



INTERIM POLICY NOTE

UNLOCKING THE 'TRIPLE DIVIDEND' OF RESILIENCE

Why investing in disaster risk management pays off



GFDRR
Global Facility for Disaster Reduction and Recovery



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Introduction

The risk of a disaster can cause economic losses even before a disaster strikes. Investing in disaster resilience, therefore, can yield a ‘triple dividend’ by (1) avoiding losses when disasters strike; (2) unlocking development potential by stimulating innovation and bolstering economic activity in a context of reduced disaster-related background risk for investment; and (3) through the synergies of the social, environment and economic co-benefits of disaster risk management investments *even if a disaster does not happen for many years.*

The devastating effects of disasters are experienced regularly and are widely documented: Lives are lost, economies suffer, essential infrastructure is destroyed, firms lose assets and markets, households become trapped in poverty, and their welfare is severely reduced with effects on education, health and income.

These losses devastate communities and nations in the short term, and impede development potential in the long run. However, strong evidence also suggests that the mere possibility of a future disaster has real impacts on present-day decisions and economic growth. Excessively risk-averse households and firms avoid long-term investments in productive assets, entrepreneurship is restricted, planning horizons are shortened – and development opportunities are lost.

Despite widespread awareness of these rising losses, investment in ex-ante Disaster Risk Management (DRM) remain low. Part of the reason for this lies in the way in which decisions are made about DRM investment. Short political mandates induce policymakers to take a gamble and put off investments to build resilience. As with investment in voluntary insurance, resilience is perceived as a ‘sunk’ cost if disaster does not strike.

However this perception is flawed. Even if a disaster does not occur for a long time, investing in DRM yields real benefits in both the short and long term. Reducing disaster-related ‘background risk’ enables forward-looking planning, long-term capital investments, and entrepreneurship. In addition, and regardless of whether a disaster hits or not, DRM investments generate co-benefits as a result of the ‘spill-over’ of social, economic and environmental benefits arising from DRM investments themselves. These benefits are in addition to the avoided loss and damage, when a disaster strikes. **Put simply, not investing in DRM is a missed opportunity for social, economic and environmental progress.**

The post-2015 Hyogo Framework for Action provides a platform for national governments to make joint commitments to reduce risk, underpinned by a targeted commitment to invest, especially at a local level. The DRM community now needs to scale up efforts to communicate the many incentives for investment in DRM and the integration of risk concerns into development. Highlighting the triple dividend of resilience can help play a central role in the process.

Glossary of key terms

Avoided losses
[1st Dividend of Resilience]

The immediate and long-run losses and damages that disaster risk reduction measures can prevent in the event of a disaster.

Background risk

The possibility of an extreme event (e.g. a disaster) that threatens the prospects of ongoing economic activity. The presence of background risk restricts long-term investments and economic growth, even before a disaster occurs.

Co-benefits
[3rd Dividend of Resilience]

Co-benefits of disaster risk management are any benefits that accrue in addition to the primary DRM objectives of avoiding losses and boosting development. Co-benefits can include economic, social and environmental aspects, and be non-DRM specific.

Development dividend
[2nd Dividend of Resilience]

The development potential that is unlocked when background risk is reduced through DRM measures. This includes innovation, entrepreneurship, and investments, and is independent of the occurrence of any actual disaster.

Disaster Risk Management (DRM)

The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.¹

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, including through the preservation and restoration of its essential basic structures and functions.²

Risk

The combination of the probability of an event and its negative consequences.³

1. To invest in DRM and resilience is to secure growth and development

1.1. Disasters and poverty

Building resilience reduces the loss and damage caused by disasters

The increasing frequency of devastating disasters is a major obstacle to the reduction of poverty and the promotion of shared prosperity. Their adverse effects have been widely documented in empirical research and are witnessed on an all too regular basis. What is particularly alarming is that low-income developing countries are hit the hardest, bearing the brunt of disasters in terms of fatalities and relative economic losses.⁴ It is the poorest people within these countries that are the most vulnerable of all. This is not only the result of the immediate losses caused by a disaster, which often exceed their entire savings, but also because of the long-term negative consequences for their income and welfare.⁵ Damages to productive assets, health and education in particular, can perpetuate poverty in the long run, sometimes even across generations.^{6, 7, 8}

The poverty impacts of disasters at the micro level often threaten socioeconomic stability at the macro level, and erase previous gains and future prospects for economic development and poverty reduction.⁹ Macro-level impacts reflect the losses incurred by households, the private sector and the state: the destruction or loss of assets, productive capital and infrastructure can have a negative toll on employment, economic activity and growth for many years after the event.

One increasing concern is the growing devastation from disasters linked to climate change, which is affecting the frequency, intensity, spatial extent, duration, and timing of extreme climatic events.¹⁰ The total number of disaster events has been increasing since the 1980s, with most of this growth stemming from the higher numbers of climate-related events (Figure 1).¹¹ This presents a particular challenge for poverty alleviation and economic development as a high frequency of both large scale and small-scale local disasters (e.g. because of changing precipitation patterns) reduces the time and resources available for post-disaster recovery.¹²

Figure 1: The number of disasters is growing, with a growing proportion of climate related events¹³

Trends in types of disaster event, 1980–2011



But losses also occur before a disaster

The knowledge of the existing risk of a disaster, an understanding of one's own vulnerability, exposure and hazard, and the experience of disasters in the past – all of these factors affect the decisions made by households, governments and firms, *even before a disaster strikes*. There is strong evidence that the mere possibility of a future disaster has real impacts on present-day economic growth, particularly in regions or localities where disaster risks are perceived to be high.¹⁴

Households fear that today's investments in tomorrow's well-being could be wiped out by a disaster.^{15,16} As a result, they refrain from engaging in entrepreneurial activities or investing in potentially revenue-generating assets, and they minimise their savings. The same applies in the private sector, as firms shy away from planning and investing for the long term. As a result of this **background risk of a disaster**, risk aversion rises, higher-risk and higher-return investments are prevented, innovation is stifled, jobs remain uncreated and development opportunities are lost^{17,18,19} (World Bank, 2013; Gollier and Schlee, 2006; Hallegatte et al., 2014). Many of the risks eventually end up – willingly or unwillingly – with governments, and the anticipation of 'hidden fiscal deficits' also affects future investment decisions, which are, in general, financed by new debt (Schick and Polackova Brixi, 2004). This could be seen, for example, in New Orleans following Hurricane Katrina, where authorities underestimated the impact of background risk on the private sector. As a consequence, large firms have moved away to locations that offer safer operating environments, thereby adding to New Orleans' economic difficulties (McCulley, 2007).

This policy note argues that investments in Disaster Risk Management (DRM) can reduce these 'pre-disaster' losses and unlock significant development potential in vulnerable areas by generating a dividend even if no disasters strike for a long time. As well as reducing background disaster risks to stimulate economic activity, the DRM actions themselves may generate social, economic and environmental co-benefits that aren't factored into today's decision-making on whether to invest in DRM.

1.2. Investments in DRM: the status quo

The gap in resilience and DRM investments

The basic rationale and common narrative for DRM is associated with saving lives, reducing losses and promoting effective recovery from disasters. This is usually achieved by implementing risk management measures, including early warning systems, vulnerability and risk assessments, protective infrastructure, education, land use policies and building codes. Although some countries, cities and communities have made significant progress, the importance of such ex-ante prevention is not yet reflected in the majority of policy and practice by governments, aid agencies, communities or businesses (World Bank and United Nations, 2010). International DRM financing over the past 20 years has been highly volatile and has totalled less than 0.4% of overall aid, with most resources flowing to a relatively small number of middle-income countries.²⁰ Meanwhile, global economic disaster losses since 1980 have grown from 0.116% to around 0.22% of gross world product, with losses exceeding \$100 billion annually for the period from 2010 to 2012.^{21,22}

While it is hard to define an optimal level of DRM action, it is clear that **a significant DRM investment gap persists**, with expenditures on prevention almost always lower than those on disaster response, and on average \$7 spent on relief versus \$1 spent on risk reduction.²³

There are many reasons for this underinvestment in disaster resilience: a lack of resources in poor countries, political myopia, a limited understanding of risks and impacts, greater political buy-in for more visible post-disaster support initiatives, and the ready availability of international post-disaster assistance.^{24, 25, 26, 27} The competition for public resources is particularly evident in the aftermath of financial crises, with more immediate employment and wealth creation being the overarching drivers of public policy. Here, DRM may be seen as detrimental to growth and development – for example through the rejection of planning applications in coastal zones. However, one critical issue for Ministries of Finance is the way in which investments in DRM are decided and evaluated.

Incomplete cost-benefit analyses result in insufficient investments in DRM

A traditional cost-benefit analysis (CBA), the standard public-sector economic appraisal tool, weighs up the cost of investment against the benefit of avoided losses (which only materialise in the case of a disaster). Over the years, appraisals of public investment decisions to support risk management using CBA and other appraisal tools have improved their scope and methodologies. Assessments have tackled, among other issues, the complexities associated with the probabilistic estimation of risk, monetising indirect risks and benefits, the role of discounting, and considering portfolios of options rather than single solutions. Nevertheless, some challenges remain, including the consideration of intangibles (loss of life, amenity and cultural values and risks, risks to ecosystems, etc.) and the role of systemic interventions into sectors such as education and health that build resilience.²⁸

Crucially however, the cost of DRM tends to dominate decisions because they are more immediate, concentrated, and observable, while the benefits are longer term, distributed more broadly and often less visible.²⁹ Undoubtedly, investment does have costs, and these in turn have trade-offs: for example the higher building costs for more resilient infrastructure, and restrictions on land-use that may slow potential short-term economic growth. In general, those affected by the costs of such changes are better at mobilising opposition than the more dispersed populations who may benefit, including future generations.

Decision makers may, therefore, **overlook the benefits of reducing background risk and generating co-benefits** and, therefore, miss a significant part of the story. This approach leads to the perception that investments in DRM are ‘sunk’ costs if disaster does not strike. However, DRM is not simply an insurance measure, undertaken in parallel to development policy. Rather, investments in DRM can make an integral contribution to development, poverty alleviation, fiscal stability and economic growth. This briefing aims to redress the balance by examining the benefits of investing in DRM, adding to its already crucial role in saving lives and avoiding losses by including the development dividend of reducing background risk and the co-benefits generated by building resilience.

2. Why investing in DRM pays off, even before a disaster strikes

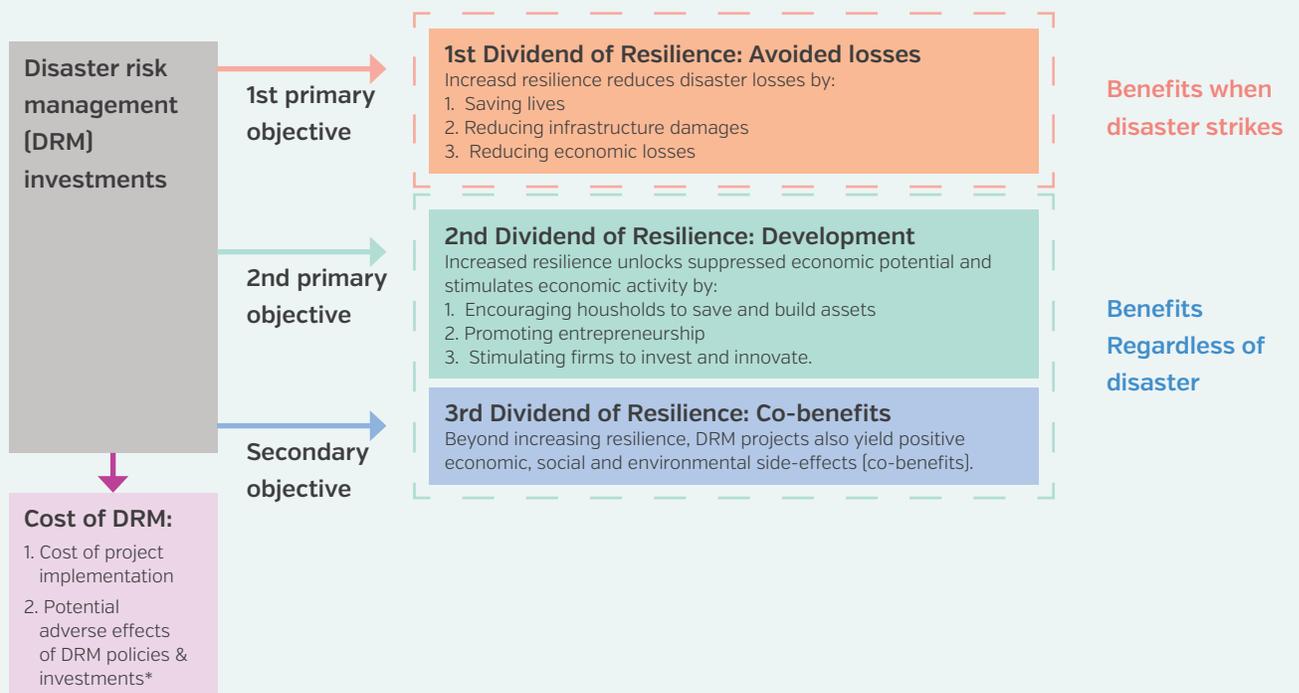
Disasters do not only cause devastation in their aftermath; **the risk of a disaster can also cause economic inefficiency and losses even before disaster strikes.** While the benefits of avoiding losses and damages have been widely studied and documented, there has been far less focus on the ways that investments in DRM can yield a real dividend, even in the absence of a disaster.^{30, 31, 32}

Figure 2 highlights the triple dividend of investments in disaster risk management: reducing losses and damages in the event of a disaster is often the key motivating factor for disaster risk management (1st Dividend of Resilience).

However, even if the anticipated disaster does not occur for a long time, increased resilience means that background risk is reduced and economic development potential unlocked (2nd Dividend of Resilience). In addition to these primary objectives of DRM, investments in resilience may yield further social, economic and environmental co-benefits (3rd Dividend of Resilience). In the medium- to long-run, these benefits can trigger a wide range of benefits across society, income groups, geographic regions, government entities, industries, and supply chains.

Figure 2: The Triple Dividend of Resilience

Investing in resilience reduces losses and damages in the case of a disaster. However, it can also yield development benefits regardless of disasters. Typically, standard disaster risk management investment appraisals fail to account for the 2nd and 3rd Dividends of Resilience.



*e.g. Rising land prices due to land use restrictions may harm poor

2.1. Investing in DRM: avoiding loss and enabling shared prosperity and growth

Safeguard development gains by limiting losses

DRM actions are necessary first and foremost to reduce the loss and damage caused by disaster events to society, the economy and the environment. Economic damage to property is compounded by damage to the flow of inputs, goods and services. In many disasters, including Hurricane Katrina in the USA, the losses as a result of business interruption have exceeded the losses caused by damage to property. Reducing the incidence of death and disease are the prominent social objectives, while there is a growing recognition of psychological impacts and damage to community cohesion and security. Disaster events also create environmental degradation that can reduce the ability of ecosystems to provide services vital for human needs, such as reliable and clean water supplies.

The impacts of disasters, as they have done in the past, will continue to hamper and even reverse economic growth in weaker economies and challenge our ability to tackle extreme poverty and share prosperity. Taking action to manage disaster risks will, therefore, be a crucial part of safeguarding past and future progress in human and economic development in the coming decades. Reducing losses remains a fundamental part of this goal, but it is only part of the picture. DRM actions can also create other investment benefits and stimulate growth and development through reducing background risk.

Unlock growth potential by reducing the burden of background risk

High and increasing disaster-related background risk makes individuals less willing to take positive risks (e.g. innovation, entrepreneurship) and provides adverse incentives to investors.^{33, 34, 35} Empirical evidence from Indonesia, Nicaragua, Peru, Ethiopia, Pakistan and various other countries

shows that individuals who have experienced a disaster in the past perceive this background risk to be substantially higher than those who have not (Cameron and Shah, 2013; van den Berg et al., 2009; Dang, 2012). As a result of their high aversion to risks that are not managed effectively, they forego opportunities, such as potentially profitable investments in productive capital, impeding the potential for increasing welfare and development.^{36, 37} If natural background risks are seen to be reduced through ex-ante DRM measures, households and firms are more likely to **take higher-risk and higher-return investment decisions**, which have been shown to be essential for driving economic growth.^{38, 39, 40, 41} Crucially, such higher-risk higher-return activities include **entrepreneurship and innovation**, which in turn can trigger further socioeconomic benefits.^{42, 43, 44}

There is strong evidence in developing countries that households and businesses evaluate the trade-offs between risk and returns according to their ability to cope with potential adverse shocks, such as heavy rainfall or other extreme events.^{45, 46, 47} Low-income households, in particular, are driven to choose low-risk activities, which yield low returns and perpetuate poverty.^{48, 49, 50} There is tentative evidence that investors factor background risk into their financial decisions, and rating agencies are starting to consider the role of disaster risk for their country and credit ratings. Disaster-prone cities with a global outreach, such as New York, Rotterdam and Singapore, use their achievements on disaster and climate resilience to attract investment.⁵¹

Investing in DRM can **unlock productive potential** and trigger investments in income generating and growth-promoting activities. These broader benefits of reduced background risk are exemplified in Tabasco State in Mexico (Box 1), where the reported benefits of flood protection measures suggest that they have generated development dividends beyond just the avoided disaster losses on which the investment was based.

Reducing background risk benefits the labour market

Taking positive risks, engaging in entrepreneurial activities, investing in productive assets and innovation – these activities are the drivers of **job creation**, rising incomes, greater productivity, and overall growth.^{53, 54, 55, 56} However, investing in resilience not only adds new jobs, but also **addresses pre-existing labour market inefficiencies**, which are caused by the presence of natural background risks.

In Bangladesh, for example, vulnerable households choose occupations that do not necessarily match their skills sets, but that help to mitigate natural risk.⁵⁷ Rather than focussing fully on agriculture, low-income households hold several parallel occupations as back-ups for the event of flooding. Such diversification of occupations within a household is used as an ex-ante risk management strategy in the face of local rainfall variability risks (droughts and floods).^{58, 59, 60, 61} At the same time, this occupational diversification means that households are not as productive as they would have been if they had specialised. Reducing background risk should be central to DRM investment to build resilience and mitigate such sub-optimal labour market outcomes, thereby increasing job creation, incomes and the welfare of poor people.

Benefits extend to industries, their supply chains and the entire economy

Reducing the burden of background risk by increasing resilience generates benefits that extend across sectors to the macroeconomic level. A region- or country-wide boost to entrepreneurship, innovation and productive investments can **benefit the overall development of a country**. Protecting coastal regions, towns, business districts, or ports with flood protection (e.g. dikes), can foster **economic activity, long term planning and capital investments**.⁶²

This is because large DRM infrastructure investment (such as dikes) protects not only large firms, but also their workers, suppliers and social and logistic infrastructure. If firms and their stakeholders, as a result, are able to make long-term capital investments, engage in trade and promote business development, the entire area benefits collectively. In fact, by fostering business growth, firms can send **positive effects up their supply chains**, benefiting other firms and their regions.⁶³

Box 1: Resilience dividends of flood risk management in Tabasco State, Mexico

A study of flood defence investment in the Mexican state of Tabasco found a benefit-cost ratio of 3:1, contributing to avoided damages and losses when floods occurred in 2010 equivalent to \$3 billion, or 7% of the GDP of Tabasco [or four times Tabasco's Public Works budget in 2014].⁵² This figure is compelling, but does not capture the full dividends of the investment at state, city and household level. Qualitative evidence suggests that in reducing background risk in the area, these DRM investments stimulated development dividends that included:

- continued investment by oil companies in the region that were otherwise leaving
- private investment in housing in previously flood-prone areas
- public investment in improved drainage and electricity networks in areas where floods had previously deterred such investment.

The DRM investments have also stimulated co-benefits for society and the environment. The local government has improved parks and street paving in areas that were once neglected because of regular flooding, while tree planting has been initiated on riverbanks to prevent landslides.

Governments, including finance ministries, are able to plan for long term growth

Through improved DRM, governments can better plan for disaster risk and deliver long-term growth. The risks of disaster events are implicit liabilities, since governments are expected to respond to acute community needs. Planning for disaster risk is not an easy proposition, as disaster risk is a *contingent* liability, i.e. costs accrue only in case of an event (so-called fiscal ‘time bombs’). Furthermore, large parts of liabilities are of an implicit, unwritten nature (e.g. disaster relief and recovery assistance to affected households and business) rather than direct liabilities (reconstruction of lost infrastructure and assets).⁶⁴ For example, the massive direct costs from damage and reconstruction in Grenada following Hurricane Ivan in 2004 were compounded by the need for large relief and recovery spending while the fiscal position was affected by a subsequent falls in Central Government revenues from a projected surplus of \$17 million to a deficit of \$54 million, or 4.5% of GDP.⁶⁵

Contingency and fiscal-risk planning have seen good progress over the years, driven to some extent by the ongoing financial and fiscal crisis affecting many states, and there are tools available to assess and manage risks in the fiscal balance sheet systematically. The fiscal risk matrix, for example, helps to identify contingent liabilities, while the fiscal hedge matrix can be used to study options to hedge and reduce risks.⁶⁶ Approaches for fiscal-risk planning organised around the fiscal risk matrix have been successfully applied. As one example, Colombia recently discovered that natural disaster risk constituted the second most important source of contingent liabilities (after legal actions).⁶⁷

Not only do investments in DRM reduce these implicit liabilities, converting contingent liabilities into explicit ones through the fiscal hedge matrix and measures such as insurance, hedge funds, reserve funds or credit lines, helps to stabilise public finance. There has been substantial experience and evidence of applications in disaster-prone countries over the past 10 years.⁶⁸ Specifically, reduced budgetary uncertainty allows governments to focus less on crisis management and more on longer-term issues. At the same time, aligning fiscal risks with fiscal hedging instruments makes a strong contribution to the more systematic assessment of investments into DRM and other priority investment areas.

2.2. Co-benefits of DRM investments to economy, society and the environment

As well as addressing background risks, many ex-ante DRM measures and investments in resilience will **deliver co-benefits that are not dependent on disaster events**. This can be seen as a secondary objective of DRM, but reinforces the fact that resilience investments can achieve multiple objectives. Co-benefits may well be economic, but can also include significant environmental and social benefits, many of which are commonly associated with development investments.⁶⁹

Maximising co-benefits from government investment

Examples of co-benefits include the direct **employment opportunities** delivered by the DRM investment, environmental service co-benefits of tree planting to stabilise slopes, or the provision of reliable water supplies and hydro-electricity from investments in flood protection measures.⁷⁰ A study of community based adaptation measures found that boats for evacuation purposes were used

outside flood events as income-generating fishing vessels, evacuation shelters were used at other times for community meetings or schools, raised water wells provided clean water year-round, and community training for evacuation has resulted in groups that can advocate for themselves on a wider range of issues.^{71,72} In Jamaica, the installation of dedicated irrigation systems to overcome the impact of drought has helped farmers to increase their productivity and output, as well as reducing soil erosion and deforestation by optimising previously inefficient farming practices (Box 2).⁷³

Other co-benefits may be more indirect, where some people and assets experience greater levels of well-being or production as a result of the wider impacts of such investments on the long-term prospects for growth and development in the area. For example, the protection of a business district may help to stimulate the development of wider supply chain activity, while improving the resilience of transport networks for commercial activity may also improve human mobility to access employment.

Social safety nets, which assist low-income households after a disaster, have been proven to deliver far-reaching positive development impacts beyond the initial disaster resilience intent. They can be effective tools for increasing food security, education, and health services:⁷⁴ co-benefits that are distinct from helping the poor manage the background risk of disasters.⁷⁵ Indeed, social safety nets strengthen the social contracts between governments and citizens, and underscore social accountabilities.

Similarly, **community participation** in developing and managing DRM activities such as early warning systems and preparedness planning may also generate significant social benefits. Many local governments have limited resources, so often rely on community knowledge, communications, vehicles, storage facilities and labour. This can strengthen community cohesion, as well as local state-society relations in non-emergency situations – even in the absence of a disaster. DRM measures to build resilience can, therefore, contribute significantly to social welfare and inclusiveness.

Box 2: Resilience dividends of risk management in Jamaican agriculture

The agricultural sector contributes about 6% of GDP in Jamaica and employs 17-18% of the labour force. A number of DRM programs, including the Jamaica Rural Economy and Ecosystems Adapted for Climate Change (JaREEACH), have focused on the domestic agriculture sector, largely located on small hillside plots. Key resilience dividends of such integrated DRM investments include the following.

- DRM irrigation projects that have reduced the impact of droughts, particularly in Southern Clarendon and St. Elizabeth. These farming communities have also benefited from **increased productivity and output** relative to other areas, even in the face of drought over the April-June quarter in 2014.⁷⁶
- A rainwater catchment tank and drip irrigation system in Lititz, St. Elizabeth, has improved small-scale irrigation resulting in **higher yields, less soil erosion and deforestation, and an increase in socioeconomic status**.⁷⁷
- **Loan defaults as a result of severe weather events have been greatly reduced.** While loans were once common among farming communities, farmers who benefited from investments in irrigation systems have been able to produce consistently across rainy and dry seasons.
- Training and shared learning on drip irrigation has **strengthened social capital** and built comradeship within the communities, especially among the farmers in the field.

Where Ministries of Finance and public and private co-investors can ensure that such co-benefits are identified and captured, they are likely to enhance the overall package of returns – direct and indirect – that can be generated by DRM investments. In so doing, they will contribute to the increasing commitment by policy and decision makers to ensuring that development plans and investments are environmental and socially responsible, as well as enhancing the successful financing and implementation of DRM programmes and projects. The identification of these co-benefits can draw on the various environmental and social frameworks established by multilateral institutions – notably the UN and its specialised agencies, and the World Bank Group (Table 1 for an example from the International Finance Corporation (IFC), the private sector arm of the World Bank Group).

Private sector DRM investments can boost profitability

At firm level, there may be clear **saleable bi-products or joint products from DRM-oriented investments**, such as a decision to install solar panels to protect the firm against disruptions from central power stations, where excess solar electricity can be sold back to the grid. Other benefits beyond firm level may be harder to measure or the value of benefits may accrue largely to others, such as the value of company sprinkler systems in protecting neighbouring properties, reducing fire risk in the community. Similarly, there are wider benefits of measures to strengthen the foundations of buildings so that they don't collapse during storms or earthquakes, or better water drainage practices that also reduce flooding beyond the company's assets.

Prudent DRM investments can increase not only the profit margins of firms but also **benefit the entire economy**. Direct benefits stem from the increased capital stock and production of the firm itself (and contributions to a higher GDP). Co-benefits stem from multiplier effects, employment opportunities and tax revenues. In addition, the reduction of uncertainty can have a stimulating effect on both the firm and the overall economy, including by attracting more foreign direct investment. Crucially, these wider benefits may, in turn, improve the market for companies' products and services.

Table 1: Potential environmental and social co-benefits of development investments⁷⁸

| POTENTIAL ENVIRONMENTAL CO-BENEFITS | POTENTIAL SOCIAL CO-BENEFITS |
|---|---|
| Avoided or minimised adverse impacts on human health and the environment by avoiding or minimising pollution | Protection of workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties and workers in the project's supply chain |
| Sustainable use of resources, including energy and water | Safeguarding of personnel and property in accordance with relevant human rights principles and by avoided or minimised risks to the affected communities |
| Reduced project-related greenhouse-gas emissions | Improved or restored livelihoods and standards of living for displaced persons |
| Biodiversity protected and conserved | Improved living conditions for physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites |
| Maintained benefits from ecosystem services | Dual purpose disaster shelters can be used as schools or training centers. |
| Sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities | Equitable sharing of benefits from the use of cultural heritage |

3. What does this mean for finance ministers, policymakers and practitioners?

The agreement and implementation of the post-2015 Hyogo Framework for Action provides a significant opportunity to address the barriers to greater disaster resilience by targeting elements of knowledge, protection, insurance and coping that are fundamental to a holistic risk management approach.⁷⁹ It also provides an opportunity to change incentives and create a new narrative: one that regards upstream investment in disaster resilience as good for growth, good for shared prosperity and good for poverty reduction, irrespective of potential reduced future losses.

Avoiding losses is critical, but considering only avoided losses is not enough. Reducing disaster losses has been, and must continue to be, a key motivator of DRM investments. However, recognising the wider development benefits of DRM adds an additional rationale in favour of investment. Conventional cost-benefit analysis of DRM measures are heavily loss-centric. Weighing up the certain cost of investing in resilience against the uncertain benefit of avoided losses leads decision makers to underestimate the benefits. A comprehensive cost-benefit analysis of DRM investments should calculate the full monetary value of the triple dividend of resilience.⁸⁰

Investing in DRM yields real returns – even in the absence of disasters. Increasing resilience reduces the background risk of disasters. As a consequence, households and firms can be encouraged to become less risk averse, undertake long term investments in productive assets, engage in entrepreneurial activities, and lengthen their planning horizons, all of which are needed for economic development and growth. This is crucial to take advantage of structural changes in the global economy, new market opportunities, and developing new market niches.

Governments can work to leverage private sector action and investments based on the triple dividend of resilience. While many major DRM investments will be made by governments, DRM is increasingly important for the private sector, given growing risks and increasing disaster losses. Businesses own the vast majority of the buildings and a considerable portion of the infrastructure at risk in most countries. In addition to providing goods and services, the private sector attracts foreign investment and foreign exchange, as well as providing tax revenues for government. There are interdependencies within the private sector in relation to supply chains, including through dependence on infrastructure services, a trained workforce and sound institutions. All of these interdependencies add to overall vulnerability to disasters, as damages to one entity are transmitted to others. Conversely, this also means that DRM investments have the potential to ripple throughout the economy, not only in helping to stem losses but also through their co-benefits and spending stimulus. Governments have a strong role to play in developing the enabling environment for businesses to manage risk effectively in line with profit incentives. This may include developing and enforcing regulations that maintain minimum levels of risk management, such as through building codes, but also through ensuring public availability of risk-related information to enable businesses to make informed risk management decisions.

It is important to understand the full costs of disasters against which the full benefits of DRM should be compared. Recent research has shown not only the costs of disasters in terms of asset loss, but also in terms of long-term income and welfare losses. It was once thought that after rebuilding their houses, bridges and factories, communities ‘caught up’ to the level of income that they would

have otherwise achieved. But it is increasingly clear that this is often not the case, and that the long-term effect of disasters has impacts on income growth for years. Therefore, governments can better assess the relationship between costs and benefits of DRM investments when both potential costs (often more negative than previously assumed) and benefits (often more positive than previously assumed) are understood. The evidence base is particularly poor in Latin America, East Asia and West Africa.

Determine where benefits might be most significant. Not all DRM actions will have the same potential for generating wider benefits beyond avoided losses. One key consideration is the likely timespan and legacy of the intervention. Land-use planning decisions or urban development in exposed locations are likely to have far-reaching and long term implications for both risk and resilience dividends. On the other hand, social safety net schemes or preparedness plans may only have planning horizons of a decade or less. Therefore, the costs of implementation need to be assessed about potential resilience dividends over the long term: cheaper actions with short-term horizons may not produce such significant benefits.

Begin to explore and communicate resilience dividend for country, sector or regional contexts. Despite the apparent potential of a resilience dividend approach, it also presents considerable challenges that frustrate the communication of these incentives to businesses, taxpayers, and political supporters. One important step is to expand empirical evidence of background risk reduction and co-benefits, and their value relative to other costs and benefits. The next phase of this report will focus on developing both methodologies for better assessing these benefits as well providing further evidence through additional concrete examples. Another challenge is to understand risk where data are poor or hazards have not previously been experienced. Analysis also needs to give greater attention to the distributional effects of how resilience costs and dividends impact various

groups such as workers, local communities, indigenous peoples, investors and consumers in different ways.

Link DRM investments with development and climate finance mechanisms. 2015 sees two important financing opportunities for building resilience. In July, the Third International Conference on Financing for Development will assess progress and address new and emerging issues. Building resilience into development planning and programming, as well as harnessing private sector finance for resilience can be central components. At the end of the year, a new global climate change agreement will be agreed in Paris. Internationally, climate finance needs to play a key role in building disaster resilience. \$3 billion has cumulatively been pledged to multilateral adaptation funds, with significant investments for incorporating climate risk and resilience measures into national development planning.⁸¹ National governments and other implementing agencies have the opportunity to ensure that DRM is integrated into these development and climate finance mechanisms.

Make the new Hyogo Framework for Action a catalyst for growth and development. The Sendai agreement provides a platform for national governments to make joint commitments to reduce risk, underpinned by a targeted commitment to invest, especially at a local level. Such commitments are likely to include stand-alone financing of DRM, but must also encompass DRM embedded into broader development planning and expenditures. Emphasising the multiple dividends of spending on disaster resilience will help to make the case to national treasuries and political decision makers, who will need to make investments via the integration of risk as part of delivering sustainable development. The implementation of the post-2015 disasters framework will, therefore, rely on the provision of specific tools and guidance on financing for national governments. The DRM community will need to scale up efforts to communicate the many incentives for investing in DRM and integrating risk concerns into development. The triple dividend of resilience can play a central role in the process.

Endnotes

1. UNISDR [2009]; UNISDR Terminology on Disaster Risk Reduction. UNISDR: Geneva.
2. Ibid.
3. Ibid.
4. Hallegatte, S. [2014] 'Economic Resilience: Definition and Measurement.' Policy Research Working Paper 6852. Washington D.C.: The World Bank.
5. Hallegatte, S., Ranger, N., Bhattacharya, S., Bachu, M., Priya, S., Dhore, K., Rafique, F., Mathur, P., Naville, N., Henriot, F., Patwardhan, A., Narayanan, K., Ghosh, S., Karmaket, S., Patnaik, U., Abhayankar, A., Pohit, S., Corfee-Morlot, J., Herweijer, C., [2010] 'Flood Risks, Climate Change Impacts and Adaptation Benefits in Mumbai!' OECD Environment Working Papers. Paris: Organisation for Economic Co-operation and Development.
6. Hallegatte, S., Bangalore, M., Bonzanigo, L., Fay, M., Narloch, U., Rozenberg, J., Vogt-Schilb, A. [2014] 'Climate Change and Poverty: An Analytical Framework.' Policy Research Working Paper 7126, Washington D.C.: The World Bank.
7. Rentschler, J. E. [2013] 'Why Resilience Matters: The Poverty Impacts of Disasters.' Policy Research Working Paper 6699. Washington D.C.: The World Bank.
8. Hsiang, S. M. and Jina, A. S. [2014] 'The Causal Effect of Environmental Catastrophe on Long-Run Economic Growth: Evidence From 6,700 Cyclones.' NBER Working Paper 20352. Cambridge MA: National Bureau of Economic Research.
9. Rentschler, J. E. [2013] Ibid.
10. IPCC [2012] *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge: Cambridge University Press.
11. Kellett, J., Mitchell, T., Lovell, E., Le Masson, V., Peter, K., Wilkinson, E., Kirbyshire, A., Bahadur, A., Carabine, E., Murray, V. [2014] *The future framework for disaster risk reduction. A guide for decision-makers*. London: Climate Development Knowledge Network and Overseas Development Institute.
12. Hallegatte, S., Hourcade J-C., Dumas, P. [2007] 'Why economic dynamics matter in assessing climate change damages: illustration on extreme events.' *Ecological Economics* 62 [2], p.330-340.
13. Kellett, J. and Caravani, A. [2014] *Financing Disaster Risk Reduction: A 20 year story of international aid*. London: Overseas Development Institute.
14. Cameron, L. and Shah, M. [2013] Risk-Taking Behavior in the Wake of Natural Disasters. NBER Working Paper No. 19534. Cambridge MA: National Bureau of Economic Research.
15. Gollier, C. and Pratt, J. W. [1996] 'Risk Vulnerability and the Tempering Effect of Background Risk.' *Econometrica*, 64 [5], pp. 1109-1123.
16. van den Berg, M., Fort, R., Burger, K. [2009] 'Natural Hazards And Risk Aversion: Experimental Evidence From Latin America.' Paper prepared for presentation at the International Association of Agricultural Economists Conference, Beijing, China, 16-22 August, 2009.
17. World Bank [2013] *World Development Report 2014. Risk and Opportunity: Managing Risk for Development*. Washington D.C.: The World Bank.
18. Gollier, C. and Schlee, E. [2006] 'Increased Risk-Bearing with Background Risk.' *Topics in Theoretical Economics*, 6 [1].
19. Hallegatte et al. [2014] Ibid.
20. Kellett, J. and Caravani, A. [2014] Ibid.
21. Shepherd, A., Mitchell, T., Lewis, K., Lenhardt, A., Jones, L., Scott, L., Muir-Wood, R. [2013] *The geography of poverty, disasters and climate extremes in 2030*. London: Overseas Development Institute.
22. UNISDR [2011] *Global Assessment Report on Disaster Risk Reduction 2011: Revealing Risk, Redefining Development*. Geneva: Secretariat to the UN International Strategy for Disaster Reduction.
23. Kellett, J. and Caravani, A. [2014] Ibid.
24. Keefer, P. [2009] 'Disastrous consequences: the political economy of disaster risk reduction.' World Bank Working Paper. Washington D.C.: World Bank.
25. Vorhies, F. [2012] 'The economics of investing in disaster risk reduction.' Working paper based on a review of the current literature commissioned by UNISDR. Geneva: Secretariat to the UN International Strategy for Disaster Reduction.
26. Wilkinson, E. [2012] *Transforming disaster risk management: a political economy approach*. London: Overseas Development Institute.
27. World Bank [2013] Ibid.

28. Mechler, R., Czajkowski, J., Kunreuther, H., Michel-Kerjan, E., Botzen, W., Keating, A., McQuistan, C., Cooper, N. O'Donnell, I. [2014] 'Making Communities More Flood Resilient: The Role of Cost Benefit Analysis and Other Decision-support Tools in Disaster Risk Reduction.' White Paper. Zurich: Zurich Flood Resilience Alliance.
29. World Bank [2013] Ibid.
30. WRI [2008] *Roots of Resilience - Growing the Wealth of the Poor*. Washington D.C.: World Resources Institute.
31. Rodin, J. [2014] *The Resilience Dividend: Being Strong in a World Where Things Go Wrong*. Washington D.C.: Public Affairs.
32. World Bank [2013] Ibid.
33. Gollier, C. and Pratt, J. W. [1996] Ibid.
34. Eeckhoudt, L., Gollier, C., Schlesinger, H. [1996] 'Changes in Background Risk and Risk Taking Behavior.' *Econometrica*, 64 [3], pp. 683-689.
35. Gollier, C. and Schlee, E. [2006] Ibid.
36. Abreha, N. H. [2007] 'An Economic Analysis of Farmers' Risk Attitudes and Farm Households' Responses to Rainfall Risk in Tigray Northern Ethiopia.' PhD Thesis, University of Wageningen.
37. Andrabi, T. and Das, J. [2010] 'In Aid We Trust: Hearts and Minds and the Pakistan Earthquake of 2005.' World Bank Policy Research Working Paper WPS5440. Washington D.C.: World Bank.
38. Romer, P. M. [1990] 'Human capital and growth: Theory and Evidence.' NBER Working Paper No. 3173. Cambridge MA: National Bureau of Economic Research.
39. Grossman, G. and Helpman, E. [1991] *Innovation and Growth in the Global Economy*. Cambridge MA: MIT Press.
40. Aghion, P., Blundell, R., Griffith, R., Howitt, P., Prantl, S. [2004] 'Entry and Productivity Growth: Evidence from Microlevel Panel Data.' *Journal of the European Economic Association*, 2[2-3], pp. 265-276.
41. Cameron, L. and Shah, M. [2013] Ibid.
42. Birch, D. L. [1987] 'Change, innovation, and job generation.' *Journal of Labor Research* 10 [1], 33-38.
43. Wennekers, S. [1999] 'Linking Entrepreneurship and Economic Growth.' *Small Business Economics* 13 [1], pp. 27-56.
44. Reynolds, P.D. [1999] 'Creative Destruction: Source or Symptom of Economic Growth.' In Acs, Z. J., Carlsson, B., and Karlsson, C. (eds) *Entrepreneurship, Small and Medium-sized Firms and the Macroeconomy*. Cambridge. Cambridge University Press.
45. Dercon, S. [1996] 'Risk, crop choice, and savings: Evidence from Tanzania.' *Economic Development and Cultural Change*, 44[3] 485-513.
46. Elbers, C., Gunning, J. W., Kinsey, B. [2007] 'Growth and risk: Methodology and micro evidence.' *The World Bank Economic Review*, 21[1], 1-20.
47. Dercon, S. and Christiaensen, L. [2011] 'Consumption risk, technology adoption and poverty traps: Evidence from Ethiopia.' *Journal of Development Economics* 96[2], 159-173.
48. Mobarak, A. M. and Rosenzweig, M. R. [2013] 'Informal risk sharing, index insurance, and risk taking in developing countries.' *American Economic Review*, 103[3], 375-380.
49. Bandyopadhyay, S., and Skoufias, E. [2013] 'Rainfall Variability, Occupational Choice, and Welfare in Rural Bangladesh.' Policy Research Working Paper Series, No. 6134. Washington D.C.: The World Bank.
50. Hallegatte et al. [2014] Ibid.
51. Hall, J. W., Berkhout, F., Douglas, R. [2014] 'Responding to adaptation emergencies.' *Nature Climate Change* 5: 6-7.
52. World Bank [2014] Análisis de los impactos de las inversiones en prevención y reducción de riesgos: Estudio de caso de Tabasco entre 2007 y 2010.
53. Picot, G., Manser, M. E., Lin, Z. [1998] 'The Role of Self-Employment in Job Creation in Canada and the U.S.' OECD/CERF/CILN International Conference on Self-Employment.
54. Carree, M. A., van Stel, A. J., Wennekers, A. R. M. [2002] 'Economic Development and Business Ownership: An Analysis using Data of 23 OECD Countries in the Period 1976-1996.' *Small Business Economics* 19, 271-290.
55. Aghion, P. and Howitt, P. [1992] 'A Model of Growth through Creative Destruction.' *Econometrica*, 60 [2], pp. 323-351.
56. Baumol, W. J. [2014] 'Stimulating growth amid recession: Entrepreneurship, innovation, and the Keynesian revolution.' *Journal of Policy Modeling* 36, 629-635.

57. Bandyopadhyay, S., and Skoufias, E. [2013] Ibid.
58. Reardon, T., Delgado, C., Malton, P. [1992] 'Determinants and Effects of Income Diversification amongst Farm Households in Burkina Faso.' *Journal of Development Studies*, 28(1), 264–296.
59. Barrett, C. B., Reardon, T., Webb, P. [2001] 'Non-agricultural Income Diversification and Household Livelihood Strategies in Rural Africa: Concepts, Dynamics and Policy Implications.' *Food Policy*, 26(4), 315–331.
60. Lay, J., M'Mukaria, G. M., Mahmoud, T. O. [2008] 'Few Opportunities, Much Desperation: The Dichotomy of Non-agricultural Activities and Inequality in Western Kenya.' *World Development*, 36(12), 2713–2732.
61. Bandyopadhyay, S., and Skoufias, E. [2013] Ibid.
62. Hallegatte, S. [2014] Ibid.
63. World Bank [2013] Ibid.
64. Schick, A., Polackova Brix, H. (eds) [2004] *Government at risk*. Washington D.C.: World Bank and Oxford University Press.
65. OECS [2014] Grenada's Growth and Poverty Reduction Strategy, GPRS, 2014–2018. Washington D.C.: Organization of Eastern Caribbean States.
66. Schick, A., Polackova Brix, H. (eds) [2004] Ibid.
67. World Bank [2011] *Analysis of Disaster Risk Management in Colombia. A Contribution to the Creation of Public Policies*. Washington D.C.: World Bank and GFDRR.
68. World Bank [2013] Ibid.
69. IFC [2012] *Performance Standards on Environmental and Social Sustainability*. Washington D.C.: International Finance Corporation, World Bank Group.
70. ERM [2005] *Natural Disaster and Disaster Risk Reduction Measures: A Desk Review of Costs and Benefits*. London: Department for International Development.
71. Tearfund [2010] *Case studies: Cost benefit analysis of community-based disaster/climate risk management*. Oxfam Research Reports. Oxford: Oxfam.
72. Cabot Venton, C. [2010] *Cost Benefit Analysis for community based climate and disaster risk management synthesis report*. Teddington UK and Boston, MA, USA: Tearfund and Oxfam America.
73. UNDP [2014] 'Water is Life': Empowering St. Elizabeth Farmers.' Article accessed from www.jm.undp.org/content/jamaica/en/home/ourwork/povertyreduction/successstories/rainwaterharvesting/#
74. World Bank [2014] *The State of Social Safety Nets 2014*. Washington D.C.: World Bank.
75. World Bank [2013] Ibid.
76. Ministry of Agriculture and Fisheries. Statement on Drought Conditions and Impact on the Agricultural Sector. Article accessed from http://www.moa.gov.jm/Speeches/2014/20140729_Statement-on-Drought-Conditions-and-Impact-on-the-Agricultural-Sector.php
77. Ministry of Agriculture and Fisheries. Statement on Drought Conditions and Impact on the Agricultural Sector. Article accessed from http://www.moa.gov.jm/Speeches/2014/20140729_Statement-on-Drought-Conditions-and-Impact-on-the-Agricultural-Sector.php.
78. Adapted from IFC, 2012 *Performance Standards on Environmental and Social Sustainability*, Washington D.C.: International Finance Corporation, World Bank Group.
79. World Bank [2013] Ibid.
80. The core phase of this work, done jointly by the World Bank, ODI and LSE, will further develop approaches for valuing the triple dividend of resilience.
81. Caravani, C., Barnard, S., Nakhooda, S. and Schalatek, L. [2014] *Climate Finance Thematic Briefing: Adaptation Finance*. Climate Finance Fundamentals. London: Overseas Development Institute.



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