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# THE SENDAI REPORT

Managing Disaster Risks for a Resilient Future



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# THE SENDAI REPORT

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Managing Disaster Risks for a Resilient Future

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# CONTENT

Executive Summary	3
1. Disasters and Development—An Alarming Trend	7
2. Disaster Risk Management in Action	15
3. National Policies and Planning	23
4. International Development Cooperation	29
5. Disaster Risk Management at the World Bank	33
6. The Way Forward: Priorities and Opportunities for the World Bank	49
Glossary and References	53

# LIST OF ABBREVIATIONS

BCP	Business Continuity Plan
CAPRA	Probabilistic Risk Assessment Initiative
CAS	Country Assistance Strategy
CAT DDO	Catastrophe Deferred Drawdown Option
CERC	Contingent Emergency Response Component
CIF	Climate Investment Funds
CSO	Civil Society Organization
CRW	Crisis Response Window
DPL	Development Policy Loan
DRM	Disaster Risk Management
DRFI	Disaster Risk Financing and Insurance
GDP	Gross Domestic Product
GEF	Global Environment Facility
GEJE	Great East Japan Earthquake
GET	Global Expert Team
GFDRR	Global Facility for Disaster Reduction and Recovery
IBRD	International Bank for Reconstruction and Development
IDA	International Development Association
IEG	Independent Evaluation Group
IFC	International Finance Corporation
IRM	Immediate Response Mechanism
IPCC	Intergovernmental Panel on Climate Change
MIGA	Multilateral Investment Guarantee Agency
NHMS	National Hydro–Meteorological Service
OECD–DAC	Organization for Economic Cooperation and Development–Development Assistance Committee
PDNA	Post Disaster Needs Assessment
SDN	Sustainable Development Network
UNISDR	United Nations International Strategy for Disaster Reduction
WMO	World Meteorological Organization

# EXECUTIVE SUMMARY

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This report argues that the practice of disaster risk management (DRM) is a defining characteristic of resilient societies, and should therefore be integrated—or ‘mainstreamed’—into all aspects of development. The report will inform the Development Committee at the Annual Meetings 2012, and support discussion at the Sendai Dialogue—a special event co-organized by the Government of Japan and the World Bank as part of the Annual Meetings program. This event will engage delegates on the importance of mainstreaming DRM, drawing upon the lessons from the Great East Japan Earthquake and tsunami of 2011, and other disasters.

### *Disasters hurt poor and vulnerable people the most.*

Since 1980, low income countries have accounted for only 9% of the disaster events but 48% of the fatalities<sup>1</sup>. Disasters affect the poor and vulnerable disproportionately, especially women, children, the elderly, and those recovering from the impact of conflicts. Living in fragile environments, on the fringes of settlements, greatly increases exposure to natural hazards. A life without the safety net of savings and property drastically reduces people’s ability to cope in a crisis. By threatening vulnerable groups the most, disasters exacerbate existing social and economic inequity, which can in turn further marginalize people and create conditions for civil unrest and conflict.

### *Disasters cause major economic impact.*

The economic losses from disasters over the past 30 years are estimated at \$3.5 trillion. Last year was the costliest on record, seeing estimated losses of around \$380 billion<sup>2</sup>. The recent floods in Thailand cost the equivalent of 5% of the country’s Gross Domestic Product (GDP), while the economic losses from Japan’s earthquake and tsunami were estimated as equivalent to 4% of GDP. In low income and small island states, the impact can exceed an equivalent of 100% of GDP. The economic impact of the Haiti earthquake in 2010 was equal to 120% of its GDP, while the 2004 Grenada hurricane caused losses equivalent to more than 200% of GDP.

### *Evidence suggests that the impact of disasters will continue to increase.*

Every day the unplanned growth of urban populations and economies drives exposure to natural hazards ever higher. At the same time poor natural resource management and urban expansion create environmental stresses that exacerbate the impact of hazards such as floods and landslides. Going forward, the future holds new challenges as climate patterns change.



### *Natural hazards need not turn into disasters.*

Deaths and damage resulting from disasters expose the cumulative implications of human decisions. Prevention is possible and often less costly than disaster relief and response.<sup>3</sup> Disaster risk can be reduced by strengthening resilience: the ability of societies to resist, cope with, and recover from shocks. The foundation for DRM is understanding the hazards, and the exposure and vulnerability of people and assets to those hazards. By quantifying the risks and anticipating the potential impacts of hazards, governments, communities, and individuals can make informed prevention decisions. Such information can be used to set priorities for development and adaptation strategies, sector plans, programs, projects, and budgets.

### *Mainstreaming DRM in development planning can reverse the current trend of rising disaster impact.*

If countries act decisively, they can save lives and assets. But many countries do not have the tools, expertise, and instruments to factor the potential impacts of adverse natural events in their investment decisions. Few systematically account for disaster losses and assess the risk from adverse natural events. Even fewer have institutional mechanisms to take risk information into account. This means that they are unable to direct the necessary resources to protect their investments and reduce their exposure to disaster impacts and climate change.

### *Development planners at national, municipal, and local levels have a major role to play in managing and reducing disaster risk.*

They are also key advocates for getting DRM measures implemented. Informed by a proper assessment of risks, city planners can employ many measures, including risk-based territorial planning, building codes, early warning systems and emergency response planning. Governments and donors can help cities and rural communities build the capacity and knowhow for understanding and managing their risks.

### *The international development community must support countries to manage growing disaster risks.*

Donor financing for disasters is currently dominated by response rather than prevention and preparedness. Development assistance—both technical and financial—can supply seed funding to catalyze national programmes, grant technical support to key risk-related areas, and give momentum to comprehensive risk management. Addressing the causes of disasters, rather than merely responding to them, can also reduce the recurrent burden on humanitarian budgets, while protecting development investments. Donors can also align their work in DRM and climate adaptation through coordinated planning, financing, and operations.

### *The World Bank plays a key role in disaster and climate risk management*

The Bank's comparative advantage lies in its ability to offer a combination of tools and resources that include concessional finance and experience in implementing risk reduction and reconstruction operations. In recent years the Bank has developed specialized expertise and a range of new instruments to support countries to better manage disaster risk. The Bank is increasingly integrating disaster risk management in Country Assistance Strategies (CASs) and operations, however much more can be done.

### *The World Bank will embark on a comprehensive mainstreaming agenda for DRM by dedicating more human and financial resources to:*

- Enhance the understanding of disaster risk in client countries;
- Scale up technical and financial support to national governments, cities and communities for disaster resilience;
- Further align the DRM and climate adaptation agendas;
- Integrate DRM in fiscal and public debt management in countries exposed to adverse natural events;
- Explore new contingent credit products and expand the use of market-based risk financing instruments, including by broadening its intermediation service capacity;
- Expand social funds, safety nets and community-driven development programs that specifically target the poor and marginalized;
- Enhance support for accelerated recovery planning in disaster-affected countries;
- Extend knowledge and partnerships to better understand and design long-term disaster resilience.

# 1 **DISASTERS AND DEVELOPMENT**

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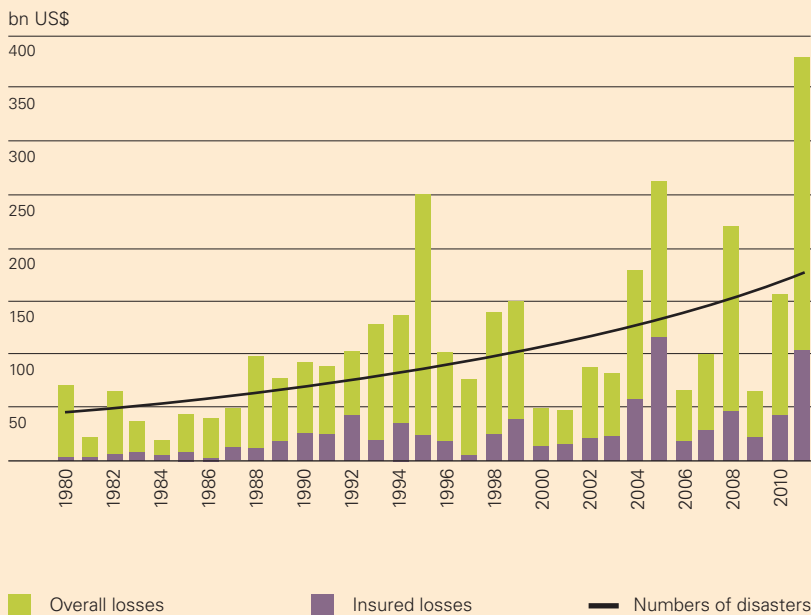
An Alarming Trend

# EVIDENCE AND IMPACT

**The frequency and severity of disasters resulting from natural hazards<sup>a</sup> are increasing.** 2011 was the costliest year on record, with estimated disaster losses of \$380 billion. Recent years saw record losses too, in an extension of an upward 30 year trend (Figure 1). The estimated total losses resulting from disasters between 1980 and 2011 are \$3.5 trillion, with one third occurring in low- and middle-income countries.<sup>4</sup>

<sup>a</sup> Throughout the report, 'disasters' refer to those resulting from natural hazards, unless otherwise stated.

FIGURE 1: **OVERALL AND INSURED LOSSES, 1980 TO 2011 (2011 VALUES)**



Source: Munich Re, Geo Risks Research, and NatCatSERVICE.

**Disasters in recent times provide a grim reminder of their human and economic toll.** In Haiti, the 2010 earthquake devastated Port-au-Prince and killed up to 230,000 people and caused estimated total losses of \$7.8 billion, equivalent to 120% of the country's 2009 GDP. In the Horn of Africa, the extended 2008-2011 drought—which left 13.3 million people facing food shortages at its peak—caused estimated total losses of \$12.1 billion in Kenya alone. In Thailand, the 2011 floods resulted in losses of approximately \$45 billion, equivalent to 13% of GDP.

#### LESSON FROM JAPAN 1: **THE GREAT EAST JAPAN EARTHQUAKE OF MARCH 2011**

The Great East Japan Earthquake (GEJE) and subsequent tsunami reminded the world that no country, no matter how well prepared, can fully insulate itself from large-scale disasters. The event was the costliest earthquake in world history.

Japan's Cabinet office has estimated the direct economic cost at ¥16.9 trillion, or \$210 billion. The 9.0 magnitude earthquake occurred off the coast of the Tohoku region along Japan's Pacific coast. Ground shaking, felt as far as Western Japan, lasted 220 seconds. The subsequent unprecedented tsunami devastated 650 kilometers of coastline, toppling sea walls and defenses, inundating more than 500 square kilometers of land, and washing away many small and medium towns and villages along the shore, leaving 20,000 people dead or missing. According to the National Police Agency damages include more than 129,000 collapsed houses and more than 254,000 severely damaged houses, with 2,126 roads, 56 bridges, and 26 railways completely destroyed.

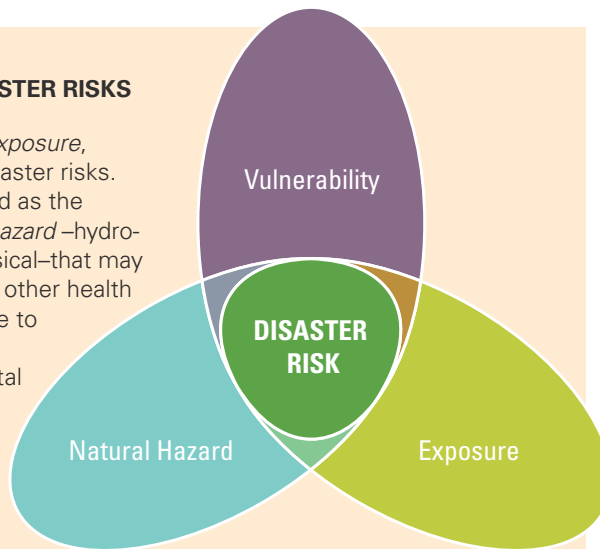
The high-impact event with a low probability of occurrence was a highly complex phenomenon, the effects of which cascaded to sensitive facilities. The impact of the disaster would have been exponentially worse if Japan had not prioritized disaster prevention and preparedness. Direct damage to major Japanese industries rippled through supply chains around the world. In the second quarter of 2011, Japan's GDP dipped 2.1 percent from the previous year, while industrial production and exports dropped even more sharply—by 7.0 percent and 8.0 percent, respectively. Japan experienced a trade deficit for the first time in 31 years. In the wake of the tsunami, businesses that relied on Japanese electronics and automotive parts faced disruptions and delays in production, distribution, and transportation; they had to scramble to find alternate supply lines and manufacturing partners.<sup>5</sup>



**Disaster risk is increasing mainly as a result of growing exposure of people and assets to natural hazards** (Box 1). Detailed analysis shows that the biggest driver of disaster risk in recent years has been the substantial growth of population and assets in at-risk areas. Migration to coastal areas and the expansion of cities in flood plains, coupled with inappropriate building standards, are among the main reasons for the increase. The degradation of ecosystem buffers like mangrove swamps also increases hazard risk. This trend will continue to drive disaster risk and is likely to be exacerbated by an increase in climate variability.<sup>6</sup>

**BOX 1: DRIVERS OF DISASTER RISKS**

Three variables—*hazard*, *exposure*, and *vulnerability*—drive disaster risks. Disaster risk can be defined as the potential occurrence of a *hazard*—hydro-meteorological or geo-physical—that may cause loss of life, injury, or other health impacts, as well as damage to *exposed* assets (property, infrastructure, environmental resources), livelihoods and service provision. The characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of a hazard is its *vulnerability*.



**Key trends:**

- *Exposure*. Population and economic growth has been the main driver for increasing exposure of people and assets, pushing up the potential for loss every day.
- *Hazard*. Population pressures and poor natural resource management, such as uncontrolled deforestation and urban expansion, create environmental stress that can lead to more floods, landslides, and other hazards. Hydro-meteorological hazards are also likely to increase due to climate change.
- *Vulnerability*. Although it is difficult to measure how vulnerability is changing globally, it is clear that the poorest in society are more vulnerable.

With urbanization and rapid economic development, increasing exposure is projected to continue to drive disaster risk. This can only be mitigated through risk-sensitive development.

Source: IPCC 2012.

**Impacts from adverse natural events are often underestimated.** A growing body of research suggests that cumulative losses from small, recurrent disasters equal or exceed those from larger catastrophes. Often escaping the national or international consciousness, these smaller events reinforce poverty and compound the hardship endured by poor communities. In Colombia, for example, cumulative total small-scale losses between 1972 and 2012 were 2.5 times greater than losses resulting from large scale disasters.<sup>7</sup>

**The global impacts of disasters are not evenly distributed.** With more exposed assets, economic impact is concentrated in fast-growing middle-income economies. In these countries the average economic impact of a disaster from 2001 to 2006 equaled 1% of GDP—10 times higher than the average in high-income economies for the same period. Smaller and poorer countries, such as small-island developing states and land-locked developing countries, tend to have the least resilience to natural hazards. In small island states, the impact can be crippling: Hurricane Tomas devastated St Lucia in 2010 and wiped out the equivalent of 43% of GDP. In terms of human life lost, low-income countries suffered 48% of total disaster fatalities during the period 1980 - 2011.<sup>8</sup>

**Seemingly 'local' disasters have much broader impacts.** As businesses become more interconnected and supply chains become more international, seemingly local events have increasing global impact. The 2010 eruption of the volcano Eyjafjallajökull had negligible impact in Iceland, but affected international air travel in Europe for over two weeks, leading to major economic losses in travel, tourism and trade. A study by Oxford Economics found that the total impact on global GDP in just the first week of disruption from the ash cloud amounted to approximately \$4.7 billion.<sup>9</sup> Similarly the 2011 floods in Thailand reduced Japan's industrial output by 2.6% between October and November of that year, due to disruptions in electronics and automotive "just-in-time" supply chains.<sup>10</sup>

**No country, even the most prepared, can fully insulate itself from disaster risk.** The 9.0 magnitude earthquake that occurred off the coast of the Tohoku region along Japan's Pacific coast in March 2011 made this clear. The resulting catastrophic tsunami compromised sea walls and defenses and devastated 650 kilometers of coastline, washing away towns and villages and leaving 20,000 people dead or missing. The tsunami destroyed 130,000 houses and severely damaged 260,000 more.<sup>11</sup> The economic impact of the disaster was estimated by Japan's Cabinet Office at \$210 billion, equivalent to 4% of Japan's GDP. That said, the impact of the disaster would have been much greater if Japan had not prioritized disaster prevention.

*"No country, even the most prepared, can fully insulate itself from disaster risk."*

*“Disasters discriminate against the most vulnerable, and adversely affect the pace and quality of socioeconomic development.”*

**Disasters discriminate against the most vulnerable, and adversely affect the pace and quality of socioeconomic development.** The poorest, disabled, elderly, orphans and other marginalized groups are more likely to be affected by natural hazards. Disasters compound existing vulnerabilities, as the poor are more likely to be exposed to natural hazards, more likely to be hit by disasters, and less able to recover.<sup>12</sup> For example, case studies carried out for four cities (Dar es Salaam, Jakarta, Mexico City and São Paulo) found that in all four cities, those living in informal settlements were most vulnerable to climate-related and disaster risks.<sup>13</sup>

#### LESSON FROM JAPAN 2: **VULNERABLE GROUPS MUST BE NOT ONLY PROTECTED BUT ALSO ENGAGED**

Understanding and meeting the challenges of the elderly, children, and women, both during the emergency and in its aftermath, are priorities for effective disaster risk management. Culturally sound solutions that take account of special needs among segments of the population should be planned in advance to enhance resilience and facilitate recovery and reconstruction.

Japan’s tradition of community participation in preparedness was a key factor in minimizing the number of lives lost to the GEJE. Community-based DRM activities are well integrated into the daily lives of most Japanese, ensuring that awareness of natural hazards is never far from their minds. The national and local governments formally recognize and support the involvement of the community in DRM through laws and regulations that define roles and commitments, through linkages with local institutions (such as jichikai, or neighborhood associations), and through participation in meetings at which decisions are made. During the GEJE, local governments and communities in affected areas served as first responders, managed evacuation centers, and promptly began postdisaster reconstruction.<sup>14</sup>





**Disasters exacerbate existing gender inequities.** In many cases, mortality amongst women is significantly higher than men. For example, 70% of fatalities in Banda Aceh after the 2004 Indian Ocean Tsunami were women and as high as 91% in Bangladesh after Cyclone Gorky in 1991. While the factors behind these figures may vary, the trend is avoidable if addressed upfront in DRM strategies. When Cyclone Sidr hit Bangladesh in 2007 the proportion of fatalities amongst women was significantly reduced compared to 1991, largely because cultural sensitivities that had led women to be reluctant to use cyclone shelters had been addressed.<sup>15</sup>

**There are clear interactions between disaster risk and state fragility.** In fragile and conflict-affected contexts, the institutions and financial resources required to manage disaster risk are particularly lacking. Weak governance, poor planning, and financial constraints compromise countries' resilience to natural shocks and stresses, which means that impacts can be more severe, and the response weaker.<sup>16</sup>

**Disaster risks cross national borders.** In South Asia, for example, river basins straddle multiple countries and upstream precipitation can have severe downstream impacts in neighboring countries. This presents particular challenges, such as how to effectively manage risks across frontiers or how to reconstruct in the event of a cross-border disaster. To manage this, countries can benefit from regional cooperation, including in areas such as early warning or risk financing.

**Cities are disaster risk hotspots.** Today more than half the world's population lives in cities, with an additional two billion urban residents expected in the next 20 years. In emerging economies in particular, the concentration of population and economic assets in cities, combined with inadequate urban planning lead to rising disaster risks. This calls for major changes in managing these risks as part of urban development. City planners have an important role to play through risk-based territorial planning, enforcement of building codes, early warning systems and emergency response plans. Governments and donors can help cities build this capacity and knowhow for understanding and managing their risks.

*"Cities are disaster risk hotspots."*

# CLIMATE VARIABILITY AND EXTREMES

**Hydro-meteorological disasters are responsible for a large proportion of losses from adverse natural events.** Of the 22,200 events recorded between 1980 and 2011, 17,400 (78.4%) were caused by storms, droughts, flooding, landslides, extreme temperatures and forest fire. Similarly these disasters also account for a high proportion of economic loss, \$2.6 trillion of the total \$3.5 trillion losses recorded over the period. Even with the very high earthquake casualty rate, hydro-meteorological events were responsible for over half of all deaths attributed to disasters during the period (1.4 million out of a total of 2.28 million).<sup>17</sup>

**The latest research indicates that, without a major breakthrough in global negotiations, the world will likely exceed a +2°C scenario before the end of this century.** This would have major implications on global ecosystems, agriculture and water supply, sea level rise and storm surges (Box 2). In any case, such uncertainty means that historical patterns alone will no longer be a good basis for planning. DRM, if informed by climate scenarios and integrated into development planning and investments now, can provide an important line of defense against an uncertain future. In this context, the Intergovernmental Panel on Climate Change (IPCC) identifies effective adaptation strategies as those that “help manage disaster risk now and offer near-term development benefits, while reducing vulnerability over the longer term”.<sup>18</sup>

## BOX 2. IPCC ASSESSMENT OF THE FUTURE OF CLIMATE AND WEATHER EXTREMES

The IPCC 2012 *Special Report on Extreme Events* presents the latest scientific consensus on the impact of climate change on disaster risks. It states that “a changing climate leads to changes in the frequency, intensity, spatial extent, duration, and timing of extreme weather and climate events, and can result in unprecedented extreme weather and climate events.”<sup>19</sup> For example, the report anticipates that “it is likely that the frequency of heavy precipitation or the proportion of total rainfall from heavy falls will increase in this century over many areas of the globe” and that “a 1-in-20 year annual maximum daily precipitation amount is likely to become a 1-in-5 to 1-in-15 year event by the end of the 21st century in many regions”.

*“Help manage disaster risk now and offer near-term development benefits, while reducing vulnerability over the longer term”*

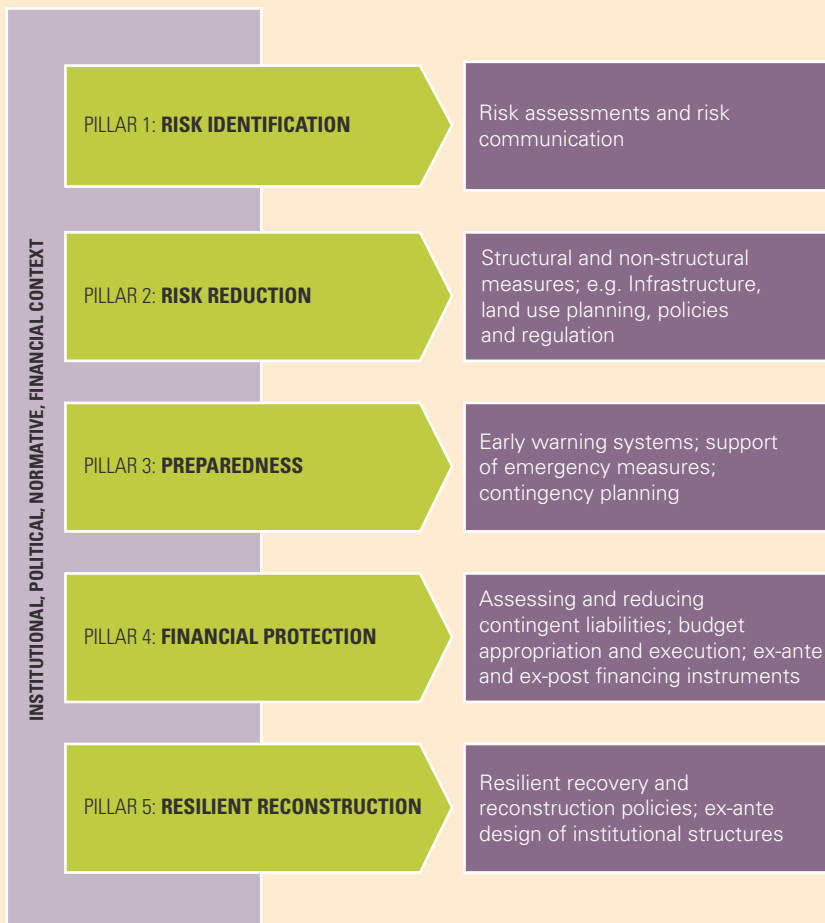
# 2 DISASTER RISK MANAGEMENT

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In Action

**There are cost-effective steps governments and others can take to protect populations and assets.** Collectively these steps contribute to the management of disaster risks. DRM can be defined as a combination of: risk identification; risk reduction; preparedness; financial protection; and planning for disaster recovery (Figure 2). Many frameworks exist to develop practical approaches to DRM. All are based on the fundamental principle that citizens and governments must be empowered to make informed choices about their risks and how best to reduce, retain or transfer them.

FIGURE 2: **A DISASTER RISK MANAGEMENT FRAMEWORK**



Source: Ghesquiere and Mahul 2010.



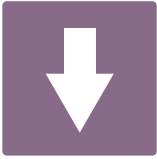
## PILLAR 1: RISK IDENTIFICATION

**Understanding hazards, exposure, and vulnerability is the first step towards managing disaster risk.** People living in disaster prone areas have assessed risks they face in various ways for centuries. Today, a range of methods can help communities, governments and companies assess risk, depending on the budget, the technical resources, and the intended purpose. By quantifying risks and anticipating the potential negative impacts of natural hazards on society and the economy, disaster and climate risk assessments can help governments, communities, and individuals make informed decisions to manage risk.

### CASE STUDY 1: RISK IDENTIFICATION - ASSESSING RISK REGION-WIDE IN THE PACIFIC

The Pacific Catastrophe Risk Assessment and Financing Initiative created the largest collection of geospatial information on disaster risks available for Pacific Island countries. The platform includes detailed country information on assets, population, hazards, and risks. The first phase of the program conducted detailed risk assessments for 15 countries, quantifying potential disaster losses from earthquakes, tsunamis, and tropical cyclones. This assessment includes the most comprehensive analysis of building, infrastructure, and cash crop exposure ever conducted for the region. Resulting exposure, hazard, and risk maps and data are shared with policymakers and the public. The project is a joint initiative of the Secretariat of the Pacific Community, Applied Geoscience Technology Division, the World Bank, and the Asian Development Bank. The Government of Japan and GFDRR provided financial support.

*“Understanding hazards, exposure, and vulnerability is the first step towards managing disaster risk.”*



## PILLAR 2: RISK REDUCTION

**Disaster risk information can inform different development strategies, plans and projects that can in turn reduce risks.** This may, on the one hand, be done through anticipatory action that seeks to avoid the creation of new risks, for example through improved territorial planning or building practice. On the other hand, it may be through investment to address existing risk, such as the retrofitting of critical infrastructure or the construction of embankment systems.

### CASE STUDY 2: REDUCING AND AVOIDING RISK - MUNICIPAL DEVELOPMENT AND FLOOD PROTECTION IN YEMEN

The city of Taiz and its surroundings suffered severe flash flooding over the last two decades. Through the World Bank-financed Municipal Development and Flood Protection Project, major parts of Taiz city, including downtown Taiz, were transformed into habitable and flash flood-secure neighborhoods. And the impact of the projects on the lives and livelihoods of the people in these areas is substantial. The structures built under these successive phases include 10 kilometers of open channel, 21 kilometers of covered channel, 85 kilometers of stone and asphalt paved roads, 54 kilometers of sewer line, 21 sedimentation traps, and 3.2 kilometers of above street-level retaining walls. Among many other benefits, the project contributed to lowering the number of deaths from flooding from an average of six people a year over the last decade to zero since the project was implemented.

*“Disaster risk information can inform different development strategies, plans and projects that can in turn reduce risks”*



## PILLAR 3: PREPAREDNESS

**Adequate preparedness is essential, as risk can never be completely eliminated or reduced.** Preparedness through early warning systems save lives and protect livelihoods and is one of the most cost-effective ways to reduce the impact of disasters. To be effective, early warning must lead to action. Preparedness activities therefore include enhancing the capabilities of local organizations to plan for and respond to the effects of disasters.

### CASE STUDY 3: **PREPAREDNESS - BUILDING GLOBAL CAPACITY FOR WEATHER EARLY-WARNING**

The World Bank has been supporting the modernization of early warning systems in many countries (including Mexico, Mozambique, Nepal, Poland, Russian Federation, Vietnam, and Central Asian countries). In each project, the aim has been to modernize the National Hydro-Meteorological Service (NHMS), building institutional capacity, modernizing the observing and forecasting systems, and improving the delivery of services. This approach is a departure from many earlier efforts to assist NHMSs, which focused on enhancing capacity on a limited scale, usually in the area of in situ observations.

The new approach is expected to be more sustainable because it is built on strengthening specialized public institutions (NHMSs), which will address a growing societal demand to get access to better quality of hydro-met services for economic sectors and communities including timely, accurate, and actionable warnings. It also recognizes that national investment alone is not enough—that partnerships and pairing arrangements with more capable NHMSs through the World Meteorological Organization (WMO) are also essential to ensure sustainability. The World Bank plans to scale up its support to global weather and climate enterprises working closely with the WMO and other partners.

*“Adequate preparedness is essential, as risk can never be completely eliminated or reduced.”*



## PILLAR 4: FINANCIAL PROTECTION

**Financial protection strategies protect governments, businesses and households from the economic burden of disasters.** These strategies can include programs to increase the financial capacity of the state to respond to an emergency, whilst protecting the fiscal balance. They can also promote the deepening of insurance markets at a sovereign and household level, and social protection strategies for the poorest.

### CASE STUDY 4: FINANCIAL PROTECTION - QUANTIFYING CONTINGENT LIABILITY FROM DISASTERS IN COLOMBIA

A review of contingent liabilities by the government of Colombia in 2010, with support from the World Bank, identified risk from adverse natural events as its second largest liability, noting that a one-in-250 year earthquake could cause losses to public assets and housing of more than \$35 billion, or 8% of GDP. When this model's outputs are combined with analysis of the government's historical losses, \$490 million is estimated as the average annual losses to the government from disasters. Building on this information, the World Bank is supporting the Colombian authorities in developing a disaster risk financing strategy to increase its capacity to mobilize funding in case of disaster while protecting fiscal balances. This strategy builds on a Colombia national disaster fund, a contingent credit line from the World Bank (the Catastrophe Deferred Drawdown Option), and catastrophe risk transfer instruments.<sup>20</sup>

*“Financial protection strategies protect governments, businesses and households from the economic burden of disasters.”*





## PILLAR 5: RESILIENT RECONSTRUCTION

**After a disaster, the reconstruction process is an important opportunity to promote resilience.** In times of disruption and reconstruction, the sensitivity of governments and the affected population to disaster risks is at its highest. This challenge also presents an opportunity to promote investment in DRM through integrated resilient recovery and reconstruction planning.

### CASE STUDY 5: RESILIENT RECONSTRUCTION - EARTHQUAKE LEADS TO MAINSTREAMING OF DRM

The Kashmir Rural Housing Reconstruction Program, supported by the World Bank, rehabilitated and reconstructed more than 600,000 houses to seismic-resistant standards. The project integrated risk reduction by supporting an owner-driven process through financial incentives and technical support, building capacity of owners, local masons, and foremen. It also strengthened logistics for the provision of quality material, mapped hazards, and built capacity for the Earthquake Reconstruction and Rehabilitation Authority and other institutions—all with monitoring and evaluating to guide the project. These elements contribute to the long-term resilience of rural housing in the face of future hazards. Systematic risk assessments and community-based activities have since been scaled up nationally under the auspices of the new National Disaster Management Authority.

*“After a disaster, the reconstruction process is an important opportunity to promote resilience.”*

**Education, training and awareness-raising are cross-cutting elements that strengthen all aspects of disaster risk management at all levels** – from sensitization of public officials to skills development of construction workers, to DRM education in school curricula. This will benefit from coordinated action on the part of national and local governments, relevant organizations, and social and business communities. Academic and technical institutions are a valuable source of knowledge and analysis. There is a need for closer collaboration between communities at risk, researchers and governments. It is essential that external agencies support governments and communities in understanding and building upon local coping strategies and indigenous knowledge.

**At every step, comprehensive DRM requires collective action.** Risk management strategies impact many sectors and interest groups, which is why policymakers talk about ‘mainstreaming’ the issue. Countries, communities and households become more resilient to disasters only when information on risks is applied to decision-making. Defining the success of any risk management strategy relies on defining the characteristics of resilience, in social, economic, infrastructural and environmental terms. Researchers and organizations approach the concept of resilience from different perspectives, but most start from the understanding that being resilient involves being able to cope with shocks while maintaining long term well-being and growth.

### BOX 3: **SOME DEFINITIONS OF DISASTER RESILIENCE**

“The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner” – United Nations International Strategy for Disaster Reduction (UNISDR)<sup>21</sup>

“The ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change” – IPCC<sup>22</sup>

“The ability of countries, communities and households to manage change, by maintaining or transforming living standards in the face of shocks or stresses - such as earthquakes, drought or violent conflict - without compromising their long-term prospects.” – Department for International Development, United Kingdom<sup>23</sup>

# 3 NATIONAL POLICIES AND PLANNING

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**In the coming decades, trillions of dollars will flow into new public investments in developing countries, much in hazard-prone areas.** If countries act firmly and immediately to reduce their vulnerability and strengthen their resilience, they will be able to protect lives and assets from known risks. But arresting the current trend of rising disaster risk will require a major shift in development planning and practice.

**Few countries have the tools, expertise, and mechanisms to consider the potential impact of disaster risk on their investment decisions.** They rarely account for disaster losses, collect data, and assess risks systematically. Even fewer have mechanisms to take risk information into account. As a result, they are not able to direct the necessary resources to protect their investments and reduce their exposure to future disaster impacts.

**Policies and programs must be put in place to ensure that new developments do not create new risks.** New buildings in expanding cities need not be located in risky areas, and should be built using resilient standards. There is a need for better territorial planning, sound environmental policies to maintain ecosystem buffers, appropriate building practices, and a culture of prevention at all levels of society. Such efforts to avoid risk bring the largest long-term return on development investment. Unfortunately, the intangible benefit of avoided loss can make these efforts politically less attractive and thus more difficult to mainstream in development planning.

### LESSON FROM JAPAN 3: **EXTREME DISASTERS UNDERScore THE NEED FOR A HOLISTIC APPROACH TO DRM**

Single-sector development planning cannot address the complexity of problems posed by natural hazards, let alone mega-disasters, nor can such planning build resilience to threats. Faced with complex risks, Japan chose to build resilience by investing in preventive structural and nonstructural measures; nurturing a strong culture of knowledge and learning from past disasters; engaging in wise DRM regulation, legislation, and enforcement; and promoting cooperation among multiple stakeholders, between government agencies and ministries, between the private sector and the government, and between multiple levels of governance, from local to national to international.

Because it is not practical—from a financial, environmental, or social perspective—to build tsunami dikes 20 to 30 meters high, Japan's government intends to accelerate the current paradigm shift in its thinking about disaster management, complementing its structure-focused approach to prevention with soft solutions to achieve an integrated approach to disaster risk reduction. Understanding that the risks from natural hazards can never be completely eliminated, the new, balanced approach incorporates community-based prevention and evacuation and other non-structural measures such as education, risk-related finance and insurance, and land-use regulation.<sup>24</sup>



**Reducing existing risks requires clear prioritization of investment.** Governments have to identify which risk management initiatives to invest in, when, and in what sequence. Reducing existing risk (as opposed to avoiding future risk) can be cost-intensive, so identifying critical infrastructure can help prioritize the most urgent risk reduction interventions. Some interventions, when properly designed, can bring important societal benefits, such as comprehensive flood management and irrigation systems, which can reduce the risk of floods in targeted areas and open them to agriculture. Others, such as retrofitting infrastructure, can be done strategically to ensure that schools, hospitals, communication systems, and basic utilities remain functional in a disaster. Risk assessments can help prioritize risk management initiatives according to a country's risk profile.

#### LESSON FROM JAPAN 4: **UNDERSTAND THE NATURE AND LIMITATIONS OF RISK ASSESSMENTS**

Understanding risks, based on risk assessments among local authorities and the population at large can improve collective and individual decision making, especially in emergencies. Communication about the unfolding disaster needs to be interactive among local communities, governments, and experts. Distributing hazard maps and issuing early warnings is a good start, but not enough. Evacuation drills and DRM education, which is part of the curriculum of the country's schools, kept children safe in Kamaishi City. The famous "Kamaishi Miracle" was not really a miracle at all, but rather the result of a sustained effort to instill a culture of resilience and prevention based on continuous learning.<sup>25</sup>

**Institutional arrangements for DRM must go beyond emergency response.<sup>b</sup>** Many countries have a stand-alone coordinating body for DRM, responsible for coordinating risk assessments and mapping, supporting the development of policy and legislative frameworks, and promoting preparedness and response planning. But such agencies rarely have the capacity or mandate to influence policy decisions at the highest level. Countries with effective DRM programs generally have specialized agencies with considerable political influence, often within the Ministries of Planning or Finance.

**Effective DRM requires governments at national and sub-national levels to work with local communities and other stakeholders.** Governments have the responsibility to ensure the safety of citizens. They have the mandate and the capacity to promote research, provide public goods, and implement large-scale risk reduction programs. They also have the ability to put in place the policy and legislative frameworks that provide the right controls and incentives for risk reduction. Effective action requires strong collaboration between governments, domestic and external specialized agencies, private sector, civil society, science and academia, indigenous people and local communities.

<sup>b</sup> *Hyogo Framework for Action Priority Area 1: Ensure that disaster risk reduction is a national and local priority with a strong institutional basis for implementation.*

**Government policy must translate into local action.** The impacts of disasters are felt locally, and communities need to be empowered and supported to manage risk. Effective DRM strategy, therefore, requires a decentralized approach and an appropriate division of labor and resources between all levels of government. Community awareness and action is needed for preparedness and for response. After the Great East Japan Earthquake it was found that, despite the prevailing culture of prevention, communication between and among communities and local authorities on the nature of tsunami risk and on the unfolding disaster itself could have been better. Civil society organizations (CSOs) are a critical partner in building local resilience. There is also evidence that investing in women, as resilience champions, pays rich dividends.

**Many developing countries lack the financial capacity to respond immediately after a disaster.** Financial protection strategies can help governments respond more effectively in case of disaster while protecting their fiscal balance. Governments are expected not only to fund recovery and reconstruction expenses for public assets after a disaster but also to ensure post-disaster order, rescue, relief, and recovery. They are also regularly called on to finance private losses, which can be a significant fiscal burden and threat to economic development.<sup>26</sup> For example, small islands find it difficult to diversify their risks; highly indebted countries may not have access to post-disaster credit; and budget processes in many countries do not allow governments to reallocate their budget after a disaster, creating a potentially crippling liquidity crunch. In this light, countries with low fiscal capacity and flexibility need to consider solutions to prepare for the worst.<sup>27</sup>

**Disasters can create significant volatility on government accounts.** Without financial protection mechanisms in place, governments can find themselves under pressure to draw funding away from basic public services or divert funds from other development programs. Knock-on effects can include inflation and rising public debt. These negative fiscal impacts can hamper longer-term economic development. Beyond the direct economic costs, disasters come with significant indirect costs, such as sustained business disruptions, lower tax revenues and fiscal instability. For example, Malawi suffered from significant fiscal volatility after several large droughts in the early 1990s; GDP fluctuated dramatically, tax revenue plummeted and public expenditure grew by 30%.<sup>28</sup>

## LESSON FROM JAPAN 5: **PREVENTION PAYS, BUT BE PREPARED FOR THE UNEXPECTED**

Japan's extensive structural measures were very effective in protecting buildings and people from the earthquake. Although 190 kilometers of the 300 kilometers of dykes in the area collapsed, they decreased the force of the tsunami and, in some areas, delayed its arrival inland. All bullet trains stopped safely without casualty, thanks to a cutting-edge system of detecting the earliest sign of ground movement. The GEJE, however, exceeded all expectations and predictions in the extent of its ensuing tsunami, demonstrating that exclusive reliance on structural measures will ultimately prove ineffective and must be supplemented with non-structural measures and a basic understanding of the uncertainties surrounding the estimation of events such as earthquakes and tsunamis.

Today, Japan is placing even heavier emphasis on recognizing and respecting complexity and residual risk, designing and managing systems that “fail gracefully”—that is, that mitigate damage to the greatest extent possible before succumbing to overwhelming force. The essence of the approach is to design and maintain resilient infrastructure capable of absorbing damage from natural disasters to some extent even when an event exceeds all feasible and affordable measures. In the wake of the GEJE, Japan also recognized that additional efforts were required to plan and design measures capable of countering events of low probability but high impact.<sup>29</sup>

**Ministries of finance can build risk management capacity in other areas of public finance—such as public debt management and fiscal policy—to assess, mitigate, and monitor the impact of disaster risks.** They can better integrate DRM into broader fiscal risk management, such as assessing the fiscal impact of exogenous shocks and improving analysis of contingent liabilities. They can build on the existing risk management capacities used to support other areas of public finance. Indeed, many of the policy frameworks, tools, and approaches used by ministries of finance to assess and manage other financial risks, are adaptable to cover financial risks associated with disasters.

**Political commitments and legislative frameworks need to result in resource allocations.** Effective policy frameworks provide a useful starting point for mainstreaming into broader sustainable development, and their absence can lead to institutional inefficiencies and wasted resources. However, even with frameworks in place, DRM is an investment in the future that competes with multiple demands on resources. One solution to this is to mainstream DRM into development processes and budgets. The acid test for political commitments lies in the integration of DRM into sector strategies, policies, plans, and budgets. In the Netherlands, for example, since 2007 cost-benefit analysis has been mandatory for all major infrastructure investments. This encompasses an assessment of the positive and negative effects of a proposed measure on safety, economy, and quality of life.<sup>30</sup>

**The private sector has an important role to play in effective policy implementation.** Commercial companies dominate the construction sector and influence how and where buildings and other infrastructure are developed. Partnerships between the public and private sector in this regard can be important, for example in design decisions in the construction of schools, hospitals and other critical infrastructure. The insurance and reinsurance industries have built commercial value out of modeling, understanding and trading in disaster risk. They can contribute to DRM both in terms of the products they offer and the expertise and data they hold. Increasingly, for example, catastrophe risk insurance and reinsurance markets allow countries to transfer risks to private investors and to ensure liquidity after disasters. Catastrophe risk insurance helps create incentives for risk mitigation by putting a price on risk.

#### LESSON FROM JAPAN 6: **DRM IS EVERYONE'S BUSINESS**

Partnerships with the private sector were also critical. Rehabilitation could begin the day after the earthquake because agreements with the private sector were already in place. Quick payment of insurance claims allowed individuals and businesses to contribute fully to the rehabilitation effort.

If it is well prepared for disasters the private sector can play an important role in reducing local and regional economic damage. Business Continuity Plans (BCPs) are an effective tool for strengthening the private sector's disaster resilience. Approximately 80 to 90 percent of the large and medium companies indicated that their BCPs were effective in the response and recovery phase after the March 11 disaster. Efforts can be made to raise awareness about the importance of developing an effective BCP, with lessons from disasters, widely shared with the private companies and organizations.

Private companies could begin with a small hazard scenario as the first step to formulate BCPs, and then add greater or different kinds of hazards. For an example in Japan, since earthquakes are a very familiar hazard, most companies start by preparing BCPs for earthquakes which they consider easier to produce. Government can help companies to develop BCPs by providing necessary information such as risk assessments and guidelines for producing BCPs.<sup>31</sup>

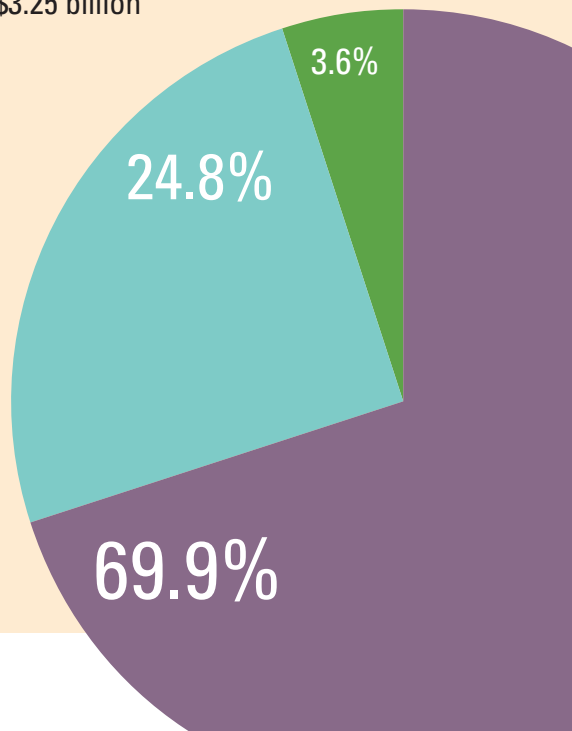
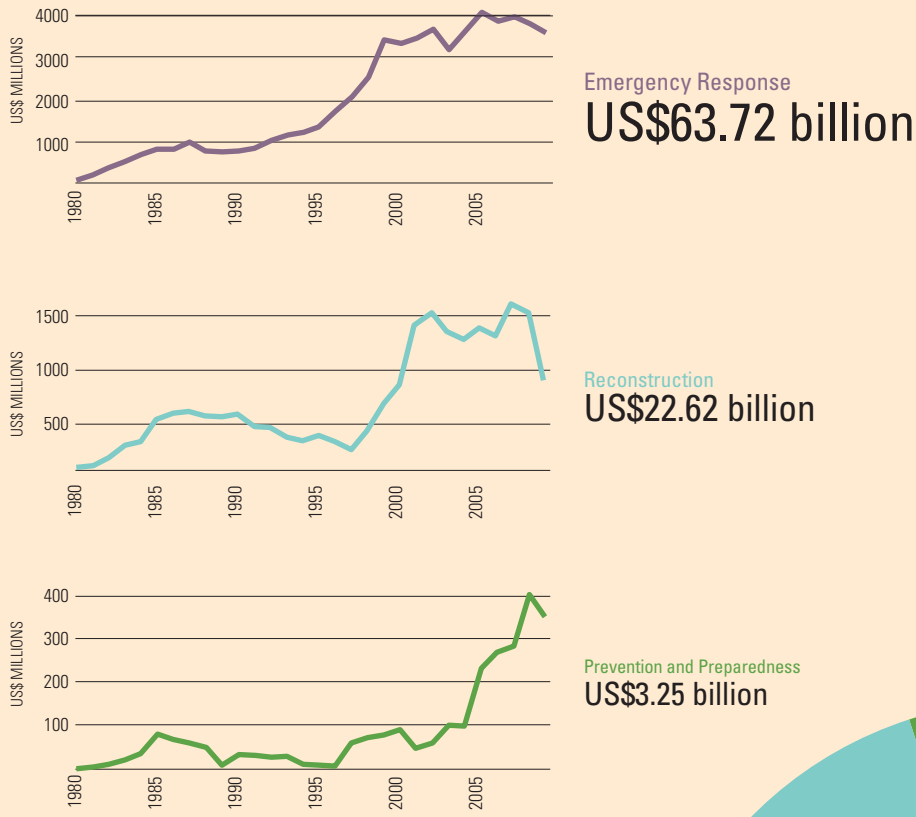




# 4 INTERNATIONAL DEVELOPMENT COOPERATION

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FIGURE 3: **DISASTER-RELATED INTERNATIONAL FINANCING**



Source: Global Facility for Disaster Reduction and Recovery (GFDRR) Disaster Aid Tracking Database.  
 Note: Figures are constant US\$ 2009.

<sup>c</sup> Remaining 1.7% (US\$1.5 billion) of the total disaster related assistance is classified under 'Emergency Assistance and Reconstruction, combinations of purposes' category and is not included in the chart above.

**Donor financing for disasters is dominated by response rather than prevention and preparedness.** Between 1980 and 2009, about 2% (\$91.2 billion) of total development assistance was allocated for disaster-related activities.<sup>32</sup> Of this, emergency response accounted for the majority (69.9%) while reconstruction accounted for a quarter (24.8%). Disaster prevention and preparedness accounted for 3.6% of disaster-related assistance (\$3.3 billion)—or 0.07% of total development assistance during the period (Figure 3).

**Financing dedicated to mainstreaming DRM can enhance overall development effectiveness.** By providing technical assistance and capacity development to support governments to understand their risk and set DRM priorities, additional resources can be leveraged, both from domestic budgets as well as from international sources, including the World Bank. What is more, investment in DRM can help prevent humanitarian assistance growing year on year at a time when donor financing is stretched.

*“Financing dedicated to mainstreaming DRM can enhance overall development effectiveness.”*

**Donors can best place DRM policy and practice in development-oriented rather than humanitarian departments.** Where donors have made risk management a priority, the responsibility is regularly allocated to humanitarian units or divisions. However, these same units are unlikely to have the necessary long-term policy perspectives, mandates or funding for effective DRM or the necessary traction with their development counterparts within or in partner countries. However, this need is being increasingly recognized and international partners are forming international coalitions and partnerships to bring humanitarian and development communities together to build resilience.

**Climate change financing provides a major opportunity for greater investment in long-term risk reduction.** Innovative DRM investments can come from the significant resources committed to climate risk management under international climate change agreements, which identify DRM and risk financing as key building blocks. The World Bank, as a trustee for both climate adaptation and DRM financing, can work with the UN and the broader international development community to foster a coherent strategic approach to long-term disaster and climate risk management.

#### BOX 4. THE HYOGO FRAMEWORK FOR ACTION

The Hyogo Framework for Action brings international stakeholders together around a common coordinated system. The goal is to substantially reduce the loss of lives and social, economic, and environmental assets by 2015.<sup>33</sup> Managed under the United Nations International Strategy for Disaster Reduction (UNISDR) it is an international voluntary framework to mobilize action and track progress.

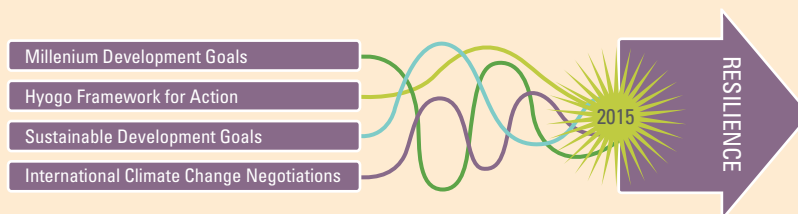
To date, 168 countries have signed up to the Framework and committed to undertake activities under its five priorities:

- Ensure that DRM is a national and local priority with a strong institutional basis for implementation.
- Identify, assess, and monitor disaster risks and enhance early warning systems.
- Use knowledge, innovation, and education to build a culture of safety and resilience at all levels.
- Reduce the underlying risk factors.
- Strengthen disaster preparedness for effective response at all levels.

Source: UNISDR.

**There is a rare convergence of renewal calendars for international policy frameworks.** This presents an opportunity for making DRM a development priority. The Millennium Development Goals and the Hyogo Framework for Action reach their target dates in 2015 (Box 4). Discussions are under way to identify what is needed beyond 2015. In addition, the Durban Platform agreed in December 2011 is to negotiate a new climate change treaty by 2015, which will include measures to address disaster risk. The Sustainable Development Goals proposed in the run up to Rio+20 will also be developed over the coming years. The international community must ensure that DRM is a priority in these policy frameworks and fully integrated in institutional and sector practices.

FIGURE 4: TOWARDS 2015



# 5 **DISASTER RISK MANAGEMENT**

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At the World Bank

# RESPONDING TO COUNTRY DEMANDS FOR DISASTER PREVENTION AND PREPAREDNESS

**In the context of a changing climate, DRM is increasingly at the core of World Bank business.** In 2011, 70% of Country Assistance Strategies and Country Partnership Strategies recognized natural disasters as a challenge to sustainable development, up from 40% in 2006 (Case Study 6). This upward trend has taken place across regions and country income groups. Similarly, in line with a commitment made in the context of the International Development Association (IDA) 16 Replenishment, vulnerability to climate change was discussed in all 2012 (fiscal year) CAS products, compared to 32% in 2007 (fiscal year). These figures signal a real shift away from a historical institutional tendency to treat disasters as interruptions in development rather than as risks that could be managed.<sup>34</sup>

## CASE STUDY 6. EXAMPLES OF COMMITMENTS TO DRM AND CLIMATE ADAPTATION IN COUNTRY ASSISTANCE STRATEGIES

After massive landslides and flooding in January 2011, the government of **Brazil** asked the World Bank to support its activities in DRM and climate adaptation through the Country Partnership Strategy, through components in investment loans, development policy loans, sector-wide approaches, fee-based services, and non-reimbursable technical assistance. The Brazil–World Bank partnership is at the federal level, with eight states and three main municipalities. Overall, Brazil has the most World Bank projects with climate adaptation and DRM components.

Recognizing that **Bangladesh** is highly vulnerable to natural hazards, the 2006-09 CAS committed the World Bank to providing support to the Government of Bangladesh's efforts to integrate DRM into all relevant ministries. The current 2011-14 CAS now recognizes that sustainable growth is dependent upon the reduction of vulnerability to natural disasters and climate change. The strategy calls for investment in disaster preparedness at all levels and risk mitigation in infrastructure including shelters and embankments.

**Financing for DRM has become more strategic.** Between 1984 and 2006 the World Bank financed more than \$26 billion disaster-related projects, or just less than \$1.2 billion a year.<sup>35</sup> Since then, financing directly linked to DRM has increased to more than \$2.3 billion a year (totaling \$11.7 billion).<sup>36</sup> Between 2006 and 2011 the World Bank financed 113 disaster prevention and preparedness operations (\$7.9 billion) and 68 disaster reconstruction operations (\$3.8 billion). In all support for DRM, the World Bank promotes a comprehensive, multi-sector approach to managing disaster risk in countries (Case Study 7). But there is still more to be done to systematically integrate an assessment of disaster risks into the design and implementation of World Bank financed projects.

#### CASE STUDY 7. **SUPPORTING COMPREHENSIVE DRM PROGRAMS**

The risk management approach followed by the Government of **Morocco**, supported by the World Bank and the Global Facility for Disaster Reduction and Recovery (GFDRR), is built upon a comprehensive analysis of multiple risks, with a focus on potential fiscal and social impacts. The top risks identified were: (i) Commodity price volatility, (ii) Natural disaster risk and (iii) Risks in the agricultural sector. The Government is working towards a holistic management strategy which includes risk assessments, risk financing instruments and risk reduction at the community level. This is important because it demonstrates an analytic lens through which DRM interventions are considered for the return they offer in comparison with interventions addressing other types of risk.

The World Bank has developed a long term broader partnership with the Government of **Colombia** on DRM. The World Bank's engagement has evolved from one primarily focused on disaster recovery to now encompassing three pillars: (a) understanding of disaster risk, (b) implementation of risk reduction activities, and (c) disaster risk financing and insurance. The World Bank's engagement over the medium term will focus on: the modernization of the national DRM system; improvements in the application of disaster risk analysis and management in policy making at the sectoral and territorial levels; and strengthening DRM at sub-national levels.

After tropical storms Ondoy and Pepeng (2009), the Government of the **Philippines** with the World Bank and with support from GFDRR and partners (ADB, AusAID, JICA) undertook a PDNA, which made recommendations for strengthening resilience to disasters. A comprehensive program of support followed, which included the formulation of a disaster risk financing strategy for the country, a flood management master plan for Metro Manila, and a DRM Development Policy Loan with a Catastrophe Deferred Drawdown Option (CAT-DDO). This provides rapid liquidity for the government in the event of a disaster. The full amount was disbursed in 2011 after the tropical storm Sendong (Washi).

#### **BOX 5. THE GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY (GFDRR)**

The World Bank hosts GFDRR, a growing partnership of 41 countries and 8 international organizations, including the United Nations and the European Union. GFDRR was established in 2006 to assist countries to reduce disaster losses by 2015, in response to the Hyogo Framework for Action agreed at the World Conference on Disaster Reduction. GFDRR has worked with the World Bank to move from a reactive approach to disasters to become more strategic in supporting the reduction of disaster risk.

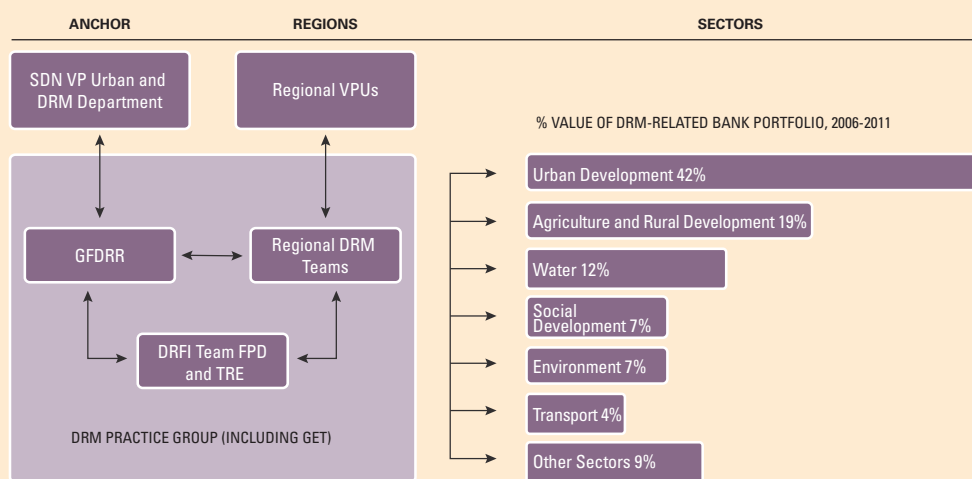
GFDRR has leveraged the World Bank's role, leadership, and performance on global knowledge creation, innovation, and partnerships in DRM. It has increased the World Bank's capacity and strategic planning to provide assistance to integrate DRM and climate adaptation in country development strategies, undertake timely Post Disaster Needs Assessment (PDNA), and support country capacity building.

**The Sustainable Development Network (SDN) anchors the DRM Practice Group, as well as GFDRR, which is a global partnership launched by the World Bank, United Nations, and bilateral donors in 2006.** The DRM function was recently elevated to Practice Group through the restructuring of the Finance, Economics, and Urban Department, bringing DRM into sharper focus. The DRM Practice Group works with regional and sector departments to coordinate knowledge and talent development. It also manages a Global Expert Team for DRM that draws on experts from across the World Bank to apply sector expertise to mainstream DRM into operations and non-lending technical assistance. Finally, working hand in hand with the GFDRR (Box 5), the Practice Group also connects the World Bank's work on DRM with that of other international partners and other stakeholders.



**Regional teams provide tailored DRM support to countries.** Working throughout the World Bank system, they develop stand-alone DRM projects, programs, and knowledge services and support other sector teams in integrating DRM considerations or components in sector operations. Over the last five years, the DRM Practice Group has grown from a handful to more than 100 staff dedicated to various aspects of DRM in sector work. DRM expertise can be found in different departments, including Urban Development, Water Resources Management, Social Development, Climate Change and Agriculture. The Finance and Private Sector Development Department as well as the World Bank Treasury have also been working closely with the DRM Practice Group to develop risk financing and insurance solutions for countries (Figure 5).

**FIGURE 5: THE WORLD BANK'S DRM NETWORK AND DISASTER-RELATED INVESTMENTS BY SECTOR**



SDN - Sustainable Development Network  
 VPU - Vice Presidential Unit  
 DRFI - Disaster Risk Financing and Insurance  
 FDP - Financing and Private Sector Development  
 TRE - Treasury  
 GET - Global Expert Team

Source: GFDRR DRM portfolio analysis.

**The World Bank has developed a series of instruments and approaches spanning financial, knowledge, and convening services to support DRM in countries.** A new operational policy on rapid response to crisis and emergencies was adopted in 2007, and new instruments were introduced to accelerate resource mobilization in case of disaster, including the Catastrophe Deferred Drawdown Option (CAT DDO), the Crisis Response Window (CRW), and the Immediate Response Mechanism (IRM).

**The largest share of disaster-related investments is currently in the World Bank's Urban Development sector (Figure 5).** Financing and technical assistance is increasingly providing a vehicle to work with city governments and others to reduce disaster risks through the lens of urban planning and development (Case Study 8). Projects delivering greater resilience to disasters include those with a broader focus on the upgrading of urban services or infrastructure, or on the governance of cities themselves. Technical assistance in risk assessment and mapping can provide the groundwork for larger scale investment in hardware, such as storm drainage or retrofitting of critical infrastructure.

#### CASE STUDY 8. **EXAMPLES OF WORLD BANK SUPPORT TO URBAN RESILIENCE**

A new project in **Sri Lanka** called the Metro Colombo Urban Development Project will look at issues including government administration, transport and solid waste management, but will take flood protection as a major focus through the installation and upgrading of drainage infrastructure.

Since 2006 the second phase of the **Colombia** Disaster Vulnerability Reduction Project has supported infrastructure retrofitting and institutional strengthening in the city of Bogota. The project financed the retrofitting of more than 200 schools and 6 hospitals as well as the resettlement of more than 5,000 families living in risky areas.

The World Bank has a history of supporting sustainable development of urban areas in **Turkey**, working on financing, risk reduction and preparedness. The post-Marmara earthquake project helped establish both the Turkish Catastrophe Insurance Pool (TCIP) as well as the forerunner of the Disaster and Emergency Management Presidency. Several projects have targeted Istanbul, supporting the development of multi-hazard risk assessments, the retrofitting of key infrastructure, flood risk reduction, emergency planning and response, and public awareness.<sup>37</sup>

In three cities in **Vietnam**, Dong Hoi, Can Tho, and Hanoi, local governments have extended the work of risk assessment to a second phase in resilience planning, completing a Local Resilience Action Plan (LRAP). This includes not only a vulnerability assessment and spatial planning, but also an inventory of planned capital investments and policy changes to address high-risk areas, analyze gaps, and a multi-stakeholder priority-setting based on comparison of alternatives in light of limited budgets and fundraising prospects.<sup>38</sup>

**Social funds, safety nets and community-driven development operations can help reduce the vulnerability of communities to disaster risk (Case Study 9).**

The ability of social funds to deliver social protection—along with community-driven development operations improving service delivery, empowering communities, and expanding livelihood opportunities—can reduce the vulnerability of poor and marginal communities to natural hazards and help them adapt to climate change.<sup>39</sup> Moreover, there is a well-recognized role for national safety net systems that are designed and funded to respond to crises and emergencies and encourage risk management at a household level. Community-driven development programs also provide a platform for community empowerment, further contributing to long-term resilience building.

**CASE STUDY 9. EXAMPLES OF SOCIAL PROTECTION AND COMMUNITY BASED PROJECTS THAT BUILD DISASTER RESILIENCE**

Grounded in extensive field work in **Lao PDR** and **Vietnam**, in 2011 the World Bank launched operationally relevant tools for World Bank staff, clients and development partners to address key issues and bottlenecks, mainstream gender into DRM projects, and help task teams design and implement gender dimensions into DRM work across the East Asia and Pacific Region. A series of five Guidance Notes focuses on practical elements of mainstreaming gender considerations into DRM programs. The second phase of the work is underway building on the operational tools developed under Phase I and focuses on action on the ground. For example in Vietnam, the Managing Natural Hazards Project (2012) will promote gender mainstreaming under the community-based DRM component. In addition, a community of practice around gender and DRM has been established and the EAP team is sharing the tools and approaches with other regions and the anchor.

In **Kenya** and **Ethiopia**, social protection projects built resilience to drought, with a particular emphasis on empowering women to become agents of change. Capacity building for women's savings and loans groups helped communities manage the risks associated with the 2005–08 drought cycle by generating income, preserving assets, and enhancing food security.

In Ethiopia, the World Bank, with other donors, is supporting the Productive Safety Nets Program, one of the largest social protection programs in Sub-Saharan Africa. The objective of the program is to reduce household vulnerability, improve resilience to shocks and promote sustainable community development in food insecure areas of rural Ethiopia. The program includes a component on drought risk financing which aims to provide timely resources for transitory food insecurity in response to shocks within the existing program areas.

**The World Bank continues to sustain efforts to mobilize additional resources for climate adaptation.** One of the first mechanisms to support climate adaptation was the Climate Investment Fund (CIF) Pilot Program for Climate Resilience. With more than \$900 million endorsed since its establishment in 2008, the program supports pilots in nine countries and two sub-regions (the Pacific and Caribbean). Most of these pilot programs build on an integrated approach to climate risk management and receive support from the DRM Practice Group and GFDRR. Similarly, Global Environment Facility (GEF) activities continue to provide lessons on the integration of climate and disaster risks in the design of projects. The World Bank has helped countries access funds from GEF's core resources, the Least Developed Country Fund, and the Special Climate Change Fund to support climate action in both low and middle income countries.

**Work is under way to integrate DRM into the World Bank's performance management system through the 'Corporate Scorecard'.** DRM indicators in the scorecard will allow the World Bank to ascertain its contribution towards ensuring that DRM is a priority in countries, with a strong institutional basis for implementation. This also signals the importance the World Bank places on DRM as a core element of working for a world free of poverty.

**The World Bank has made good progress in integrating climate adaptation and DRM in its policy dialogue and investment operations.** Given the deep uncertainty in climate change projections, DRM investments need to be robust across a wide range of scenarios. In practice this means that risk assessments that guide these investments must be capable of capturing long-range variability. In many low-income countries in particular, uncertainty remains high because climate models do not have the necessary level of accuracy or detail. But this should not delay action to build resilience (Case Study 10). The World Bank Group's Environment Strategy 2012 – 2022,<sup>40</sup> with its focus on green, clean and resilient development, will further strengthen the focus and linkages between climate adaptation and DRM.

#### CASE STUDY 10. THE KIRIBATI ADAPTATION PROGRAM

**Kiribati**, one of the most vulnerable nations to climate change and sea level rise, has identified and piloted adaptation measures to improve coastal protection, freshwater supplies, and sustainability. Climate risk management is now coordinated and driven by a high-level ministry. About half a kilometer of sea walls has been built along the main road, more than 37,000 mangrove seedlings have been planted, and several water management improvements have been carried out, all helping to increase resilience to climate change for Kiribati's 98,000 residents. Following these initial achievements, the biggest challenge is to build sustained capacity of the organizations and people of this remote island nation, which will require long term support from partners like the World Bank.

**The World Bank provides technical assistance and financing in support of climate services to help countries improve weather forecasting and provide early warning of extreme events.** The interplay of natural hazards with the impacts of water scarcity and food insecurity has emerged as a serious challenge for policy planning in many countries. Responding to client demand, the World Bank's portfolio of projects supporting hydro-meteorological investments is approaching \$500 million, and will continue to grow. These projects include support to modernize observation networks, service delivery and climate-modeling capacity to design adaptation policies (Case Study 11).

**Inclusion of "Achieving Climate Resilient Development" as a special theme for the 16th replenishment of IDA provides an important opportunity to build resilience in the most vulnerable countries.** Under a system developed to track climate co-benefits, the World Bank is able to report its financing commitments in a consistent and transparent manner. About 32% (\$4.7 billion) of total IDA commitments in fiscal year 2012 supported climate adaptation (\$2.3 billion) and mitigation (\$2.4 billion). This is a significant increase from fiscal year 2011, where only 9% delivered climate adaptation co-benefits.

#### CASE STUDY 11. **CLIMATE-PROOFING IN VULNERABLE REGIONS**

Through a partnership with the Intergovernmental Authority on Development's Climate Prediction and Applications Centre (ICPAC), the World Bank and GFDRR have helped to build climate observation and climate-modeling capacity in the national meteorological and hydrological agencies of **East Africa**.

In the **Caribbean** region, climate change is likely to intensify existing hazard patterns that threaten its vulnerable, small island states. The World Bank has facilitated access to combined resources from IDA, PPCR and GFDRR that fund technical assistance to build capacity in the region for analyzing and managing disaster risks. The World Bank financed Regional Disaster Vulnerability Reduction Program enables the governments in the Eastern Caribbean to reduce climate risks and strengthen capacity, including: (i) prevention and adaptation investments in public buildings and infrastructure; (ii) hazard and risk evaluations and applications to improve decision making; and (iii) an emergency recovery and rehabilitation mechanism to provide additional financing in the case of a national emergency.

# INSTRUMENTS AND OPERATIONAL POLICIES

**The World Bank's crisis and emergency response operational policies and procedures have evolved in order to enhance flexibility, speed, and effectiveness.** In 2007 the emergency response operational policy was revised to enable faster preparation and approval of emergency projects. The new policy allows for rapid mobilization by recognizing upfront the inherent risks involved in working in emergency situations, including the risks and lost opportunities associated with a delayed response. It also expands the applicability of emergency procedures to situations of imminent emergency.

**The CAT-DDO has become an instrument of choice to support financial protection strategies in middle-income countries.** CAT-DDOs are Development Policy Loan (DPL) instruments that provide client countries with contingent lines of credit that can be drawn upon in case of disaster. Of the 16 DRM-related DPLs the World Bank has approved since 2008, eight included a CAT-DDO to enhance the capacity of governments to manage the impact of natural disasters.<sup>d</sup> The CAT-DDO was created first and foremost to encourage investment in risk reduction. To have access to this contingent credit, countries must show that they have engaged in a comprehensive disaster management program.<sup>41</sup> Similar instruments have not yet been developed for IDA countries largely because they require setting aside part of scarce IDA country allocations for a contingent facility.

**To compensate for the absence of a fast-disbursing instrument for IDA countries, the World Bank recently launched the IRM.** The IRM initiative encourages the introduction of Contingent Emergency Response Components (CERC) in all IDA operations. A CERC is a zero-dollar component within a project that allows for funds to be quickly reallocated to emergency recovery activities in the event of a disaster (Case Study 12). They avert the need for time-consuming project restructuring because the budget line is already there (albeit empty). The IRM augments the resources that can be mobilized quickly for emergency response by allowing up to 5% of an undisbursed IDA portfolio in an affected country to be channeled through any CERC.

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<sup>d</sup> *The CAT-DDO is a financial instrument that offers IBRD-eligible countries immediate liquidity of up to \$500 million, or 0.25% of GDP (whichever is less) in case of a natural disaster. The instrument was designed by the World Bank to provide affected countries with bridge financing while other sources of funding are mobilized.*

## CASE STUDY 12. CONTINGENT EMERGENCY RESPONSE COMPONENTS

Several disaster-prone countries are including CERCs in World Bank financed projects allowing them to be better prepared in case of a disaster.

The first CERC was introduced in the Colombia Disaster Vulnerability Reduction Project in 2007. This \$150 million component was subsequently replaced by a CAT-DDO when the instrument came to life in 2008. The Laos Roads Sector Project (2010, \$27.8 million) triggered a contingent component of \$1 million and reallocation of another \$3 million from other project components to repair roads damaged by Typhoon Haima. In Indonesia, contingent components have been added under the Third National Program for Community Empowerment in Urban Areas (2010, \$150 million) and Western Indonesia Roads Improvement Project (2011, \$250 million). In Pakistan, CERCs were recently introduced in the Balochistan Disaster Management Project and in the Punjab Cities Governance Improvement Project.

Once triggered, the contingent funds can be mobilized following procedures based on World Bank's Policies on Rapid Response to Crises and Emergencies, which minimize upfront processing steps and the fiduciary and safeguard requirements.<sup>42</sup>

### **The CRW is a specific IDA funding window for concessional assistance for post-disaster recovery and reconstruction, which is additional to country allocations.**

Piloted in 2009 through IDA 15 and institutionalized in 2011 through IDA 16, the window was first triggered in response to the Horn of Africa Drought in 2011. To alleviate the impacts of the drought, an additional IDA allocation of \$250 million was pooled with other resources to support three new projects and provide additional financing to seven ongoing projects as part of the World Bank's \$1.88 billion Horn of Africa Drought Response Plan. In Ethiopia, for example, the Productive Safety Net Project disbursed \$107 million to support 6.8 million food-insecure people.

### **The World Bank has helped establish a number of national and regional catastrophe risk insurance programs to help transfer disaster risk from the government to the financial market.**

The World Bank provides advisory services to countries on disaster risk financing and insurance to increase their financial resilience to natural disasters. It assisted Romania and Turkey in establishing national catastrophe risk insurance pools to protect homeowners against natural disasters; it helped Mongolia create a livestock insurance pool to protect herders against harsh winters; and it has helped the Indian government move towards market-based crop insurance. The World Bank Treasury and Finance and Private Sector Development (FPD) Department are working closely with International Finance Corporation (IFC) to develop agri- and micro-insurance products as well as innovative solutions like the Indonesia earthquake index insurance mechanism to help increase the resilience of financial institutions to facilitate faster recovery following a severe seismic event. Regional initiatives<sup>43</sup> also contribute to the development of market-based catastrophe

risk insurance. Countries increasingly ask for advisory services to develop integrated disaster risk financing strategies, based on public-private partnerships, as part of their broader DRM and climate change adaptation agendas.<sup>f</sup>

**To encourage greater use of market-based solutions, the World Bank provides intermediation services for DRM transactions.<sup>g</sup>**

The International Bank for Reconstruction and Development (IBRD) began providing treasury services to the Caribbean Catastrophe Risk Insurance Facility in 2007, intermediating catastrophe swaps. In 2008 IBRD and IDA introduced intermediate weather derivatives, a product Malawi used over the past four years to manage the risk of severe and catastrophic drought. Both initiatives represent the broader options of customized financial solutions to help protect government investments and development resources. To respond to the diversity of demand in this area, it may be necessary to broaden the scope of intermediation services and the type of products offered. In particular, the World Bank is looking to offer CAT Swaps and weather derivatives designed to address the broader risk needs applicable to all natural hazards.

**IFC is emerging as a leader in promoting action on DRM in emerging markets.**

IFC has been actively supporting resilient reconstruction by providing investment and advisory services to the financial sector to benefit a broad range of clients, especially smaller and medium enterprises, in addition to direct financial support to local businesses (Case Study 13). Given the rising trends of disaster impacts, IFC is increasingly shifting to a more proactive ex-ante disaster preparedness strategy for the private sector in disaster prone countries. It is incorporating disaster and climate risk assessments in its investment and advisory projects where disaster resilience in infrastructure can be introduced at the design stage, as in the case of recent investments in China, Timor-Leste and the Philippines.

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<sup>e</sup> Including the Caribbean Catastrophe Risk Insurance Facility, the Pacific Catastrophe Risk Assessment and Financing Initiative, and the South Eastern Europe and the Caucasus Catastrophe Risk Insurance Facility

<sup>f</sup> Also to note is the International Finance Corporation–managed Global Index Insurance Facility, a multi-donor trust fund to support the development of index-based agricultural insurance solutions.

<sup>g</sup> Intermediation services represent a mechanism that helps countries enter into insurance or derivative contracts with IBRD/IDA. In cases where IBRD/IDA have provided intermediation services, IBRD/IDA stand in the middle of the transaction by acting as counterparty to the country on one side of the transaction, and to the market counterparty on the other. This allows the country to access the terms of the desired risk protection using insurance or derivative contracts transacted with IBRD/IDA. A number of countries have indicated that intermediation by IBRD/IDA is valuable to their efforts to cautiously build confidence in and strengthen capacity to use market-based tools.



**The World Bank is using a range of instruments to support climate and disaster resilient development programs.** DPLs are proving to be an important instrument for mainstreaming DRM and climate adaptation into country policies. In Mozambique, one such DPL combines adaptation, mitigation, and DRM and brings together different financial flows for multiple sectors, for example agriculture, coastal zone management or water resource management. In the private sector, adaptation strategies for key sectors will be developed. In Mexico, a climate change DPL series promotes state- and municipal-level climate change and DRM action planning, alongside land development and community-level sustainable forest management. Globally, the World Bank has produced integrated country climate adaptation and disaster risk profiles that synthesize the data and information on climate and disaster risks.

#### CASE STUDY 13. **IFC ENGAGEMENTS IN DISASTER AND CLIMATE RISK MANAGEMENT**

- After the Wenchuan Earthquake of 2008, IFC provided \$1.7 billion in investment and advisory services to local banks and microfinance institutions to support local businesses.
- Following the Thailand floods of 2011, IFC provided \$100 million to local banks as part of the World Bank Group flood response strategy. Another \$200 million is under approval.
- IFC supported over 4,000 micro and small businesses ranging from food processing to tourism after the earthquake and tsunami that affected Indonesia and Samoa in 2009.
- In Bangladesh, IFC is piloting advisory services to improve the supply chain sustainability of its agribusiness clients through introducing more resilient seed varieties.

### **Random Hacks of Kindness**

The World Bank supports “volunteer technical communities” to apply their technological skills to some of the challenges raised by DRM practitioners. Launched in 2010, the Random Hacks of Kindness—a partnership that includes the World Bank, Google, Microsoft, Yahoo!, National Aeronautics and Space Administration, and Hewlett-Packard—brings together 150 government, private sector, and civil society partners to find technological solutions to support response in crisis and emergencies. The initiative has since branched out to other sectors.

### **Learning from Mega-disasters: a knowledge-sharing project**

A major knowledge partnership between the World Bank and the Government of Japan—the Learning from Disasters project—is collating and analyzing research and evaluations conducted by academic institutions, nongovernmental organizations, government agencies, and the private sector. The objective is to share Japan’s knowledge on DRM and post-disaster reconstruction with other countries.

## **Innovation and knowledge partnerships in DRM**

### **2011 World Reconstruction Conference**

The World Bank, GFDRR, UNISDR, and others organized the World Reconstruction Conference: the first large-scale global conference focused on disaster recovery and reconstruction. The conference brought together over 2,500 political leaders, experts, policy makers, and practitioners, from government, international organizations, CSOs, academia, and the private sector from both developing and developed countries to outline an international disaster recovery and reconstruction framework.

### **Indonesia Scenario for Emergencies (InaSAFE)**

InaSAFE is a free and open source software developed in partnership with the Indonesian Disaster Management Agency, the Australia-Indonesia Facility for Disaster Reduction, and the World Bank that produces natural hazard impact scenarios for better planning, preparedness, and response activities. InaSAFE provides a simple yet rigorous way to combine data from scientists, local governments, and communities to assess likely effects of future disaster events. The tool was piloted by the city of Jakarta for emergency planning during the 2012 flood season.

### **Probabilistic Risk Assessment (CAPRA)**

An open-source platform available to apply probabilistic techniques to the analysis of multiple hazard models is the World Bank-supported the Probabilistic Risk Assessment Initiative, or CAPRA. Developed originally to increase understanding of risks in Central America, CAPRA is a GIS-based platform that can combine multi-hazard information with exposure and vulnerability data, allowing the user to visualize, quantify and track sources of risk resulting from a range of hazards.

### **Understanding Risk Forum**

Every two years, the World Bank convenes the Understanding Risk Forum, one of the main gatherings of experts working on disaster risk assessment. Held in Cape Town, the 2012 forum brought together government officials, insurance experts, engineering firms, risk modelers, space agencies, and nongovernmental organizations from 86 countries.

## EXTENDING KNOWLEDGE AND BUILDING PARTNERSHIPS

**The World Bank is building internal expertise to respond to client demand for DRM.** Dedicated regional teams are on the frontline of operational support to clients and mainstreaming across sectors. In addition, a Global Expert Team on DRM draws from experts in departments throughout the World Bank to deliver on-demand knowledge services to clients. From this roster, experts can rapidly deploy to support country needs. For example, experts are currently working with the Government of Vietnam to reduce the impact of disasters on the main transport corridor running through the country, which is highly prone to flooding.

**The World Bank continues to deliver resources and knowledge to the development community and national governments.** The World Bank has developed a wide variety of knowledge products to support its operation and technical advice. These include the *Safer Homes, Stronger Communities: A Handbook for Reconstructing after Disasters*,<sup>43</sup> *Natural Hazards, UnNatural Disasters: The Economics of Effective Prevention*,<sup>44</sup> *Populations at Risk of Disaster: A Resettlement Guide*,<sup>45</sup> *Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century*,<sup>46</sup> and many others. This global knowledge has also been adapted to local circumstances in many cases.

**Building on its Access to Information program launched in 2010, the World Bank established the Open Data for Resilience Initiative (Open DRI).** Open DRI partners with governments, international organizations, and civil society groups to develop open systems for creating, sharing, and using disaster risk and climate change information. OpenDRI seeks to develop and implement innovative approaches to transparency, accountability and works to ensure that a wide range of actors can participate in the challenge of building resilience. The initiative emerges from and complements a number of innovations linked to DRM that demonstrate the World Bank's thought-leadership and expertise in the field (Figure 5).

**In partnership with the United Nations and the European Commission, the World Bank has been supporting disaster-hit countries to carry out PDNAs.** These country led assessments provide a coordinated platform for building immediate and longer-term disaster resilience. An assessment estimates damages, economic losses, human impacts, and forward-looking needs resulting from a disaster. It also provides a coordinated and credible basis for recovery and reconstruction planning that incorporates risk-reduction measures and financing plans. This serves as a basis for the government to reorient resources towards recovery, and for development partners to direct their external assistance. The *Joint Declaration on Post-Crises Assessments and Recovery Planning* of 2008 to improve the coordination of support offered to governments affected by disasters was a crucial step in this direction.

# 6 THE WAY FORWARD

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## Priorities and Opportunities for the World Bank

There is a clear need to deepen efforts in disaster and climate resilient development. An increased focus on DRM can save lives and livelihoods, and support poverty reduction, by increasing the resilience of communities. It can also help protect economic growth, for example by making new roads, hospitals, and schools last. It is also a good place to start when planning for the impacts of climate change. Growing demand from countries and the possibilities afforded by new tools and techniques to better understand and manage risk provide a unique opportunity to support developing countries in their path towards a more sustainable and prosperous future.

**To deepen efforts in disaster and climate resilient development, the World Bank will:**

*Enhance the understanding of disaster risk as a first step to informing effective policy and investment decisions.*

The World Bank will support countries in the development and use of risk information, by developing country and sector risk profiles, building capacity in disaster risk assessment, and using spatial and structural risk analyses to inform investment planning. This could build upon the climate risk screening process identified as a priority in IDA 16, and be expanded to comprehensively consider disaster and climate risk assessments. The World Bank will increase its efforts to integrate disaster and climate risk analysis into CASs, Operational Risk Assessment Frameworks, analytical work, sector planning, and project design. Given observed and forecasted patterns of increasingly concentrated disaster risk in urban areas, the World Bank will place a particular focus on the management of disaster risks in cities through urban development projects. The Urban Risk Assessment tool can be promoted to ensure that options to reduce disaster risks can be assessed and appraised during project design and implementation.

*Scale up technical assistance and financial support for building resilience to disasters and climate change in vulnerable countries.*

High-risk developing countries often lack the resources to invest in long-term risk reduction activities. They also lack the incentives to do so since the benefits of risk reduction become more apparent only after major disasters. The World Bank will strive to increase comprehensive action through technical assistance and targeted financing across the five elements of the DRM framework (Figure 2). The World Bank will also seek to trigger the CRW for recovery financing in the aftermath of exceptionally severe natural disasters. CRW resources would be provided under the presumption that a portion of these resources should be used to strengthen disaster resilience. The World Bank will also seek to mobilize donor resources to further mainstream DRM in development policy and investment programs.

*Increase attention to disaster resilience at the local level.*

At the sub-national and city level, financing and technical capacity can be scarce. The World Bank will work with groups like the C40 Cities Climate Leadership Group to develop better access to financing and expertise, whether via the World Bank or through market-based mechanisms. In addition the World Bank will further

support social protection systems at the community level, investing in women and building social capital in communities to build resilience. The World Bank will ensure that DRM and reconstruction efforts are pro-poor and gender inclusive, through entry points including risk assessment, data generation and risk communication.

### *Further align the DRM and climate adaptation agendas.*

The World Bank recognizes that DRM and adaptation to climate extremes are intricately linked. The World Bank will better align funding sources for these two areas, particularly in technical assistance work to help lay the analytical groundwork for strengthening the design of climate smart investment operations that encourage anticipatory adaptation to long-term climate change threats. This could include projects to be funded by the CIFs. Through its Open DRI initiative and Climate Change Knowledge Portal, the World Bank will develop an integrated tool that will enhance access to integrated data and advice on managing climate and disaster risks.

### *Increase support for the design and implementation of financial protection strategies.*

Countries have a variety of financial protection options when facing disaster risk, from reserve funds to contingent lines of credit, and to private insurance markets. To help countries prepare financially for the next disaster, the World Bank will increase its advisory services to develop financial exposure profiles, helping the design of risk financing strategies and sustainable domestic catastrophe risk insurance markets.

### *Promote the use of contingent components within its projects, including the IRM.*

The World Bank will explore how contingent financing instruments similar to CAT-DDOs can be offered by linking up to other instruments, such as IBRD or market mechanisms. It will also explore how market mechanisms could be combined with CAT-DDOs, to top up contingent credit lines. The World Bank will also explore how other IBRD products could support DRM, for example by linking up to the new 'Programming for Results' lending instrument to combine risk mitigation with contingent financing.

### *Expand the use of market-based solutions and broaden the scope of intermediation services.*

In particular, the World Bank is looking to offer CAT Swaps and weather derivatives, to member countries, designed to address the broader risk needs applicable to all natural hazards. The World Bank will also explore coordination with industry leaders, to apply risk assessment technologies and innovative financial instruments available in more mature markets to un-hedged risks in developing countries with low market penetration. IFC will put greater emphasis on climate and weather-related risks in its risk assessments, particularly in the infrastructure and agribusiness sectors, and will work with the Bank to develop local capital markets for effective intermediation of risk and support the expansion of insurance products. The Multilateral Investment Guarantee Agency (MIGA) is willing to support eligible private sector components of DRM projects, before and after disasters.

### *Enhance support to countries for accelerated recovery planning.*

International assistance to support developing countries in disaster recovery and reconstruction can help governments to mainstream DRM in development policy and programs. The World Bank will continue to support PDNAs in disaster-affected countries and strengthen the Quick Response Team<sup>i</sup> and the Standby Recovery Financing Facility (SRFF),<sup>j</sup> which provides immediate technical assistance for accelerated recovery planning to requesting governments.

### *Promote further convergence of donor efforts to support disaster resilience.*

In light of the crosscutting nature of DRM, strong donor coordination and effective aid reporting are essential. The World Bank will strive to work with its international partners—including UN agencies, multilateral development banks, the Organization for Economic Cooperation and Development–Development Assistance Committee (OECD-DAC), bilateral donors, private foundations, and CSOs—to harmonize the reporting of DRM-related financing and track progress and impact. It will also strengthen its support to GFDRR as a global partnership and multi-donor financing mechanism that facilitates donor coordination for DRM mainstreaming. The Disaster Aid Tracking initiative, developed by GFDRR in partnership with UNISDR, OECD-DAC and the non-profit organization Development Gateway, will provide the analytical tools and analysis to demonstrate needs and assess gaps in financing disaster risk management in current development and humanitarian assistance.

### *Extend knowledge and partnerships to support DRM policies and programs.*

The World Bank will develop and host an open-knowledge platform to create and support a global community of practice, building on GFDRR's global partnership, the Understanding Risk Forum and international climate change knowledge platforms. This platform will bring together multi-stakeholder experts from around the world, connecting regional centers of excellence and virtual knowledge hubs, to extend evidence-based DRM knowledge and share good practices. The forthcoming 2014 World Development Report on Risk, Uncertainty and Crisis also offers an opportunity to explore disaster risk and resilience in greater depth.

### *Strengthen internal capacity to better respond to client demand.*

To enhance its internal response capacity the World Bank will increase dedicated resources to the DRM Practice Group and Global Expert Team and work to build internal capacity to deliver services in DRM. In addition, the World Bank will roll out a full training program on key concepts and practices in DRM.

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<sup>i</sup> The Quick Response Team is a roster of experts from throughout the World Bank, international organizations and national governments.

<sup>j</sup> The Standby Recovery Financing Facility (SRFF) is a multi-donor trust fund, housed in GFDRR for demand-driven ex-post assistance to disaster-hit countries.



## **GLOSSARY AND REFERENCES**

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# GLOSSARY OF KEY TERMS

(All definitions are from the IPCC Glossary,<sup>47</sup> except those with specific references.)

## **Adaptation**

In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

## **Capacity**

The combination of all the strengths, attributes, and resources available to an individual, community, society, or organization, which can be used to achieve established goals.

## **Climate change**

A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

## **Climate extreme (extreme weather or climate event)**

The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as 'climate extremes.'

## **Damage**

Total or partial destruction of physical assets existing in the affected area. Damage occurs during and after the disaster and is measured in physical units (i.e. square meters of housing, kilometers of roads, etcetera). Its monetary value is expressed in terms of replacement costs according to prices prevailing just before the event.

## **Disaster**

Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

**Disaster risk**

The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

**Disaster risk management**

Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.

**Early warning system**

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

**Exposure**

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

**Hazard**

The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources.

**Mitigation (of disaster risk and disaster)**

The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability.

**Natural hazard**

The potential occurrence of a natural physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources.

**Preparedness**

The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions.

**Risk transfer**

The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise, or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

**Risk assessment**

A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm. exposed people, property, services, livelihoods and the environment on which they depend.

## NOTES

- <sup>1</sup> Munich Re, 2012
- <sup>2</sup> Munich Re, 2012
- <sup>3</sup> World Bank and UN, 2010
- <sup>4</sup> Munich Re, 2012
- <sup>5</sup> World Bank and Government of Japan, 2012
- <sup>6</sup> IPCC, 2012
- <sup>7</sup> Campos et al, 2012
- <sup>8</sup> 1.09 million of a total 2.28 million deaths. (Munich Re, 2012)
- <sup>9</sup> Oxford Economics, 2010
- <sup>10</sup> Mitchell, Mechler, and Harris, 2012
- <sup>11</sup> World Bank and Government of Japan, 2012
- <sup>12</sup> Arnold and Burton, 2010
- <sup>13</sup> World Bank, 2011c
- <sup>14</sup> World Bank and Government of Japan, 2012
- <sup>15</sup> World Bank, 2011a
- <sup>16</sup> Mitchell, Mechler, and Harris, 2012
- <sup>17</sup> All data from Munich Re, 2012
- <sup>18</sup> IPCC, 2012
- <sup>19</sup> IPCC, 2012: 7
- <sup>20</sup> UNISDR, 2011
- <sup>21</sup> <http://www.unisdr.org/we/inform/terminology>
- <sup>22</sup> In the Glossary of the IPCC 4th Assessment Report Climate Change 2007: [http://www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/annexessglossary-rz.html](http://www.ipcc.ch/publications_and_data/ar4/syr/en/annexessglossary-rz.html)
- <sup>23</sup> DFID, 2011
- <sup>24</sup> World Bank and Government of Japan, 2012
- <sup>25</sup> World Bank and Government of Japan, 2012
- <sup>26</sup> World Bank, 2012
- <sup>27</sup> Ghesquiere and Mahul, 2010
- <sup>28</sup> Benson and Clay, 2004
- <sup>29</sup> World Bank and Government of Japan, 2012
- <sup>30</sup> World Bank, 2012b
- <sup>31</sup> World Bank and Government of Japan, 2012
- <sup>32</sup> [gfdr.aiddata.org](http://gfdr.aiddata.org)
- <sup>33</sup> [www.unisdr.org/we/coordinate/hfa](http://www.unisdr.org/we/coordinate/hfa).
- <sup>34</sup> IEG, 2006
- <sup>35</sup> IEG, 2006
- <sup>36</sup> GFDRR Disasters Portfolio Database (data as of June 30, 2012). The database includes all projects with any activity related to disasters, though it excludes many activities that have a non disaster-related purpose but that may also help to reduce the impact of disaster. The methodology used to track investments since 2006 follows that of the IEG report to ensure consistency and comparability.

- <sup>37</sup> GFDRR, 2011
- <sup>38</sup> World Bank, 2011c
- <sup>39</sup> World Bank, 2009
- <sup>40</sup> World Bank, 2012 - 2022
- <sup>41</sup> Ghesquiere and Mahul, 2010.
- <sup>42</sup> World Bank Project Appraisal Documents; World Bank, 2011c
- <sup>43</sup> Jha et al, 2010
- <sup>44</sup> World Bank and UN, 2010
- <sup>45</sup> Correa et al, 2011
- <sup>46</sup> Jha, Bloch, and Lamond, 2012.
- <sup>47</sup> IPCC, 2012

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