PROMOTING SUSTAINABLE DEVELOPMENT THROUGH DISASTER RISK MANAGEMENT

Charlotte Benson

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Promoting Sustainable Development through Disaster Risk Management

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1 INTRODUCTION

Asia and the Pacific is subject to all major types of natural hazards and dominate disaster impact categories across all regions of the world. Over the 10-year period 2005 to 2014, 426,991 lives were lost in the region as a consequence of natural hazards, 52% of the global total. An estimated 1.4 billion people were affected by natural hazard events, representing 85% of the global total. Reported direct physical losses reached over $0.7 trillion, equivalent to an average $198 million loss per day.[1] The region accounted for 49% of total global losses over the same period, far higher than the region's share in global gross domestic product.

Despite considerable advances in disaster risk management (DRM) understanding and know-how over the past few decades, there has been no evidence of a long-term decline in loss of human life in Asia and the Pacific (ADB 2013). Moreover, direct physical losses have increased more rapidly than regional gross domestic product. Rising losses have reflected increasing exposure of people, property, and other assets to natural hazards as expanding numbers of people, homes and infrastructure are positioned in hazard-prone areas without due action to ensure they are sufficiently disaster resilient. Disaster losses are expected to continue following an upward trend over the next few decades as demographic and economic expansion continues in hazard-prone areas with little regard for disaster risk. The predicted increase in the intensity and, in some areas, frequency of extreme climate events as a consequence of climate change, as detailed in latest Intergovernmental Panel on Climate Change (IPCC) reports, is expected to fuel this trend. Even with renewed action immediately to reduce disaster risk, higher disaster losses can be anticipated reflecting the considerable level of disaster risk accumulated over recent years.

Asia and the Pacific now face a collective average annual loss of $157 billion as a consequence of natural hazards.[2] ADB's developing member countries (DMCs) alone face an average annual loss of $78 billion. Eleven DMCs face average annual loss equivalent to in excess of 2% of GDP. Twenty-one DMCs face average annual loss equivalent to in excess of 1% of GDP. Countries and cities in Asia and the Pacific also dominate league tables of disaster and climate risk. For example, nine Asian cities topped a list of 50 cities of current and future importance to global business in terms of the level of risk from changing weather systems and temperatures (Maplecroft 2013).[3] The Philippines, the People's Republic of China, Japan, and Bangladesh are home to over half of the 100 cities most exposed to natural hazards, with 8 of the top 10 cities in the Philippines alone (Verisk Maplecroft 2015). Significant urban risk in part reflects the very facets of geography that attracted settlement and investment in the first place—namely, proximity to rivers and coasts, and thus trade routes, and to (low-lying) flat land (ADB 2013). As urban areas continue to expand at an unprecedented pace, particular effort will be needed to stem rising disaster risk in the region's cities and in particular to strengthen the resilience of the cities' poorest inhabitants. Urban areas are expected to account for over 50% of the population in Asia and the Pacific by 2018, rising to 60% by 2040 (UN-Habitat and UNESCAP 2015).

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1 The statistics on disaster losses are based on data extracted from EM-DAT: The OFDA/CRED International Disaster Database (www.emdat.be). Université Catholique de Louvain, Brussels.

2 Average annual loss is based on the average expected loss over thousands of years from both historic and modeled potential disasters, ranging high frequency low intensity events to extremely low impact high frequency events. Data on average annual losses are drawn from http://www.preventionweb.net/english/hyogo/gar/2015/en/home/

3 In order of ranking: Dhaka, Manila, Bangkok, Yangon, Jakarta, Ho Chi Minh City, Kolkata, Mumbai, and Chennai.

1.1 Relevance of Disasters to Sustainable Development

Disasters undermine sustainable development. They result in loss of life and cause injury, sometimes with life-changing consequences. Furthermore, they destroy homes, schools, health clinics, hospitals, utilities, roads, markets and other social and economic infrastructure as well as damaging the natural environment. These direct, physical losses have further indirect consequences, disrupting livelihoods, education, access to health care and so forth, together leading to adverse secondary impacts on social and economic aggregates such as GDP, the balance of payments and budget deficits. Recent econometric analysis for the Pacific islands, for instance, found that damage and losses equivalent to 1% of GDP leads to a 0.3 percentage point fall in annual GDP growth on average over a 10-year period. As such, damage and losses experienced in the Pacific over the period 1980 to 2014 reduced trend growth by 0.7 percentage points, from an average growth rate of 3.3% in the absence of disasters to 2.6%, with substantial cumulative consequences (Cabezon et al. 2015).

Most fundamentally, disasters challenge efforts to reduce poverty. They can force the near-poor temporarily below the poverty line and contribute to more persistent, chronic poverty. The poorest members of society are least equipped to cope with disaster losses, often turning to informal money lenders to rebuild their homes and replace assets. Fewer may be able to afford medical care in the aftermath of a disaster, resulting in long-term impacts on health. Education can be disrupted. Field research in Nepal, for instance, found that disasters physically prevent children from reaching schools; reduce household capacity to meet the cost of school fees and stationary; result in the transfer of children into income-generating activities to supplement household earnings; and result in increased (adult) male migration, requiring children to stay at home to help with domestic and agricultural work (Gautam and Oswald 2008). There may be long-term consequences for gender inequality too. For instance, a study of the Philippines revealed a disproportionate increase in female infant mortality in the years following exposure to a typhoon due to deterioration in economic conditions and subsequent disinvestments in female infant nutritional intake and health care (Anttila-Hughes and Hsiang 2013).

Countries at lower levels of human development, in particular with higher levels of poverty, are likely to suffer especially large socioeconomic setbacks as a consequence of disasters. Higher levels of poverty typically imply higher levels of vulnerability to natural hazards. The poor are more likely to live in substandard structures in hazard-prone areas; to face uncertain land ownership rights, reducing incentives to manage risk; and to depend on vulnerable livelihoods, for instance in agriculture and informal urban labor markets. For example, an estimated 94% of people killed by disasters between 1975 and 2000 were from low or lower-middle income groups (UNISDR 2008). The poor are also likely to face more prolonged periods of postdisaster recovery, reflecting lower savings and more limited access to insurance and formal credit with which to replace destroyed assets. The threat of hazard can also influence long-term behavior, in some cases reinforcing poverty via deliberate risk-averting livelihood choices. For example, there is some tendency among marginal rice farmers in the Philippines to cultivate traditional, lower-yielding rice varieties because such varieties are relatively more hazard-tolerant, thereby restricting potential earnings but also reducing the risk of total crop failure (World Bank 2007).

More marginalized groups such as women, children, the elderly, the disabled, and minority groups are often particularly vulnerable to natural hazards, mirroring wider socioeconomic and cultural inequalities. Women are more likely than men to die in the event of a disaster in countries where their socioeconomic status is low. For instance, female mortality rates were twice those of men in one

eastern coastal district of Sri Lanka, after the 2004 Indian Ocean tsunami (UNDP 2010) whilst 61% of the victims of Cyclone Nargis in Myanmar in 2008 were female (Yeomans and Leung 2008).

Disasters events themselves have further ramifications for the poor via their impact on planned development projects and investments. Many developing countries face significant financing gaps in the event of a disaster, falling back on the reallocation of planned capital and recurrent spending to meet more immediate postdisaster spending requirements and often redirecting capital budgets over a number of subsequent years to meet reconstruction costs. Thus, capital budgets for, say, new classrooms may be reassigned to replace destroyed ones, a pattern replicated across many areas of public infrastructure. For example, in Nepal the Department of Water Supply and Sewerage reported several years ago that it faced annual disaster-related damage bills of around NRs100 million, considerably in excess of its annual NRs30 million budgetary allocation for such purposes, forcing a reallocation of maintenance expenditure. In consequence, many routine repairs were not undertaken and thus, although the Government of Nepal had achieved theoretical clean drinking water coverage of 78%–80% of the population, in practice only 56%–57% were served because of outstanding repairs to the network (Benson et al. 2009).

Thus, vulnerability to natural hazards and poverty are mutually reinforcing and postdisaster financing shortages play an additional contributory factor hindering advancement of the poor. Together they place a significant constraint on the pace of human development.

By the same token, however, resources spent on strengthening disaster resilience and on advancing human development could be similarly complementary, in this case to mutual benefit rather than disadvantage, together both strengthening resilience and reducing poverty. Likewise, postdisaster support could be deliberately designed with a view to securing sustained progress towards the achievement of a country's sustainable development objectives.

These synergies are explicitly recognized in the new post-2015 agenda for sustainable development. The Sendai Framework for Disaster Risk Reduction 2015–2030, as adopted by 187 United Nations (UN) member states at the Third World Conference on Disaster Risk Reduction in March 2015, states that while disasters significantly impede progress towards sustainable development, conversely effective disaster risk management contributes to sustainable development (UN 2015a). The outcome document adopted at the Third International Conference on Financing for Development in July 2015 in Addis Ababa recognizes that development finance can contribute to a reduction in vulnerability and encourages consideration of climate and disaster resilience in development financing to ensure the sustainability of development results (UN 2015b).

Finally—and most critically—the Sustainable Development Goals (SDGs) adopted by 193 countries at the UN Sustainable Development Summit in September 2015 explicitly targets risk reduction under 4 of its 17 goals. The relevant goals focus on ending poverty (Goal 1); ending hunger, achieving food security and improved nutrition and promoting sustainable agriculture (Goal 2); making cities and human settlements inclusive, safe, resilient and sustainable (Goal 11); and taking urgent action to combat climate change and its impacts (Goal 13) (UN 2015c).

This paper is intended to support the realization of the potential synergies in actions to strengthen disaster resilience and reduce poverty. It begins with a brief review of the aims and scope of DRM before exploring the scale and nature of funding available for disaster risk reduction (DRR) and postdisaster response. It then discusses potential opportunities to exploit synergies between actions

intended to strengthen resilience and respond to disasters and to advance sustainable development, seeking to maximize the impact of available funding.

1.2 Disaster Risk Management

A disaster results when a natural hazard event occurs in an area containing vulnerable people and assets. The level of disaster risk is measured in terms of the probability of occurrence of natural hazards of varying severity in a particular area; the value of physical assets situated in that location; and their degree of vulnerability to each of type of natural hazard.

DRM involves actions both to reduce disaster risk and to manage the remaining residual risk, with the goal of strengthening long-term disaster resilience. Risk reduction is often the most cost-effective way to address high probability, low impact hazard events and can also yield significant returns by reducing risks associated with lower probability, higher impact events. Risk reduction is also essential in ensuring that buildings and other engineering structures are built to life safety standards, allowing people to evacuate a structure without harm. Further financing is required to manage the remaining or residual risk, supporting adequate and timely disaster relief, early recovery and reconstruction operations and thereby limiting the indirect social and economic consequences of a disaster. The faster a bridge, say, can be repaired then the more rapidly access to markets and social infrastructure can be restored. Similarly, the faster schools and health centers can be reconstructed, then the quicker fully functioning education and healthcare systems can be re-established.

DRR can take the form of both structural and nonstructural measures. It can include interventions to tackle the hazard directly (e.g., by reducing probabilities of landslides and flooding through forest conservation on steep slopes); to tackle exposure (e.g., by supporting the integration of disaster risk considerations into land use planning); and to tackle vulnerability (e.g., by supporting rainwater harvesting, community early warning systems and livelihood diversification into more resilient occupations,). DRR actions can take the form of standalone initiatives, such as seismic retrofitting of school buildings; the incorporation of DRR components into wider projects, such as flood control elements of urban development projects; and the integration of DRR measures into other development actions, such as adjustments in road engineering design and location to strengthen resilience against extreme floods or landslides. The latter two types of action can referred to as embedded DRR measures.

Residual risk management entails actions to restore infrastructure, assets, livelihoods and, ultimately the social and economic fabric of communities and nations in the aftermath of a disaster. The integration of measures to strengthen resilience to future hazard events into these actions, colloquially known as building back better, is now recognized good practice in postdisaster response.

2 DISASTER RISK MANAGEMENT FINANCING

2.1 Financing for Disaster Risk Reduction

It is extremely difficult to quantify the degree of adequacy of funding for DRR. Available data on relevant public expenditure is incomplete, in part reflecting significant measurement complexities. Explicit budget allocations for standalone DRR activities can be directly measured but support a relatively narrow set of initiatives such as flood defenses, seismic retrofitting, evacuation shelters,

geophysical and hydrometereological monitoring, and early warning systems. Additional embedded actions to strengthen disaster resilience may be spread across a wide range of line agencies, spanning sectors such as health, education, transport, water, agriculture, environment, public works, energy and telecommunications. There are innate challenges in gauging spending on such actions as they form just one component or feature of a wider project (e.g., the incremental cost in building a hospital to withstand an earthquake) or may be an indirect outcome of a wider development project (e.g., irrigation of land that in turn alleviates the effects of drought), rather than an explicit goal.

There are further issues in determining target levels of expenditure and thus the likely scale of any funding gap, even in the few instances where concerted efforts are made to track DRR expenditure. Risk reduction spending needs will vary country by country depending on the nature and scale of disaster risk and related opportunities for and appropriate forms of investment in DRR.

Nevertheless, there is wide consensus that there is inadequate investment in DRR, a view echoed by government officials actively engaged in securing DRR resources. Although not asked for such information, 34 out of a total 95 countries across the globe explicitly stated in their national progress reports on the implementation of the Hyogo Framework for Action for the period 2009–2011 that they had inadequate funding for DRR (Benson 2011a).[4] A further 13 countries made more indirect reference to insufficient funding. This underinvestment can often be traced back to the simple fact that policy makers favor investments that generate immediate, tangible outcomes rather than risk reduction endeavors that may not reap benefits for many years. Even then, when benefits are finally reaped, they may generate little political advantage because these benefits manifest in loss that does not happen rather than in tangible gains. There is thus a strong preference for building additional kilometers of roads and more schools and health clinics, rather than fewer, but more disaster resilient ones.

The international community similarly allocates relatively few resources for DRR, according to available data. Globally, it provided $13.5 billion for DRR between 1991 and 2010, equivalent to just $0.40 in every $100 in international flows over the same period and to just 12.7% of total disaster-related aid (Kellet and Caravani 2013).[5] In 2010, international DRR aid flows reached their second highest ever level but, even then, paled into significance relative to spending on other areas. Expenditure on the Global Fund to Fight AIDS, tuberculosis and malaria totaled $2.4 million in 2010 while $9.5 billion was spent by the international community on peacekeeping, compared to expenditure of just $1.1 billion on DRR.

International DRR assistance for Asia and the Pacific alone has been similarly limited relative both to total aid flows and total disaster-related support. ADB's developing member countries received $6.4 billion for DRR between 1991 and 2010, equivalent to $0.64 in every $100 in international aid

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4 For copies of the national reports, see http://www.preventionweb.net/english/hyogo/progress/reports/?pid:222&pil:1

5 Kellett and Caravani's analysis is based on data extracted from the Disaster Aid Tracking (DAT) database modified by the authors to correct some apparent misclassifications. The DAT database was developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) and Development Gateway on the AidData platform. It is the most comprehensive attempt to identify disaster-related financing within international humanitarian and development assistance. The database draws on a number of sources, supplementing the Organisation for Economic Co-operation and Development's (OECD) Creditor Reporting System, with additional information provided by donors. For example, the DAT's category of "Disaster prevention and preparedness" includes flood control measures, which are classified under "Development aid" in data reported by OECD DAC. It should be noted that the category "Emergency response" may include some aid components related to nondisasters as in several cases it was not possible to identify the precise nature of emergency aid flows. Data are reported in constant 2009 US dollars. The database is available at http://gfdrr.aiddata.org

flows over the same period and 21% of total disaster-related flows.[6] International assistance for DRR was equivalent to just 1.0% of total disaster-related losses over the same period.

These figures on international aid spending on DRR are probably significant under estimates. Once again, there are problems in tracking expenditure on DRR, probably resulting in considerable underreporting. Nevertheless, it is reasonable to conclude that international expenditure on DRR has been very low, mirroring low government and donor priority accorded to DRR.

Evidence of a significant public under-investment in DRR is reflected in the significant increase in direct physical disaster losses in Asia and the Pacific over the past 40 years. Average real losses rose almost sixfold between 1970–1979 and 2000–2009 and the rate of growth in disaster losses exceeded growth in gross domestic product, as already noted (ADB 2013). This suggests that rising losses are not entirely due to an increase in the volume of infrastructure and assets located in hazard zones as economies have grown. Instead, rising vulnerability has also played a role. In other words, the region has failed to invest adequately in disaster resilience as it has grown economically.

2.2 Financing for Disaster Relief, Early Recovery, and Reconstruction

Similarly, funds for postdisaster response are typically very limited relative to need. Disasters can place enormous pressure on public finance, resulting in both higher spending demands and loss of revenue as economic productivity drops. Both explicit and implicit contingent government liabilities are brought to bear. These potentially take the form of the repair and reconstruction of public assets and the fulfillment of public guarantees (for instance, in the form of financial backing of insurance schemes or of lending institutions that subsequently struggle because of disaster-induced defaults). They also include moral, economic, and politically motivated actions to provide relief, early recovery, and reconstruction support to affected households and businesses (ADB 2013). Governments have a moral and ethical imperative to provide rescue services and humanitarian relief. Further government actions in the aftermath of a disaster can be driven by a combination of efforts to alleviate poverty and stimulate economic recovery, sometimes resulting in considerable additional expenditure. For example, following the earthquake and tsunami in Japan in 2011, causing estimated losses of $210 billion, the cost of economic and social support programs (e.g., to generate employment, support small and medium-sized enterprises, and provide health care) outweighed direct repair and reconstruction costs (Sato and Boudreau 2012).

The capacity of a government to deal with these financial pressures depends on a range of factors, including its overall fiscal position, its level of access to international assistance and external capital markets (in turn linked to existing levels of indebtedness), and its use of ex ante disaster financing instruments—that is, instruments put in place before a disaster happens, including insurance and other risk transfer options. In reality, many governments in disaster-prone developing countries in Asia and the Pacific make some limited regular budgetary provision for relief and early recovery purposes. National and, in some countries, local governments are often required by statute to allocate a percentage of the budget for use in the event of a disaster. However, governments have made extremely limited use of other ex ante disaster risk financing instruments to spread the cost of disaster response over time, reflecting more general limited penetration of insurance across the region. In 2013, for instance, only 8% of disaster losses in Asia and the Pacific were covered by insurance policies,

[6] These figures are based on unmodified data reported in the DAT and AidData databases. The latter provides data on total aid flows from all donors. This database is available at http://www.aiddata.org

compared to 67% in the US (AON Benfield 2014). In consequence, ex ante disaster risk financing arrangements prove far from adequate when a major disaster strikes.

Moreover, contrary to popular belief, the international community does not necessarily cover the majority of any funding shortfall. In a study of 98 major disaster events globally over the period 1970 to 2008, Becerra et al. (2012) found that aid surges typically cover only 3% of the total estimated economic damages. Responses to international appeals for humanitarian assistance often fall far short of their target. For example, only 60% of the $776 million international appeal in response to the November 2013 Yolanda (Haiyan) in the Philippines and 44% of the $357 million sought in response to the 2011 floods in Pakistan was met.[7] A previous appeal in response to Typhoon Durian in the Philippines in 2006 raised just 15% of its $48 million target.

It should also be borne in mind that postdisaster external assistance does not necessarily involve additional flows of international support. Instead, it often entails some adjustment of existing aid programs and potentially displaces short- to medium-term flows of new development support.

Estimating the precise extent of likely funding gaps for postdisaster relief, early recovery and reconstruction is, again, difficult. It requires comprehensive data on forecast losses and related public contingency liability for a range of hazards with varying return periods and on likely flows of financing from a wide range of sources. The speed with which funding can be made available relative to the sequencing with which tranches of relief, early recovery and reconstruction funding are required also needs to be considered. Total financing requirements do not need to be met in the immediate aftermath of a disaster but, nevertheless, financing is needed in a timely fashion as and when required to limit the indirect economic and social consequences of a disaster. Moreover, governments need assurance that funds will be available as and when required, allowing them to plan their response efforts with the confidence that the plans can be implemented.

In fact, it is even difficult to estimate the scale of funding gap in the aftermath of a particular disaster event. The quality and depth of coverage of postdisaster assessments to identify levels of damage and response needs have improved over the past decade , particularly in the aftermath of major disasters (see Section 3.3) Efforts to track flows of assistance are also being strengthened. However, postdisaster operations can involve many national and international actors; the reallocation of public resources, much of which may be poorly documented; and both off-budget and on-budget contributions. A few months after Typhoon Yolanda (Haiyan) in the Philippines, there over 400 nongovernment organizations (NGOs) alone working in the affected areas, creating significant coordination and tracking challenges.

Nevertheless, one cross-cutting exercise to measure the funding gap has provided some indication of the possible scale of the issue, at least with regard to climate-related hazards. This exercise focused on such hazards in 73 countries, including 21 countries in Asia and the Pacific (Mechler et al. 2010). It was based on a series of assumptions about different inflows of funding in the event of a disaster.[8]

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7 Data was extracted from the UN OCHA Financial Tracking Services (http://fts.unocha.org).

8 The analysis assumed that government infrastructure accounts for 20% of the total capital stock and that the government bears responsibility for a further standard 30% of losses, regardless of the scale of a disaster. Probable maximum losses were estimated based on historical evidence and risk estimates from various existing sources. Financial resources for post-disaster response were assumed to be available in the form of (i) international aid, with three scenarios explored based on aid flows equivalent to 0%, 5.2%, and 10.4% of total losses; (ii) reallocations, at an amount equivalent to 7.5% current government expenditure; (iii) domestic borrowing, to the value of 10% additional government borrowing from the private sector; (iv) and external borrowing, at an amount equivalent to the difference between existing level of external borrowing

Results were presented in terms of the return period for climate-related hazards beyond which a funding gap would emerge in each country. For instance, according to the analysis, both Japan and Malaysia have sufficient resources available to meet the relief, early recovery and reconstruction costs associated with relatively large-scale, infrequent events occurring up to, on average, every 550 years (Table 1). In contrast, Samoa would only be able to meet the full disaster response costs associated with climate-related events occurring every 1-in-11 years or more frequently. Unsurprisingly, the analysis found that small island developing states and highly indebted hazard-prone countries faced particularly extreme financial vulnerability. Funding gaps also tended to be larger for lower-income countries, reflecting the higher opportunity costs associated with such spending.

Table 1: Scale of Postdisaster Funding Gaps for Climate-Related Hazards

Country	Return period funding gap threshold (years)	Country	Return period funding gap threshold (years)	Country	Return period funding gap threshold (years)
Samoa	11	Pakistan	52	Philippines	123
Tonga	13	Cambodia	53	Indonesia	305
Vanuatu	13	Lao PDR	60	PRC	368
Bangladesh	14	Maldives	61	Australia	447
Tajikistan	14	Sri Lanka	62	Kazakhstan	544
Fiji	22	Nepal	108	Japan	550
Armenia	50	India	116	Malaysia	550

Lao PDR = Lao People's Democratic Republic, PRC = People's Republic of China.

Note: This table only presents results for countries in Asia and the Pacific.

Source: Mechler et al. 2010.

Ultimately most physical disaster losses are addressed in significant part through extensive budget reallocations, as already noted. However, funding constraints imply that reconstruction efforts are often significantly delayed in developing countries, causing further indirect socioeconomic impacts with a particularly detrimental impact on the poor. For example, in May 2008, Cyclone Nargis affected an estimated 800,000 housing units in Myanmar, totally destroying 56% of them (TCG 2008). Three years later, the UN Human Settlements Programme estimated that some 75,000 households were still awaiting new housing (IRIN 2011). The extent to which nonphysical infrastructure needs—for instance, for livelihood regeneration—are ultimately met is less clear as they cannot be measured in terms of physical rebuilding alone. However, adverse impacts of disasters on the poor suggest that much more could be done to support the poor in postdisaster recovery.

In summary, disasters do not trigger a surfeit flow of resources that can be readily tapped for other purposes. Governments struggle to find adequate resources to meet immediate humanitarian needs in the immediate aftermath of a disaster and to support recovery and reconstruction efforts. The international community is similarly constrained by limited aid budgets.

and the credit buffer (in the case of Highly Indebted Poor Countries [HIPC] defined as 150% of each country's typical value of exports). Disaster reserve, sovereign catastrophe insurance cover and contingent credit arrangements were also taken into account where relevant.

3 THE WAY FORWARD

There is nothing inevitable about escalating disaster losses and, with it, the forfeit of hard-won development gains (ADB 2013). There are a wide range of measures that governments, their development partners and civil society can take to strengthen disaster resilience and, at the same time, promote human development.

At the same time, significant resource constraints imply that available DRM resources need to be used as strategically and cost-effectively as possible. By implication, there is an urgent need to focus more heavily on the root causes of disasters, seeking to tackle the issues that create disaster risk both through ex ante risk reduction efforts and in by building resilient communities in the aftermath of disasters. Many of these root causes ultimately link back to social and economic shortcomings that people-centered development seeks to address. Disaster losses are a manifestation of a complexity of underlying social and economic issues. As such, despite resource limitations, there is considerable scope for using DRM resources to support progress towards wider sustainable development objectives as well. Some key opportunities for so doing are explored below.

Likewise, many actions to advance sustainable development can potentially strengthen disaster resilience as well. Many development actions offer opportunities to strengthen disaster resilience at relatively limited cost.

3.1 Disaster Risk Reduction and Sustainable Development

3.1.1 Integrating Disaster Risk Reduction into Development

Enhanced integration of disaster risk concerns into development policy, development plans and individual development initiatives would both strengthen disaster resilience and contribute to sustainable development. Many development decisions by governments, the private sector, the international community, and society at large have been made with little regard to their consequences for the vulnerability of either populations or infrastructure (ADB 2013). Some decisions have created risk internal to the development itself, such as through failure to consider seismic risk in building design or site selection. Some decisions have resulted in the modification or destruction of naturally occurring hazard defenses supplied by ecosystem structures and functions, as when forests, floodways, deltas, mangroves, wetlands, dunes, or reefs are occupied for development projects. Some decisions have encouraged populations to move into hazard-sensitive areas by establishing public infrastructure and jobs in these locations.

The integration of disaster risk concerns into development actions, including poverty reduction initiatives, thus lies at the heart of required actions to strengthen disaster resilience and support human development. Many development actions carry potential disaster risk but also provide opportunities to strengthen resilience. Greater private, as well as public, sector consideration of disaster risk is urgently required given the de facto reliance on the private sector to meet a significant share of the region's huge productive and social infrastructure investment needs over the next few decades.

This integration requires explicit consideration of disaster risk in the design of development policies, national and subnational development plans, land use plans, building codes, and individual investments. For example, the goals and objectives laid out in a national development plan drive the

focus of public interventions over the life of that plan (ADB 2013). The plan's preparation provides an opportunity to explore disaster risk from a socioeconomic perspective, examining its contributory role to the pace of both human and economic development. This analysis can then lead to the establishment of a development vision and related program of work incorporating principles of strengthened resilience and stimulating practical progress in risk assessment, risk reduction, and the management of residual risk.

Disaster risk and potential for enhanced resilience can be explored in further depth as part of the detailed feasibility studies for individual projects. In India, for example, the Ministry of Finance made it mandatory in 2009 for all project proposals in excess of Rs1 billion ($16 million) to include a disaster impact assessment. Related risk reduction measures should be included in the project costing (Government of India 2009). Risk-sensitive land use plans are essential too in all hazard-prone countries, demarcating land use according to level of disaster risk and seeking to ensure that housing and critical facilities, such as hospitals, water treatment plants and schools, are located in low-risk areas.

3.1.2 Incentivizing Investment in Risk Reduction

This integration of disaster risk considerations into development also requires the establishment of incentives to ensure that disaster risk is, indeed, considered in individual public and private development actions. Both direct and indirect incentives can be used to promote disaster resilience. Direct incentives include, for example:

(i) Personal and corporate tax reductions for infrastructure built in low-risk zones or to particular disaster-resilient standards.

(ii) Subsidies for commerce, manufacturing, and industrial enterprises located in lower risk areas

(iii) Easements on height restrictions and floor area ratios for property developers that adopt strong resilience features.

(iv) Risk-based insurance premiums and deduction differentials for properties that incorporate DRR measures in their design.

(v) Provision of secured land tenure and enhanced social services for informal settlers that relocate to lower risk zones.

More evidence on the net economic and social benefits of investments in DRR would also help stimulate greater investment in resilience. The existing body of evidence in this regard is very limited. As such, little can be categorically stated about the net returns on various types of DRR investment. The returns will also vary, of course, according to a host of local demographic, socioeconomic, geographic, and other factors and to the frequency and intensity of the natural hazard(s) faced (Benson 2010). The choice of discount rate is also critical in determining the results of cost-benefit analyses. Nevertheless, available evidence suggests potentially significant net gains from investment in resilience in many cases (Box 1).

Ex post analyses can also be undertaken to compare the cost of ex ante hazard strengthening with the cost and postdisaster reconstruction, providing further evidence on the benefits of investing in resilience. For example, floods in India and Nepal in 2008 were attributed to the breach of a 1.4 km stretch of the Koshi embankment, which was 50 years old and had been in need of repair for several years. An estimated $5.27 million would have been required to repair the embankment prior to the

breach (Benson et al. 2009). In contrast, the Koshi and far-west floods together caused some $29.2 million in direct damage and a further $44.8 million in indirect damage, a significant share of which could be attributed to the Koshi breach (ADB 2008).

Box 1: Net Economic Benefits of Investment in Resilience—Worked Examples

- Tearfund, an NGO, undertook an ex post analysis of the net benefits of interventions to reduce the impact of flooding in five villages in the state of Bihar in India (Cabot Venton and Venton 2004). The selected villages experience annual flooding for periods of three to four months. Hand pumps were therefore elevated to ensure year-round safe water supplies and to protect the pumps against flood-related damage. An escape road was also installed and boats provided, supporting more rapid evacuation and reducing flood-related deaths, injuries and loss of household possessions, tools and livestock. The analysis estimated that this package of interventions had a benefit cost-ratio of 3.8—that is, for every $1.00 spent on the interventions, benefits equivalent to $3.80 were realized.
- Analysis of the economic returns to a variety of masonry and mixed wall structures to strengthen housing against floods in Jakarta found that the highest benefit to cost ratios were obtained for a 1 meter elevation of mixed wall buildings. These structures would yield a benefit to cost ratio of 2.70 assuming a 10-year life span and a 12% rate of discount; and of 6.73: 1 assuming a 25-year life span and a 5% rate of discount (Hochrainer-Stigler et al. 2011).
- A hanging footbridge over a bridge between Pisanan and Indigan barangays in Antique province in the Philippines, was built by villagers with the support of the Red Cross to enable people to cross the river safely during rains and floods, sustaining access to schools and health centers and economic activity. The footbridge is estimated to have generated a P24 return for every peso invested (IFRC 2009).
- Cost benefit analyses of a statistical sample of 5,500 US Federal Emergency Management Agency mitigation grants between 1993 and 2003 for earthquake, flood, and wind hazard in the United States, supporting both structural and nonstructural projects, yielded an overall benefit to cost ratio of 4.0. The ratio varied from 1.5 for earthquake mitigation to 5.1 for flood mitigation (Rose et al. 2007).

Further case analysis, backed by the development of simplified methodological tools for this purpose, would generate some broad yardsticks on the net benefits of investments in resilience, providing a more solid basis for rational decision making during preliminary project design and development (ADB 2013). Existing cost–benefit analyses should also be collated and placed in the public domain.

Improved knowledge on the incremental cost of integrating disaster resilience measures into new investments across different sectors could also foster increased investment in resilience. The cost may be as low as an additional few percentage points on the baseline cost of construction. For instance, much of the cost of earthquake design is incurred in making a structural frame more robust through the use of additional materials, such as extra reinforcing steel and concrete. In East Asia and the Pacific, this is estimated to add only around 2%–4% to the overall cost of construction (GFDRR 2010). The cost of long-term climate proofing may be a little higher, in the range of 5% to 15% of total investment costs according to internal evaluations by ADB. Nevertheless, this is still far lower than the cost of having to replace infrastructure before it has reached the end of its expected life.

3.1.3 Financing Investments in Resilience

Increased financing for DRR is essential too. In particular, the establishment of dedicated budget lines for DRR initiatives could play a central role in kick-starting investments in this area. Supporting actions would help demonstrate the benefits of risk reduction, hopefully helping to lead to the ultimate absorption of incremental DRR costs into regular line agency development budgets as recognized cost-effective practice. These DRR budget lines could take the form of:

(i) dedicated multisector DRR budget lines for use by national agencies, providing additional resources to strengthen the hazard resilience of approved investment projects;

(ii) centrally held DRR budget lines for use by local governments that demonstrate a commitment to disaster resilience; and

(iii) additional discretionary resource allocations to more hazard-prone areas as part of the annual budget transfer from central to local government, again perhaps linked to performance in strengthening resilience (ADB 2013).

Resources in support of both DRR and sustainable development can also be enhanced by tapping into climate adaptation financing. Indeed, this financing is already being increasingly used to support DRR (Kellett and Caravani 2013) and all climate-related DRR actions should be designed taking climate change into account. In this context, DRR interventions can be viewed as "no-regrets" minimum levels of adaptation. They should be justified on the basis of current economic, social, and environmental costs, benefits, and levels and forms of disaster risk but also offer scope for future modification as appropriate to be additionally resilient without requiring any certainty in the immediate term about the frequency or intensity of future hazard events.

Specific targets on DRR expenditure have been periodically discussed as a means of enhancing DRR spending. Delegates at the 2009 session of the Global Platform for Disaster Risk Reduction called for at least 1% of both national development funding and international development assistance to be allocated for risk reduction (UN 2009). Delegates at the Fourth Asian Ministerial Conference on Disaster Risk Reduction (2010) called for 2% of development assistance to be assigned for DRR by 2015. Many participants at both meetings also supported the allocation of 10% of humanitarian relief funds for DRR. In practice, there are considerable measurement difficulties in defining relevant expenditure, as discussed above, and whether these goals are reached is in part a question of labeling. DRR spending requirements also vary between countries, implying that different targets may be appropriate in different contexts. No doubt reflecting these considerations, global spending targets were not included in the Sendai Framework for Disaster Risk Reduction 2015–2030. Nevertheless, the establishment of global and regional targets can provide extremely useful mechanisms for drawing attention to the often considerable underspending on DRR, for rallying support for increased expenditure, and for encouraging related monitoring of expenditure (ADB 2013).

3.2 Postdisaster Response and Human Development

3.2.1 Financing Arrangements for Postdisaster Relief, Early Recovery and Reconstruction

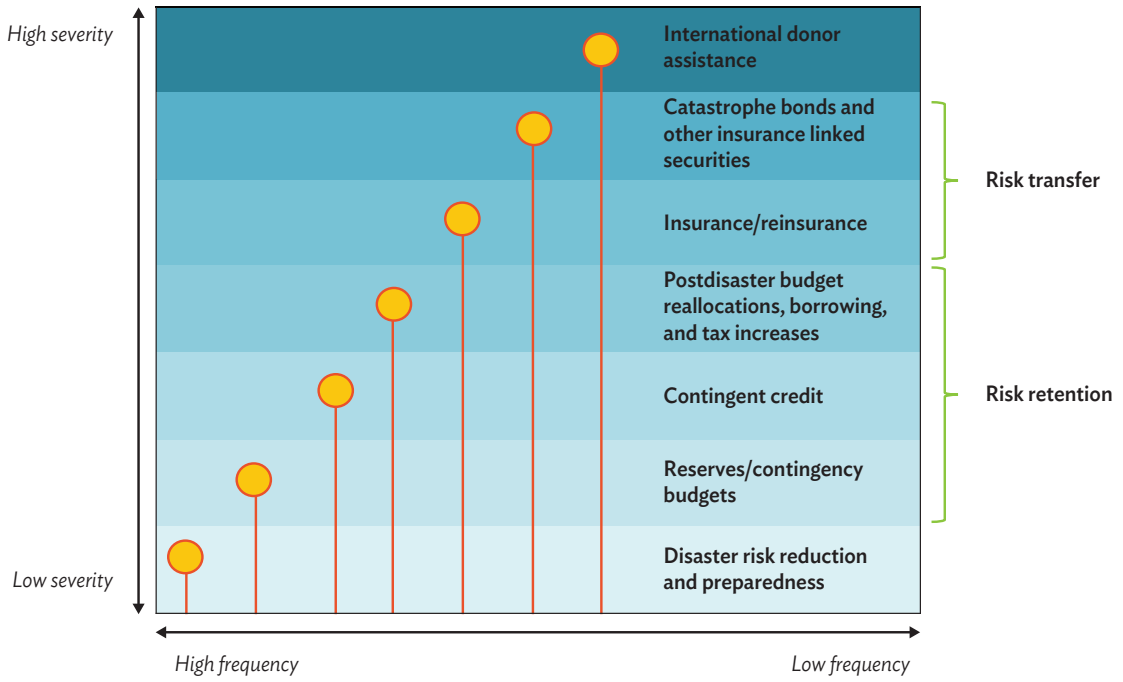
There is considerable scope for leveraging DRM resources in support of sustainable development by ensuring that there are adequate financing arrangements in place for postdisaster relief, early recovery and reconstruction, both to meet explicit government contingent liabilities and to support the recovery of individual businesses and households.

This is relevant to human development for two reasons. First, delayed and inadequate financing prolongs early recovery and reconstruction and thus the indirect consequences of direct physical damage, with implications for access to health care, education, and so forth. Livelihood recovery is also affected, with additional indirect consequences for, for instance, nutritional intake and the consumption of education, health and other services.

Second, postdisaster financing shortages imply that the opportunities presented by disasters to achieve a leap in social and economic development can be lost. Such leaps are linked to the opportunity to upgrade technology and infrastructure, improving factor productivity, competitiveness and thus, potentially, long-term economic and social development performance. This reasoning is captured in an endogenous Schumpterian model of growth through a process of creative destruction (Aghion and Howitt 1998). Funding constraints limit the resources available for technological advancement including, most fundamentally, to build back better, strengthening the resilience of infrastructure against future natural hazards. Both funding constraints and delays in the disbursement of funding also imply that affected communities are more likely to take their own actions to rebuild homes and livelihoods, again often replicating prior vulnerabilities due to lack of resources and alternatives. As such, opportunities presented by disasters to restrategize and switch to alternative paths out of poverty are lost.

Governments should therefore strive to develop comprehensive disaster risk financing strategies that are capable of providing adequate and timely postdisaster support. This requires an analysis of the potential hazard-related fiscal risks faced by a government, in turn based on an assessment of disaster risk and related contingent liabilities and other assumed responsibilities borne by government. A layered approach to the development of a basket of appropriate disaster risk financing instruments to cover this risk is widely advocated, breaking disaster risk down according to the frequency or probability of occurrence of hazard events and associated levels of loss. Risk reduction is often the most cost-effective way to address high-probability, low-impact hazard events and can also yield significant returns by reducing risks associated with lower-probability, higher-impact events (see below). A range of other financing instruments can then be applied to the remaining layers of residual risk, selecting the most appropriate instrument on the basis of a range of factors including the scale of funding required for each layer of loss, the speed with which disbursement is required, and the relative cost-effectiveness of alternative instruments for specific layers of risk (Figure 1).

Figure 1: Financing Residual Risk



Source: Amended from Ghesquiere and Mahul (2010).

Residual risks associated with high-frequency, lower-cost events occurring on a near-annual basis should be covered from disaster contingency budgets and reserves, financed through regular annual budget allocations (Benson and Mahul 2013). Further funding for slightly larger events can be secured through ex-ante contingent loan arrangements, postdisaster reallocations and some realignment of national capital investment priorities, potentially at a slightly higher opportunity cost. Governments can also introduce temporary taxes, increase borrowing or expand money supply. Higher layers of residual risk associated with lower-frequency, higher-cost event should be transferred to third parties via a mixture of indemnity and parametric insurance tools and catastrophe bonds. For the most extreme events, international assistance and major realignments of government capital spending plans offer additional resources. Local, as well as national, governments should ensure that they have sound disaster risk financing strategies in place. Moreover, governments can actively encourage increased penetration of market-based property, crop, and business interruption insurance and microinsurance solutions to reduce the implicit contingent liability on the public purse and support enhanced financial management of disaster risk by individuals and the private sector.

Such approaches place greater emphasis on ex ante disaster risk financing than is currently practiced in many developing countries. Ex ante disaster risk financing solutions spread the cost of disaster relief, early recovery and reconstruction over time. They can also incorporate incentives to reduce risk—for instance, through the application of risk-based insurance premiums, with implied reductions in premiums if actions are taken to reduce risk. However, ex ante disaster risk financing instruments also require continuous spending allocations to build up disaster reserves and cover insurance premiums. This can be politically difficult. Governments are becoming increasingly interested in ex ante disaster risk financing mechanisms and the need for increased disaster insurance penetration, in particular,

is increasingly frequently emphasized at international global fora such as recent Group of 7 (G7), Asia-Pacific Economic Cooperation, and climate change events. However, at the end of the day, governments commonly favor investments that reap near-immediate returns, rather than benefits that may be realized during another government's term of office. Many governments also lack adequate decision-making tools and sufficient information on disaster risk, associated contingent liabilities and current outlays on postdisaster response to make fully rational choices regarding disaster risk financing options, in likelihood exacerbating the tendency towards very limited financial preparation for disaster response. Efforts underway to address these gaps should be awarded further prominence and attention—for instance, through support for disaster risk assessments and the development of tailor-made tools to assess disaster risk financing alternatives.

3.2.2 Predisaster Recovery Planning

Predisaster recovery planning is essential in ensuring that disaster relief, early recovery and reconstruction financing is used to greatest effect in furthering sustainable development or, at the very least, in ensuring that progress towards the achievement of the SDGs remains on track. Both local and national governments can prepare for recovery using scenario-based plans to take best advantage of the opportunities presented by disasters for social and economic advancement. Predisaster recovery planning involves the identification and establishment of shared recovery goals (e.g., strengthened disaster resilience; poverty reduction; an expanded tourism sector), objectives, strategies and capacity to guide post disaster decision-making; to ensure that relief and recovery activities address key needs and align with long-term development goals; to minimize the indirect and secondary consequences of the disaster; and to enhance resilience to future natural hazard events (UNISDR, EC, and IRP 2012). The recovery-development alignment is particularly critical: "integrating development and recovery planning … permits policy makers and planners to take advantage of the post disaster window of opportunity to initiate larger changes which may have otherwise proved difficult", rather than returning to the predisaster norm (UNISDR, EC, and IRP 2012: 9). Predisaster recovery planning also provides an opportunity to involve potentially affected communities, including marginalized groups, in the identification of priorities and strategies, without the inevitable pressures of time and increased workloads in a postdisaster context.

For example, predisaster recovery planning may highlight the fact that in order to limit the socioeconomic impacts of a disaster it is essential that subsequent harvests are not affected, in turn focusing attention on both pre- and postdisaster actions to support agricultural recovery. Agricultural inputs and implements could then be stockpiled and crop diversification options developed to strengthen the resilience of agricultural households. As a further example, restoration of school services may be considered a high priority, leading to pre-agreed arrangements between neighboring schools to absorb affected student populations; to identify and secure transitional facilities in which schooling could be conducted; and to establish contingency arrangements to ensure that teaching staff and materials can be made available (UNISDR, EC, and IRP 2012).

In practice, predisaster recovery planning is only applied on a very limited scale at the current time. In Asia and the Pacific, the Tokyo Metropolitan Government has been one of the most active agencies in this regard. It has developed a predisaster recovery plan consisting of three documents: the grand design, a recovery manual for officers (outlining municipal responsibilities), and a recovery manual for citizens (UNISDR, EC, and IRP 2012). The international community, including the International

Recovery Platform,[9] is seeking to promote far greater predisaster recovery planning. Both national and local governments should be encouraged in this regard.

3.2.3 Postdisaster Assessments and Coordination of Programs of Support

Robust postdisaster damage, loss, and needs assessments presented in the context of wider economic and sustainable development plans and objectives are also crucial in ensuring that disaster response efforts align with long-term development goals. There have been considerable advances in this regard over the past decade or so in Asia and the Pacific, at least in the context of major disaster events. This effort has been led by the international community, which has introduced a methodology originally developed in the 1970s by the United Nations Economic Commission for Latin America and the Caribbean (UNECLAC) to Asia and the Pacific.

In the methodology's current form, the assessments determine damage, losses (a term used to refer to the indirect flow consequence of the direct physical damage) and, in some cases, needs after a disaster as a basis for estimating and prioritizing recovery and reconstruction requirements. A comprehensive assessment covers the human impact of a disaster; damage, losses and needs by sector; and economic and social impacts, including macroeconomic, fiscal, poverty, employment and livelihoods impacts. It outlines the proposed recovery and reconstruction program, distinguishing between short-term recovery and longer-term reconstruction needs and determining related costs. It also covers DRR actions associated with the proposed recovery efforts. These assessments provide invaluable information for use both in designing appropriate relief and reconstruction programs and in fostering broader understanding of the relevance of major events to socioeconomic development and growth (Benson 2010). Since 2009, the international community has supported the preparation of postdisaster assessments in the aftermath of at least 15 disasters in Asia and the Pacific.

There have been parallel efforts at a country level, again often with development partner support, to improve damage assessment methodologies for both major and less severe disasters, to enhance related collection and recording systems, and to provide related capacity building and training (Benson 2010). For instance, the ECLAC methodology has been directly adapted for use in India and the Philippines. Further initiatives along these lines are required in other countries in the region, both to support efficient and effective relief and reconstruction efforts and, via well-designed analytical and dissemination channels, to inform the wider DRM agenda and strengthen synergies between DRM and sustainable development.

Countries also need to begin collecting longitudinal data on the human development impacts of disasters, looking beyond physical losses to long-term consequences on indicators such as levels of health, educational attainment, access to clean water, livelihood opportunities, and gender equality. Such data is fundamental in designing recovery programs that also support long-term sustainable development. However, few if any governments currently collate longitudinal information, even on a partial basis.

Strong coordination of disaster relief, early recovery and reconstruction efforts is also critical to ensure that all key needs are met and to avoid duplication of support. Although problems remain, there have been significant advances in international coordination over the past decade or so. This process has

[9] The International Recovery Platform is a thematic platform of the United Nations International Strategy for Disaster Reduction system which seeks to identify gaps and constraints in disaster recovery and to serve as a catalyst for the development of tools, resources and capacity for resilient recovery.

been supported by the establishment of cluster groups[10] of UN agencies, NGOs, and other international organizations around key sectors and themes following a major reform of humanitarian coordination by the United Nations in 2005.

Efforts have been taken to strengthen reporting and monitoring of disaster response efforts as well, a key component of an effective and transparent disaster response program. For example, in the aftermath of the 2004 Indian Ocean tsunami, the Government of Indonesia and the World Bank developed a system for tracking resource allocations and disbursements by the government, international donors and the 20 largest NGOs, together accounting for 80% of total assistance flows (Fengler et al. 2008). This system in combination with a joint needs assessment provided a powerful tool for reconstruction planning and monitoring (Goldstein and Amin 2008). It relied on relatively low-tech, labor-intensive data collection and analysis, including proactive collection of data from key players.

As a further example, in the aftermath of Typhoon Yolanda (Haiyan) in November 2013, the Government of the Philippines introduced an online system known as Foreign Aid Transparency Hub (FAiTH) to track the status of foreign aid channeled through government agencies and to make this data publicly available. A year on, the e-Management Platform: Accountability and Transparency Hub for Yolanda (eMPATHY) was established as an online open-access portal through which government agencies as well as donors could enter project information. eMPATHY is based on an off-the-shelf application for development assistance tracking which has also been applied in other countries. A third open-platform system, Open Reconstruction, has also been set up in the Philippines to monitor reconstruction expenditure relating both to Typhoon Yolanda and the 2014 Bohol earthquake, tagging spending once it enters the budget ticketing system and tracking and monitoring progress through procurement, implementation, and auditing. It is intended that this site will also be used for future disasters. Again, such efforts need to be expanded to additional countries.

3.2.4 Targeting Postdisaster Support for the Poor

Social safety nets such as food-for-work, cash-for-work and direct cash and in-kind handouts (e.g., food, clothing, housing, agricultural tools, seeds) are commonly used to support the poor in a postdisaster context, both by governments and development partners. This support can be important in minimizing potential increases in poverty and inequality and in maintaining social equilibrium; in protecting assets of the poor by reducing the need to sell them; and in rebuilding assets by directly or indirectly supporting resumption of livelihood generating activities (Del Ninno 2008). For example, ADB, the European Community Humanitarian Office and Plan International, an NGO, are supporting daily cash-for-work activities in the Philippines following Typhoon Haiyan (Yolanda) in November 2013. These activities are focusing on debris clearance and the repair of public buildings such as schools and hospitals, and other rural facilities, empowering people to rebuild their own communities.

However, social safety net schemes are typically developed in response to specific events and can take three to four months to get under way. Meanwhile, preexisting, regular safety net programs, such as welfare, unemployment benefit, health care and food security programs, are rarely used to channel postdisaster support. Even fewer programs have been explicitly designed ex ante with a potential postdisaster use in mind.

[10] In their current form the cluster groups focus on Protection, Camp Coordination and Management, Water Sanitation and Hygiene, Health, Emergency Shelter, Nutrition, Emergency Telecommunications, Logistics, and Early Recovery, Education and Agriculture.

There are a few notable exceptions, the earliest dating back to food-for-work programs enshrined in the Indian Famine Code of the 1880s. The Government of Bangladesh also maintains a variety of social safety net programs designed to address mainly transient food insecurity issues stemming from shocks, including natural hazards. These include vulnerable group feeding, open market sales, cash for work, food for work, vulnerable group development, and gratuitous relief programs. In several other countries, safety nets originally established to support disaster-affected households have become effectively institutionalized into longer-term programs. For example, looking beyond Asia and the Pacific, the Ethiopian Productive Safety Net Programme (PSNP) was designed specifically to address a situation of near continuous rainfall deficit, replacing ad hoc emergency appeals on a near annual basis for food aid and other forms of emergency assistance with a more permanent program targeted on the chronically poor. Participants are eventually expected to graduate out of the PSNP and move onto other food security programs. In the event of a drought, cash can be disbursed to additional distressed households through the PSNP.

Greater use of preexisting social safety nets to target postdisaster assistance on the most vulnerable households, whether through dedicated facilities or the periodic scaling up of regular benefit schemes, could play a significant role in ensuring that progress in human development is not undermined by disaster events. It would support better targeting of limited resources and the more rapid channeling of assistance to the poor, limiting actions such as informal borrowing and the withdrawal of children from school. Institutionalized arrangements could also help separate decisions on targeting from political considerations, an issue in a number of countries. In Mongolia, for instance, decisions on the inter-household division of assistance within affected soums (subprovinces) during the 2009–2010 dzud[11] were often left in the hands of individual soum administrators. In the interests of 'equity', these resources were frequently evenly distributed across all herder households, rather than targeted on the most severely affected families (Benson 2011b, Fernández-Gimenez et al. 2012). This reflected a commonly held attitude in Mongolia that more skilled herders who lose fewer livestock during periods of extreme weather should not be penalized because they are more capable.

The institutionalization of disaster-related social protection transfer arrangements could be particularly effective if accompanied by efforts to increase uptake of market-based insurance mechanisms by the nonpoor, including near poor, who are better able to afford insurance premiums. By leveraging private financing to support the near poor, public funds can be 'freed up' to target the poor (Benson et al. 2012).

4 CONCLUSIONS

There are significant opportunities to exploit synergies between actions intended to strengthen resilience and to achieve progress towards the achievement of the SDGs. Disaster risk poses a significant risk to sustainable development. Likewise, disaster risk is exacerbated by lower levels of human development. By implication, there is scope for mutually supportive actions both to strengthen disaster resilience and to advance sustainable development. These synergies need to be explicitly recognized and effort taken to ensure they are realized.

[11] A *dzud* is a Mongolian term relating to winter climatic extremes associated with snowfall and temperature which can threaten livestock populations.

There is a number of ways in which DRM financing can be used to advance sustainable development and, likewise, in which development actions can be used to strengthen disaster resilience. In particular, governments and their development partners can:

(i) integrate disaster risk in the design of development policies, national and subnational development plans, land use plans, building codes, and individual investments;

(ii) establish direct and indirect incentives for incorporating disaster risk reduction measures into both public and private investment decisions;

(iii) strengthen the availability of financing for investments in resilience;

(iv) ensure that postdisaster relief, early recovery and reconstruction financing is provided in a sufficient and timely fashion, minimizing the indirect consequences of direct physical losses and therefore the development costs of disasters and facilitating the emergence of more resilient communities;

(v) promote greater uptake and support development of predisaster recovery plans, strengthening the links between disaster response efforts and long-term human development goals;

(vi) strengthen postdisaster damage, loss and needs assessments, including retrospective longitudinal studies to explore the long-term impacts of disasters on human development, to strengthen the design of disaster response programs further;

(vii) enhance the coordination and monitoring of disaster response resources, ensuring that identified relief, early recovery and reconstruction needs are met; and

(viii) develop mechanisms to improve targeting of postdisaster assistance on the poor and to speed up rates of disbursement, limiting the use of informal disaster coping mechanisms which can have detrimental consequences for long-term development.

The 2014 World Development Report states that "managing risks responsibly and effectively has the potential to bring about security and a means of progress for people in developing countries and beyond" (World Bank 2014). As the post-2015 development agenda clearly acknowledges, this statement applies as much to disaster risk as it does to other forms of risk. There is considerable scope for promoting sustainable development through DRM.

REFERENCES

Asian Development Bank (ADB). 2008. *Nepal: The 2008 Flood Damage and Needs Assessment Report.* Final Report. December. Manila: ADB.

___. 2013. *Investing in Resilience: Ensuring a Disaster-Resistant Future.* Manila: ADB.

Aghion, P. and P. Howitt. 1998. *Endogenous Growth Theory.* Cambridge, Massachusetts: MIT Press.

Anttila-Hughes, J.K. and S.M. Hsiang. 2013. *Destruction, Disinvestment, and Death: Economic and Human Losses Following Environmental Disaster.* 18 February 2013. http://ssrn.com/abstract=2220501

AON Benfield. 2014. *Annual Global Climate and Catastrophe Report: Impact Forecasting—2013.* Chicago: Impact Forecasting.

Becerra, O., E. Cavallo, and I. Noy. 2012. Foreign Aid in the Aftermath of Large Natural Disasters. IDB Working Paper IDB-WP-333. Washington, DC: Inter-American Development Bank.

Benson, C. 2010. *Economic and social analysis of natural disasters in the Asia-Pacific region.* Bangkok: United Nations Economic and Social Commission for Asia and the Pacific.

___. 2011a. *Financing disaster risk reduction: A strategic framework to stimulate greater public and private investment.* Geneva: United Nations International Strategy for Disaster Reduction.

___. 2011b. Dzud Disaster Financing and Response in Mongolia. Paper prepared for World Bank study on *Structuring Dzud Disaster Preparation, Financing and Response to Increase Resilience of Herder Households to Climatic Risk in Mongolia.* May. Washington, DC: World Bank.

Benson, C., M. Arnold, A. de la Fuente, and R. Mearns. 2012. *Financial innovations for social and climate resilience: Establishing an evidence base—Framework paper.* Washington, DC: World Bank

Benson, C. and O. Mahul. 2013. *Risk Assessment and Management of Natural Disasters from a Fiscal Perspective: Framework Paper.* World Bank/SECO Disaster Risk Financing and Insurance Program. Washington, DC: World Bank.

Benson, C., R. Prasad Gyanwaly, and H.P. Regmi. 2009. *Economic and Financial Decision Making in Disaster Risk Reduction: Nepal Case Study.* Geneva: United Nations Development Programme, Bureau of Conflict Prevention and Recovery.

Cabezon, E., L. Hunter, P. Tumbarello, K. Washimi, and Y. Wu. 2015. Enhancing Macroeconomic Resilience to Natural Disasters and Climate Change in the Small States of the Pacific. *IMF Working Paper* WP/15/125. Washington, DC: International Monetary Fund.

Cabot Venton, C. and P. Venton. 2004. Disaster preparedness programmes in India: A cost benefit analysis. *Humanitarian Practice Network Paper* 49. Paper commissioned and published by the Humanitarian Practice Network at the Overseas Development Institute (ODI). London: Overseas Development Institute.

Del Ninno, C. 2008. Role of Cash Transfers and Other Social Safety Nets after a Disaster. Workshop on Building Resilient Communities: Risk Management and Response to Natural Disasters, 13 June 2008, Bangkok. Washington, DC: World Bank.

Fengler, W., A. Ihsan, and K. Kaiser. 2008. Managing Post-Disaster Reconstruction Finance International Experience in Public Financial Management. Policy Research Working Paper 4475. Washington, DC: World Bank.

Fernández-Gimenez, M.E., B. Batjav, and B. Baival. 2012. *Lessons from the Dzud: Adaptation and Resilience in Mongolian Pastoral Social-Ecological Systems.* Colorado State University, Center for Nomadic Pastoralism and World Bank, June.

Gautam, D. and K. Oswald. 2008. *Child Voices: Children of Nepal Speak Out on Climate Change Adaptation.* Research Report. Children in a Changing Climate. http://www.childreninachangingclimate.org/database/ids/Publications/Child%20Voices_np.pdf

Ghesquiere, F. and O. Mahul. 2010. Financial Protection of the State against Natural Disasters: A Primer. Policy Research Working Paper 5429. Washington, DC: World Bank.

Global Facility for Disaster Reduction and Recovery (GFDRR). 2010. *It is not too late: Preparing for Asia's next big earthquake with emphasis on the Philippines, Indonesia and* [the People's Republic of] *China*. Washington, DC: GFDRR and the World Bank.

Goldstein, M. and S. Amin, eds. 2008. *Data against Natural Disasters Establishing Effective Systems for Relief, Recovery, and Reconstruction.* Washington, DC: World Bank.

Government of India. 2009. Revision in EFC format to address disaster management concerns. Office Memorandum No. 37(4)/PF.II/2003. New Delhi: Government of India.

Hochrainer-Stigler, S., H. Kunreuther, J. Linnerooth-Bayer, R. Mechler, E. Michel-Kerjan, R. Muir-Wood, N. Ranger, P. Vaziri, and M. Young. 2011. The Costs and Benefits of Reducing Risk from Natural Hazards to Residential Structures in Developing Countries. Working Paper No. 2011-01, January 2011. Philadelphia, PA: Risk Management and Decision Processes Center, The Wharton School, University of Pennsylvania.

India: New Companies Act on Corporate Social Responsibility Duties. http://blog.kpmg.ch/india-new-companies-act-corporate-social-responsibility-duties/

International Federation of Red Cross (IFRC). 2009. *Assessing Quality and Cost Benefit: A Philippines Case Study.* Geneva: IFRC and Red Crescent Societies.

IRIN. 2011. Three years later, still no shelter. *Relief Web.* 3 May 2011. http://reliefweb.int/node/399646

Kellett, J. and A. Caravani. 2013. *Financing Disaster Risk Reduction: A 20 Year Story of International Aid.* London: Overseas Development Institute.

Maplecroft. 2013. *Climate Change and Environmental Risk Atlas 2013: Country-by-Country Risk Analysis and Mapping.* Bath: Maplecroft.

Mechler, R., S. Hochrainer, G. Pflug, A. Lotsch, and K. Williges. 2010. Assessing the Financial Vulnerability to Climate-Related Natural Hazards—Background paper for the World Development Report 2010 "Development and Climate Change". Policy Research Working Paper 5232. Washington, DC: World Bank.

Rose, A. et al. 2007. Benefit-Cost Analysis of FEMA Hazard Mitigation Grants. *Natural Hazards Review*. 8(4): 97–111.

Sato, M. and L. Boudreau. 2012. *The Economics of Disaster Risk, Risk Management, and Risk Financing: Financial and Fiscal Impacts of the Great East Japan Earthquake*. Washington, DC: World Bank.

Tripartite Core Group (TCG). 2008. *Post-Nargis Joint Assessment.* A report prepared by the Tripartite Core Group comprised of Representatives of the Government of the Union of Myanmar, the Association of Southeast Asian Nations and the United Nations with the support of the Humanitarian and Development Community. July. Yangon: TCG.

United Nations (UN). 2009. Creating linkages for a safer tomorrow: Proceedings of the Global Platform for Disaster Risk Reduction. Second Session, Geneva, Switzerland, 16–19 June 2009. New York: United Nations.

___. 2015a. *Sendai Framework for Disaster Risk Reduction 2015–2030.* New York: United Nations.

___. 2015b. *Addis Ababa Action Agenda of the Third International Conference on Financing for Development.* New York: United Nations.

___. 2015c. *Transforming Our World: The 2030 Agenda for Sustainable Development.* New York: United Nations.

United Nations Development Programme (UNDP). 2010. *Power, Voice and Rights: A Turning Point for Gender Equality in Asia and the Pacific–Asia Pacific Human Development Report.* Colombo: UNDP, Regional Centre for Asia Pacific.

UN-Habitat and United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP). 2015. *The State of Asian and Pacific Cities 2015: Urban transformations—Shifting from quantity to quality.* Bangkok: UNESCAP.

United Nations International Strategy for Disaster Reduction and Recovery Secretariat (UNISDR). 2008. *Linking disaster risk reduction and poverty reduction: good practices and lessons learned.* Geneva: United Nations International Strategy for Disaster Reduction and Recovery Secretariat. http://www.unisdr.org/we/inform/publications/3293

UNISDR, European Commission (EC), and International Recovery Platform (IRP). 2012. *Guidance Note on Recovery—Pre-Disaster Recovery Planning.* Geneva, Brussels, and Tokyo: UNISDR, EC, and IRP. http://www.unisdr.org/files/31963_predisasterrecoveryweb.pdf

Verisk Maplecroft. 2015. *Natural Hazards Risk Atlas 2015.* Bath: Verisk Maplecroft.

World Bank. 2007. Philippines: Agriculture Public Expenditure Review. Technical Working Paper 40493. Washington, DC: World Bank.

___. 2014. *World Development Report 2014: Risk and Opportunity—Managing Risk for Development.* Washington, DC: World Bank.

Yeomans, A. and M. Leung. 2008. *Emergency Market Mapping and Analysis (EMMA): Pilot Test 2, Myanmar—Key Findings and Recommendations.* 15–31 July 2008. Yangon: Save the Children.

Promoting Sustainable Development through Disaster Risk Management

Asia and the Pacific is subject to all major types of natural hazards and dominate disaster impact categories across all regions of the world.

These disasters undermine sustainable development and challenge efforts to reduce poverty. Conversely, however, many actions to advance sustainable development can potentially strengthen disaster resilience. Likewise, resources spent on strengthening disaster resilience can advance human development.

This paper highlights the opportunities to realize these potential synergies between disaster resilience and sustainable development, including through the integration of disaster risk in the design of development policies, strategies, land use plans, building codes, and individual investments; the creation of incentives for investments in resilience; and actions to ensure that postdisaster support is deliberately designed with a view to the achievement of a country's sustainable development goals.

About the Asian Development Bank

ADB's vision is an Asia and Pacific region free of poverty. Its mission is to help its developing member countries reduce poverty and improve the quality of life of their people. Despite the region's many successes, it remains home to the majority of the world's poor. ADB is committed to reducing poverty through inclusive economic growth, environmentally sustainable growth, and regional integration.

Based in Manila, ADB is owned by 67 members, including 48 from the region. Its main instruments for helping its developing member countries are policy dialogue, loans, equity investments, guarantees, grants, and technical assistance.

ADB

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