stand-alone projects and programmes to longer-term processes. The application of social funds to support C-DRM and L-DRM initiatives, for example, offers the potential to scale-up in just this way.

L-DRM has been most successful where decentralization processes have provided local governments with the resources and capacities to fulfil their disaster risk reduction responsibilities, such as in Brazil or Colombia. In such contexts, local governments often become promoters of C-DRM processes. Where local governments are weak and disempowered it is unlikely that L-DRM will take root as the technical capacities, political authority or financial resources required are generally not present.

To conclude, C-DRM and L-DRM are approaches that can and should be applied to ensure the effectiveness and viability of all the other practices reviewed here, from strengthening urban governance and rural livelihoods, through to developing microinsurance and payment systems for ecosystem management. Their full potential is only fulfilled when they grow into partnerships between government and civil society, which are based not only on local participation and ownership but on political and economic support from national institutions, as illustrated by the case of El Salvador (see Box 6.15). Such partnerships are fundamental for advancing the different practices for addressing disaster risk, poverty and climate change that have been presented in this chapter.

**Box 6.15:**  
**Development**  
**promotion from a**  
**risk management**  
**perspective, El**  
**Salvador<sup>64</sup>**

The Lower Lempa Valley in El Salvador covers an area of some 880 square kilometres that is recurrently affected by flooding, minor landslides and drought. This area is characterized by poverty levels of over 70%, occupation by resettled ex-combatants from the civil war years, and agricultural production primarily for local consumption and, increasingly, for export.

Seriously affected by flooding related to Hurricane Mitch in 1998, the area has regularly demanded disaster risk reduction attention from the national government. Until 2001, this had mainly consisted of dyke building, river dredging exercises and attempts to introduce an early warning system for flood-related risks. The area had been typified by a division between the west and east banks, where the dominant local organizations professed different, and at times, antagonistic philosophies on development.

A new strategy for development in the area was inspired by a Salvadorian Ministry of Natural Resources and Environment project financed by the IADB. The project was informed by risk management goals and principles, and worked with the two major organizations and other smaller NGOs and municipal governments.

The central notion was that transformation in employment and livelihood options was a crucial component of risk reduction, and thus the plan should emphasize ways that risk reduction and development promotion could be enhanced on a parallel front. Design of the strategy was achieved

using participatory diagnostic techniques whereby the population participated actively in the diagnosis and identification of development-based risk reduction instruments and schemes.

The final strategy document called for investment in such diverse aspects as:

- woodland recovery on the river banks as a means for flood control and generation of new employment opportunities
- road construction linking reliable and efficient land to routes out of the zone
- storage facilities for agricultural products so as to be able to avoid forced sale of goods to unscrupulous commercial intermediaries
- provision of potable water supplies in order to combat water-related disease during floods and offer a permanent measure of every-day security to the local population
- early warning systems and continuity of dyke strengthening and river dredging.

This combination of measures attempted to broach the risk reduction theme from the angle of livelihood strengthening and direct risk reduction measures. A very important aspect in the proposed scheme was the creation of a local, representative development support organization that could bring together the opposing factions in the area and negotiate new projects with a shared direction and purpose. The development of a second stage, an early warning system for flood-related risk financed through international funds demonstrates the ongoing effectiveness of this model.

## Endnotes

- 1 Christoplos, et al., 2001
- 2 De-agrarianization is a long-term process of occupational adjustment, income earning reorientation, social identification and spatial relocation of rural dwellers away from strictly agriculture-based rural livelihoods. Bryceson, 2000.
- 3 Bryceson, 2000
- 4 Brown, et al., 2006
- 5 Winslow, et al., 2004
- 6 Winslow, et al., 2004
- 7 Winslow, et al., 2004
- 8 UNISDR, 2008c
- 9 IISD et al., 2003
- 10 RRN, 2006
- 11 Small tanks are man-made irrigation reservoirs, often built in cascade systems with different ponds being used for different purposes – domestic water supply, rainwater recharge, paddy cultivation, etc.
- 12 Miamidian, et al., 2005
- 13 World Bank, 2008b
- 14 World Bank, 2009
- 15 de Silva, 2008
- 16 Hardoy and Pandiella, 2008 note that many middle- and upper-income neighbourhoods also develop in high risk areas near rivers or coasts or on slopes but they have the political influence to ensure public provision of infrastructure to reduce risks and the resources to strengthen their homes and insure their property and possessions.
- 17 Campbell, 2003
- 18 Campbell, 2003; Fernandes, 2007; Cabannes, 2004
- 19 Fernandes, 2007
- 20 See for instance Edesio, 2007
- 21 D’Cruz and Satterthwaite, 2005; Mitlin, 2008
- 22 Abers, 1998; Menegat, 2002
- 23 Cabannes, 2004
- 24 Roberts, 2000; Lafferty and Eckerberg, 1998
- 25 Mitlin and Muller, 2004
- 26 Drawn from Manda, 2007
- 27 Omar Dario Cardona (2009) Case study information contributed on behalf of Universidad Nacional de Colombia, for the 2009 Global Assessment Report on Disaster Risk Reduction. ISDR. United Nations. <http://www.manizales.unal.edu.co/>
- 28 Cummins and Mahul, 2009
- 29 Moreno, 2007; O’Donnell, 2009
- 30 Churchill, 2006; O’Donnell, 2009
- 31 As of the end of December 2006, from Microcredit Summit Campaign, 2007: <http://www.microcreditsummit.org>
- 32 Aheeyar, 2006; Duflos, et al. 2006; Lynch, 2005
- 33 Warner, 2006 cited in O’Donnell, 2009
- 34 O’Donnell, 2009
- 35 Janvry, et al., 2006
- 36 McCord, et al., 2001
- 37 Republic of South Africa, 2008
- 38 Churchill, 2006
- 39 Arnold, 2008
- 40 Mahul and Skees, 2007
- 41 Lotsch, 2007
- 42 Fundación PROFIN
- 43 Gine, and Yang, 2009 (forthcoming)
- 44 Cummins and Mahul, 2009
- 45 Gurenko, et al., 2006
- 46 Caribbean Catastrophe Risk Insurance Facility: [www.crif.org](http://www.crif.org)
- 47 Cummins and Mahul, 2009
- 48 UNEP and Stockholm Resilience Center, 2008
- 49 Millennium Ecosystem Assessment, 2005
- 50 ProAct Network, 2008
- 51 ProAct Network, 2008
- 52 UNISDR/PEDRR, 2009
- 53 Centre for Development Research, University of Bonn, 2009: <http://www.zef.de/>
- 54 Lavell, 2008
- 55 UNDP/BDP, 2005
- 56 We have preferred not to use the more common community-based disaster risk management terminology given that most initiatives take place at the community level but are not necessarily community based.
- 57 UN, 1994
- 58 Benson and Twigg, 2007
- 59 Maskrey, 1989; Wilches-Chaux, 1988; Anderson and Woodrow, 1989
- 60 This issue has been highlighted consistently since the publication of Davis, 1976.
- 61 Mercy Corps, 2008
- 62 UNISDR, 2008c
- 63 See for example the following definition: “the process of disaster risk management in which communities at risk are actively engaged in the identification, analysis, treatment, monitoring, and evaluation of disaster risks in order to reduce their vulnerabilities and enhance their capacities. This means that people are at the centre of decision making and implementation. The involvement of the most vulnerable is paramount and the support of the least vulnerable necessary. Local and national government are involved and supportive.” Abarquez and Murshed, 2004.
- 64 Lavell, 2008

