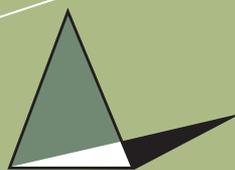


Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations

Charlotte Benson and John Twigg with Tiziana Rossetto



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Preface

The development process does not necessarily reduce vulnerability to natural hazards. Instead, it can unwittingly create new forms of vulnerability or exacerbate existing ones, impeding efforts to reduce poverty and promote growth, sometimes with tragic consequences. ‘Win-win’ solutions for securing sustainable development, reducing poverty and strengthening hazard resilience, therefore, need to be explicitly and actively sought, particularly as climate change looks set to increase the incidence of droughts and floods and the intensity of windstorms. Such solutions are best derived by integrating disaster risk reduction strategies and measures within the overall development framework, viewing disaster risk reduction as an integral component of the development process rather than as an end in its own right.

Since the late 1990s, there has been increasing recognition of this need to ‘mainstream’ disaster risk reduction into development – that is, to consider and address risks emanating from natural hazards in medium-term strategic frameworks and institutional structures, in country and sectoral strategies and policies and in the design of individual projects in hazard-prone countries. A number of development organisations have begun efforts to mainstream disaster risk reduction into their work, undertaking various related institutional, policy and procedural changes and adjusting operational practice.

This ProVention project on Tools for Mainstreaming Disaster Risk Reduction supports this process, providing a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into development work in hazard-prone countries. The guidelines are deliberately intended as short, practical briefs supplementing existing, more general, guidelines on programming, appraisal and evaluation tools.

The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support.

The full guidance note series is contained in this volume. Additional copies are available online at http://www.proventionconsortium.org/mainstreaming_tools

A web-based *Disaster Risk Reduction Monitoring and Evaluation Sourcebook* is also under development as part of the same ProVention project. This sourcebook will be available at http://www.proventionconsortium.org/M&E_sourcebook later in 2007.

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Introduction

Guidance Note 1

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This preliminary note outlines the rationale underlying the series, introduces the guidance notes and highlights critical factors contributing to the successful mainstreaming of disaster risk reduction into development policy and practice.

1. The case for mainstreaming

Since the late 1990s, there has been increasing recognition of the need to ‘mainstream’ disaster risk reduction into development – that is, to consider and address risks emanating from natural hazards in medium-term strategic frameworks and institutional structures, in country and sectoral strategies and policies and in the design of individual projects in hazard-prone countries. Mainstreaming requires analysis both of how potential hazard events could affect the performance of policies, programmes and projects and of the impact of those policies, programmes and projects, in turn, on vulnerability to natural hazards. This analysis should lead on to the adoption of related measures to reduce vulnerability, where necessary, treating risk reduction as an integral part of the development process rather than as an end in itself.

This shift in perspective from a previously widely entrenched view of disasters as unpredictable, unavoidable events to be dealt with by emergency specialists has, in part, reflected increasing understanding of disasters as unresolved problems of development. Development initiatives do not necessarily reduce vulnerability to natural hazards. Instead, they can unwittingly create new forms of vulnerability or exacerbate existing ones, sometimes with tragic consequences (Box 1). The rising importance attached to poverty reduction has been particularly instrumental in contributing to this enhanced understanding. Exposure to risk and income shocks, including those emanating from natural hazards, has been widely acknowledged as one of the fundamental dimensions of poverty. This acknowledgement has triggered considerable focus on the analysis of forms and underlying causes of vulnerability and related initiatives to strengthen resilience.

Box 1 Ignoring hazards hurts

- In the Vietnamese city of Hue, expansion of infrastructure, including bridges, railway lines and roads, has created a barrier across the valley within which the city is located. As a result, excess rainfall can no longer soak away quickly and problems of flooding have become more severe.¹ Similar problems have occurred in several villages in Gujarat, India, following the construction of a donor-funded highway.
- Following widespread devastation caused by Hurricane Hugo in 1989, a new aid-funded hospital was built at the foot of a volcano in the Caribbean island of Montserrat. This hospital was subsequently destroyed by pyroclastic flows after the volcano began eruptive activity again in mid-1995.²
- Following the devastating 2004 Indian Ocean tsunami, some housing in Aceh, Indonesia, was reconstructed in flood-prone areas, leaving families vulnerable to future hazard events.

¹ IFRC. *World Disasters Report: Focus on recovery*. Geneva: International Federation of Red Cross and Red Crescent Societies, 2001.

² Clay, E.J. et al. ‘An Evaluation of HMG’s Response to the Montserrat Volcanic Emergency’. 2 Vols. *Evaluation Report EV635*. London: Department for International Development (UK), 1999.

The rising interest in mainstreaming risk has also been fuelled by a gradual upward rise in reported disaster losses, primarily due to the increasing vulnerability to natural hazard events of economic and social assets and the well-being and livelihoods of populations. Between the 1950s and 1990s, the reported global cost of disasters increased 15-fold in real terms while numbers affected rose from 1.6 billion over the period 1984–1993 to almost 2.6 billion during the subsequent decade.³ In more recent years, there has been a rapid succession of catastrophic events causing substantial human and economic losses, including the Indian Ocean tsunami in 2004 and Hurricanes Katrina and Rita in the United States of America and the South Asian earthquake centred on Kashmir in 2005. Although the largest absolute economic losses occur in developed countries, developing countries suffer far worse in relative terms. According to the World Bank, losses can be up to 20 times greater as a percentage of gross domestic product in developing countries than in industrialised nations, while over 95 per cent of all disaster-related deaths occur in developing countries.⁴ Indeed, disasters are increasingly recognised as a potential threat to sustainable development, poverty reduction initiatives and the achievement of a number of the Millennium Development Goals.

‘Win-win’ solutions for securing sustainable development, reducing poverty and strengthening hazard resilience, therefore, need to be explicitly and actively sought, particularly as climate change looks set to increase the incidence of droughts and floods and the intensity of windstorms.⁵ Such solutions are best derived by integrating disaster risk reduction strategies and measures within the overall development framework, viewing disaster risk reduction as an integral component of the development process rather than as an end in its own right. As a recent World Bank report stated, “...it would be well to remember that there is no period when disaster risks can be safely ignored or set aside, specially for the subgroup of countries that is highly vulnerable to disasters”.⁶ Instead, hazard-related issues need to be considered in national and sectoral development planning, country programming and in the design of all development projects in hazard-prone countries, seeking both to protect the development investments themselves against natural hazards and to strengthen the hazard resilience of the communities they serve. Hazard-proofing individual structures may not even cost much.⁷ Although figures vary, the United States Federal Emergency Management Agency,⁸ for instance, estimates that mitigation measures increase construction costs for new facilities by as little as 1 to 5 per cent while potential returns may be considerably higher (Box 2). As such, due consideration of disaster risks may represent an important aspect of international efforts to enhance aid effectiveness.

Box 2 Disaster risk reduction pays

- A Vietnam Red Cross mangrove planting programme implemented in eight provinces in Vietnam to provide protection to coastal inhabitants from typhoons and storms cost an average US\$ 0.13 million a year over the period 1994 to 2001, but reduced the annual cost of dyke maintenance by US\$ 7.1m. The programme also helped save lives, protect livelihoods and generate livelihood opportunities.⁹
- Spending 1 per cent of a structure’s value on vulnerability reduction measures can reduce probable maximum loss from hurricanes by around a third in the Caribbean, according to regional civil engineering experts.¹⁰
- One dollar spent by FEMA on hazard mitigation generates an estimated US\$ 4 on average in future benefits according to a study of FEMA grants (including for retrofitting, structural mitigation projects, public awareness and education and building codes).¹¹
- Only two schools were left standing in Grenada after the passage of Hurricane Ivan (September 2004). Both had been subject to retrofit through a World Bank initiative. One of the schools was used to house displaced persons after the event.¹²

³ World Bank (2006).

⁴ <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTDISMGMT/0,,menuPK:341021~pagePK:149018~piPK:149093~theSitePK:341015,00.html>

⁵ The 2006 Stern Review similarly argues in relation to climate change that adaptation, including efforts to enhance hazard resilience, should be mainstreamed into development and specifically states that “the key to successful DRR [disaster risk reduction] is ensuring it is integrated into development and humanitarian policy and planning” (HM Treasury and Cabinet Office (2006) p. 566).

⁶ World Bank (2006) p. 67.

⁷ See, for instance, FEMA. *Protecting Business Operations: Second Report on Costs and Benefits of Natural Hazard Mitigation*. Washington, DC: Federal Emergency Management Agency, 1998; IACNDR. *Inter-American Strategic Plan for Policy on Vulnerability Reduction, Risk Management and Disaster Response*. OEA/Ser G. Permanent Council Document 3737/03. Inter-American Committee for Natural Disaster Reduction, 2003.

⁸ See footnote 7 (FEMA, 1998).

⁹ IFRC. *World Disasters Report: Focus on reducing risk*. Geneva: International Federation of Red Cross and Red Crescent Societies, 2002.

¹⁰ World Bank. *Managing Catastrophic Risks Using Alternative Risk Financing and Insurance Pooling Mechanisms*. Discussion draft. Washington, DC: World Bank, Finance, Private Sector and Infrastructure Department, Caribbean Country Management Unit, Latin America and Caribbean Region, 2000.

¹¹ MMC/NIBS. *Natural Hazard Mitigation Saves: An Independent Study to Assess the Future Savings from Mitigation Activities*. Washington, DC: Multihazard Mitigation Council of the National Institute of Building Sciences, 2005.

¹² World Bank. *Grenada, Hurricane Ivan: Preliminary Assessment of Damages, September 17, 2004*. Washington, DC: World Bank, 2004. Available at: http://siteresources.worldbank.org/INTDISMGMT/Resources/grenada_assessment.pdf

- Between 27 August and 18 September 1995, Hurricanes Luis and Marilyn damaged 876 housing units in Dominica, causing a total loss of US\$ 4.2 million. The small wooden houses that were destroyed did not comply with local building codes. But all the buildings that had been retrofitted via simple modifications to local construction techniques under the Caribbean Disaster Mitigation Project's Safer Construction Program funded by the United States Agency for International Development (USAID) successfully withstood the hurricanes.¹³

Increasing appreciation of the need to mainstream disaster risk reduction into development was formalised in January 2005 when the Hyogo Framework for Action 2005–2015 was adopted by the World Conference on Disaster Reduction with 168 nation and multilateral institution signatories. The Hyogo Framework is centred around three principal strategic goals, the first of which is “the more effective integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction”.¹⁴

Progress to date: Policy and institutional change

Against this backdrop, a number of development organisations have begun efforts to mainstream disaster risk reduction into their work, undertaking various related institutional, policy and procedural changes. In terms of institutional changes, for instance, following the 1997–1998 United Nations (UN) reform process, responsibility for ‘natural’ disaster mitigation, preparedness and prevention within the UN system was transferred from the Office for the Coordination of Humanitarian Affairs, whose work primarily involves post-disaster response, to the United Nations Development Programme (UNDP), the UN’s development agency. In 1998 the World Bank established a Disaster Management Facility (now renamed the Hazard Risk Management team) to improve its disaster prevention and mitigation practices and emergency response. The Hazard Risk Management team’s mandate is to provide a more strategic and rapid response to disasters and to promote the integration of disaster prevention and mitigation efforts into the World Bank’s development activities. Both the Inter-American Development Bank (IDB) and the Asian Development Bank (ADB) have established new disaster management focal points, in part tasked with supporting the mainstreaming of disaster risk reduction into their respective organisations’ development programmes.

As regards policy changes, ADB and the United Kingdom’s Department for International Development (DFID) have both approved substantially revised disaster policies over the past few years, with IDB also expected to approve a new Disaster Risk Management Policy in the first part of 2007. The new ADB policy, approved in 2004, “shifts the emphasis from only responding after disaster strikes to also supporting activities that anticipate and mitigate the likely impact of disasters that might occur”.¹⁵ Underlying principles include “mainstreaming disaster risk management as an integral part of the development process”.¹⁶ DFID’s new disaster risk reduction policy, published in March 2006, has three basic objectives, the first of which is to “integrate risk reduction better into development and humanitarian policy and planning ... [including] better integration into DFID’s own programming as a regular part of country-office approaches to sustainable development in areas most affected by disaster risk”.¹⁷ IDB’s new draft Disaster Risk Management Policy has two interrelated objectives, the first of which is “to strengthen the Bank’s effectiveness in supporting its borrowers to systematically manage risks related to natural hazards by identifying these risks, reducing vulnerability and by preventing and mitigating related disasters before they occur”.¹⁸ The World Bank is similarly revising its operational policy on emergency recovery assistance (which also covers prevention and mitigation), in part to support the integration of disaster risk reduction principles into its development operations. A recent World Bank evaluation has also recommended the development of a strategy or action plan for assistance related to disasters which, as well as supporting improved emergency response operations, should “make provisions to give more attention to natural hazards during the appraisal of investment projects generally, and specifically in the preparation of PRSPs [Poverty Reduction Strategy Papers], CASs [Country Assistance Strategies], and other strategic documents”.¹⁹ The Hazard Risk Management team is carrying this recommendation forward by targeting the CASs of highly vulnerable countries and providing assistance on mainstreaming disaster risk management into the documents.

¹³ CDMP. *Toolkit: A Manual for Implementation of the Hurricane-resistant Home Improvement Program in the Caribbean*. Caribbean Disaster Mitigation Project publication series. Washington, DC: Organization of American States, 1999. Available at: <http://www.oas.org/cdmp/document/toolkit/toolkit.htm>

¹⁴ UN/ISDR (2005) p. 3.

¹⁵ ADB (2004) p. 20.

¹⁶ *Ibid.* p. 20.

¹⁷ DFID (2006) p. 3.

¹⁸ IDB (2006) p. 2.

¹⁹ World Bank (2006) p. 73.

Other bilateral donors currently engaged in mainstreaming disaster risk reduction concerns into their development policies and programmes include the Canadian International Development Agency (CIDA), the Danish International Development Agency (DANIDA), the European Commission (EC), Germany's Gesellschaft für Technische Zusammenarbeit (GTZ), the Norwegian Ministry of Foreign Affairs, the Swedish International Development Cooperation Agency (Sida) and the Swiss Agency for Development and Cooperation (SDC). Some non-governmental organisations (NGOs) are undertaking a similar process including, for instance, ActionAid, CARE, Christian Aid, Plan International, Practical Action and Tearfund.

Governments have also committed to various mandates to integrate disaster risk reduction into development. For instance, the Inter-American Committee for Natural Disaster Reduction (IACNDR)²⁰ reports that, as of 2003, member states of the Organization of American States (OAS) had taken on collectively, as regional groups or individually, over 30 acquired commitments, many of which incorporate this approach. Many governments were also signatories to the 2005 Hyogo Framework of Action. Development organisations are supporting governments in this mainstreaming process. For instance, the African Union (AU)/New Partnership for Africa's Development (NEPAD), African Development Bank (AfDB) and the United Nations International Strategy for Disaster Reduction (UN/ISDR) Africa have been working together since the beginning of 2003 to seek ways to provide strategic guidance and direction to policy-makers in the region in mainstreaming disaster risk reduction into development.²¹

Turning policy into practice

Much of the progress to date on the mainstreaming of disaster risk reduction into development relates to policy and institutional changes. The next crucial step is to alter development practice in hazard-prone countries. Various initiatives are under way in support of this process, including:

- *Development and application of operational guidelines.* Some work has been initiated on the development of operational guidelines and related tools to support the mainstreaming of risk into country programming and project design:
 - The Caribbean Development Bank and the Caribbean Community (CARICOM) have developed a sourcebook on the integration of natural hazards into environmental impact assessment (see **Guidance Note 7**).
 - IDB has developed an overview risk management checklist to support analysis and assessment of natural hazards and related risks in its lending programmes (see **Guidance Note 5**, Box 2).
 - As part of its Global Disaster Reduction Mainstreaming Initiative (see below), UNDP, in collaboration with UN/ISDR, has produced guidance on the integration of disaster risk reduction into the UN system's country programming tools, the Common Country Assessment (CCA) and the United Nations Development Assistance Framework (UNDAF) (see **Guidance Note 4**, Box 4).
- *Development and application of disaster risk indicators.* Increasing recognition of the importance of mainstreaming disaster risk reduction within broader development has spawned a number of initiatives to develop indicators of national and sub-national risk, including by the World Bank/ProVention, UNDP, IDB and the EC (see **Guidance Note 4**, Box 2). Such indicators are intended to allow development practitioners to judge the relative importance of disaster risk in decisions on country programming and project design and respond accordingly. For instance, drawing on the World Bank/ProVention 'Hotspots' study, the World Bank website now includes an interactive map-based tool which identifies geographic areas of highest relative disaster risk potential, supporting Bank staff and others in determining where to prioritise disaster risk reduction investments and better informing development efforts.²² Disaster risk reduction indicators also provide a quantification of risk for use in monitoring and evaluating programme performance.
- *Development and delivery of training materials.* Various development organisations, including DFID, IDB and the World Bank, are currently preparing training materials on the mainstreaming of disaster risk reduction into development.
- *Support to governments.* Development organisations are actively supporting governments in mainstreaming disaster risk reduction into their own policies, strategies and operations. For instance, in September 2006 the World Bank and UN/ISDR launched a major new initiative, the Global Facility for Disaster Reduction and Recovery (GFDRR), which will provide technical assistance grants to vulnerable countries in support of national capacity-building efforts for disaster reduction and global and regional partnerships in support of national programmes. UNDP is also

20 See footnote 7 (IACNDR, 2003).

21 African Union (2004).

22 See <http://geohotspots.worldbank.org/hotspot/hotspots/disaster.jsp>

implementing a Global Disaster Reduction Mainstreaming Initiative aimed at integrating disaster risk reduction into UNDP's work planning and processes and those of its development partners, with a particular focus at the country level.

A ProVention project on Tools for Mainstreaming Disaster Risk Reduction has contributed to this process, extending the work being undertaken on the development and application of operational guidelines to develop a series of guidance notes for use by development organisations on the incorporation of disaster risk analysis into tools of country programming, project appraisal and evaluation. This guidance note is part of this ProVention series.

ProVention's Tools for Mainstreaming Disaster Risk Reduction project

The ProVention guidance note series is based on a set of principles relating to the nature of vulnerability to natural hazards and the findings of a preliminary detailed review, undertaken as part of the ProVention project, of standard tools used by development organisations in designing and evaluating projects:²³

- Vulnerability to natural hazards is complex and multi-faceted, requiring analysis and solutions from environmental, economic, social, institutional and technical perspectives and thus related tools to accomplish this.
- Existing programming, appraisal and evaluation tools and guidelines often cover risk in the broadest sense (relating to operational risk, financial risk, political risk and so forth) but typically contain few specific references to hazard-related issues.
- In consequence, natural hazards and related vulnerability are rarely considered in designing and appraising development projects, other than dedicated risk reduction projects, even in high-risk areas.
- Many of the existing programming, appraisal and evaluation tools could easily be extended to indicate countries, sectors and individual potential projects at risk from natural hazards, generate detailed information on the nature and level of risk and help ensure that appropriate risk reduction measures are taken.
- Collectively these tools would allow project and programme planners to explore hazard-related issues from a wide range of perspectives and areas of expertise, in keeping with the multi-faceted nature of vulnerability.
- There is nothing intrinsically difficult about either appraising disaster risks or designing and evaluating risk reduction measures if these tasks are approached thoughtfully and knowledgeably and are adequately resourced.

A series of 14 guidance notes (including this one) was therefore developed for use by development organisations in adapting programming, project appraisal and evaluation tools and guidelines to support the mainstreaming of disaster risk reduction into development. The guidelines are deliberately intended as short, practical briefs supplementing existing guidelines on programming, appraisal and evaluation tools, rather than providing full, comprehensive guidance on all aspects of each tool. They focus specifically on where and how to take hazard-related concerns into account in each of the tools covered, ensuring that disaster risk and related opportunities for reducing vulnerability are adequately and systematically considered in hazard-prone countries.

The guidance notes are directed primarily at development organisations, as already indicated. The scope, level of detail and emphasis of country programming and project appraisal and evaluation practices obviously vary between different organisations depending on their area of specialism, developmental approach and the scale of assistance provided. The ProVention guidance notes are not tailored to any particular development organisation and may not dovetail exactly with individual procedures. However, they can be adjusted to fit accordingly.

The series is also of relevance to stakeholders involved in the mainstreaming of adaptation to climate change into development. As the Organisation for Economic Co-operation and Development (OECD) states, “[C]limate change adaptation needs to be brought into the mainstream of economic policies, development projects, and international aid efforts.”²⁴ The ProVention guidance notes identify entry points in the planning and provision of development assistance for considering the impact of potential hazards on development and the impact, in turn, of development initiatives on vulnerability to natural hazards. These entry points are also of relevance in seeking to ensure that development is climate-friendly, leading to a reduction in greenhouse emissions, and that development is more resilient to the impacts of climate change.

²³ Benson and Twigg (2004).

²⁴ OECD (2006) p. 1. See also HM Treasury and Cabinet Office (2006).

2. The ProVention guidance note series

The purpose and scope of each guidance note in the ProVention series on Tools for Mainstreaming Disaster Risk Reduction is described below.

A broad schema indicating how the guidance notes fit together and collectively support the mainstreaming of disaster risk reduction concerns into individual development projects in hazard-prone countries is presented in Figure 1 (see also **Guidance Note 5**, Table 1).²⁵ Other key influences determining the quality of disaster risk management practice are also indicated, in acknowledgement of the fact that development projects are not designed and implemented in a vacuum. Such factors may similarly require some form of strengthening to help support improved disaster risk management (see Section 3).

Guidance Note 1: Introduction. This preliminary note outlines the rationale underlying the series, introduces the guidance notes and highlights critical factors contributing to the successful mainstreaming of disaster risk reduction into development policy and practice.

Guidance Note 2: Collecting and using information on natural hazards. The second guidance note focuses on the basic processes of acquiring and using hazard information. It forms a central pillar of the guidance note series, supporting development organisations in identifying the level of hazard exposure in a particular country or region and determining whether or not disaster risk mainstreaming is necessary. The guidance note covers key elements of natural hazards information, its place in the project planning/management cycle, tools for gathering information, providers of information and issues to be considered when collecting and analysing data. Owing to the diversity of natural hazards and the varying types of related information and data collection methods, the note is intended purely as an introduction to this topic.

Guidance Note 3: Poverty reduction strategies. As development organisations increasingly align their programmes of support with recipient country government policies and objectives, it is essential that mainstreaming begins with government policies and strategies themselves. This guidance note therefore covers the integration of hazard-related issues into the preparation of poverty reduction strategies (PRSs) – the primary development planning tool in many low-income countries – and other poverty reduction initiatives in hazard-prone countries. It is intended for use by national governments in preparing PRSs and by international development organisations in supporting governments in this process.

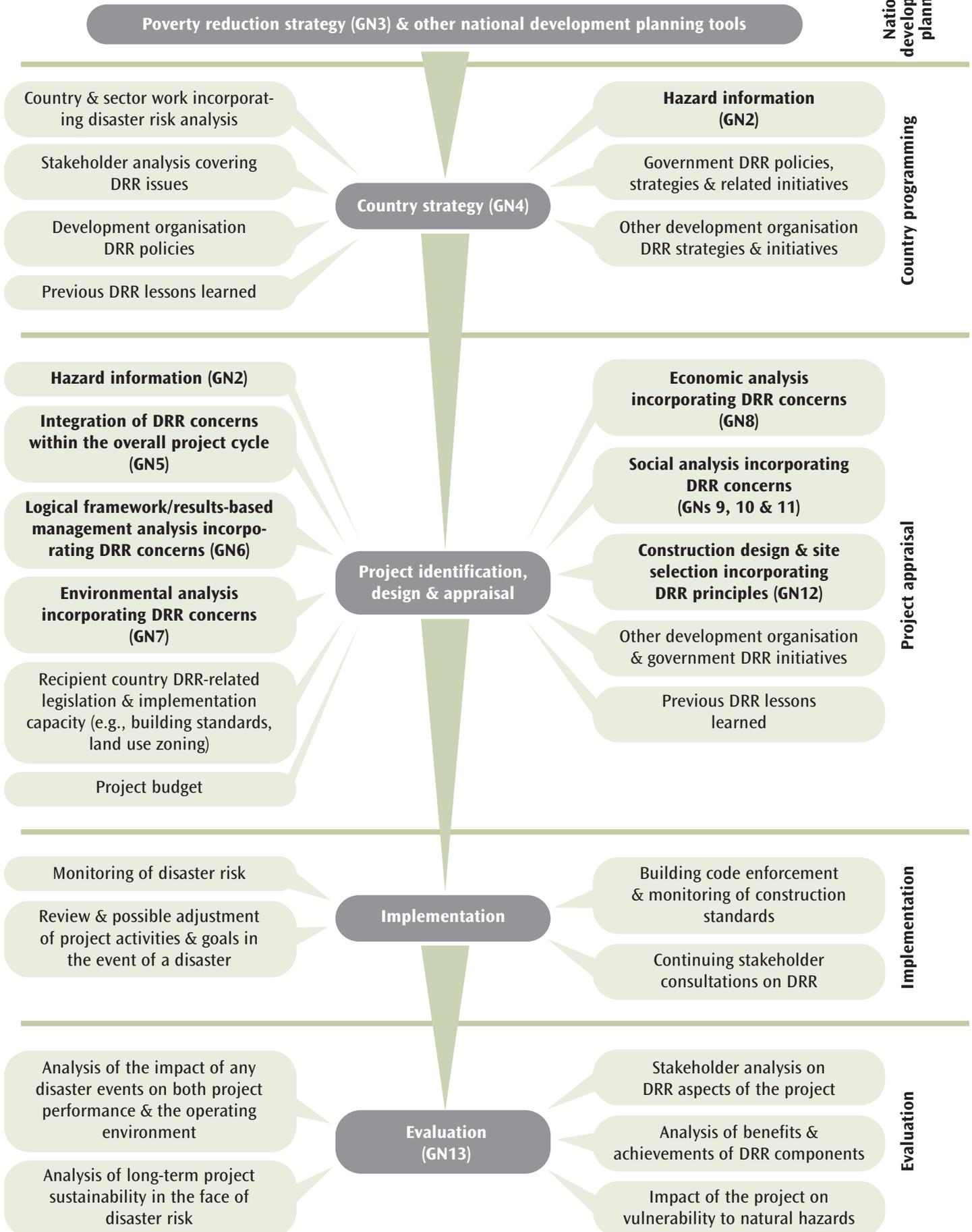
Guidance Note 4: Country programming. All international development organisations apply some form of country or regional programming framework through which problems, needs and interests are analysed, sectoral and thematic areas of focus identified and the broad level and composition of assistance outlined. This process provides an important opportunity to address disaster risk in a strategic and coordinated fashion, exploring the complex, cross-cutting and multi-faceted nature of vulnerability and identifying appropriate, proactive risk management solutions. The fourth guidance note in the series therefore addresses this topic, providing guidance on how to assess and address disaster risk within country programming in hazard-prone countries. It is intended as a basic, generic guide for use by all types of international development organisation, complementing existing country programming guidelines.

Guidance Note 5: Project cycle management. This guidance note shifts the focus of attention down to the level of individual projects, beginning by discussing some general questions about the integration of disaster risk management concerns within the project cycle as a whole, particularly in the planning phases. It explains the project cycle approach, provides overall guidance on mainstreaming within it and looks at available related tools. Such tools complement efforts to adapt specific individual appraisal tools commonly deployed within the project cycle to take hazard-related concerns into account. This guidance note is intended primarily for use by people working in development organisations on project design and management, but is also relevant for personnel of governments and private organisations.

Guidance Note 6: Logical and results-based frameworks. Logical framework and results-based management tools are widely used for overall project design and management purposes. This note provides guidance on the systematic consideration of hazard-related issues in the application of these tools to all projects in hazard-prone areas. It is intended for use by development organisation project preparation teams and implementing officers.

²⁵ **Guidance Note 14** (Budget support) is not included in Figure 1 because the diagram focuses on the mainstreaming of disaster risk reduction into individual projects.

Figure 1 Mainstreaming disaster risk reduction (DRR) into development projects in hazard-prone countries



Guidance Note 7: Environmental assessment.²⁶ This guidance note focuses on environmental assessment, a key point in the design of a project to explore natural hazards and related risk. Natural hazards are themselves environmental phenomena, potentially damaging and disrupting projects, while the state of the environment, in turn, is a key factor determining vulnerability to natural hazards. The note therefore provides guidance in analysing the vulnerability consequences of potential projects via their impact on the environment and the potential threat to projects posed by natural hazards. The findings are intended to feed into other forms of appraisal and engineering design as relevant. This guidance note is intended primarily for use by development organisations but is also relevant for personnel of governments and private organisations involved in the design of individual projects.

Guidance Note 8: Economic analysis. Multilateral lending agencies routinely undertake some form of economic analysis as part of their project appraisal process. This guidance note outlines how to analyse disaster risk and related options for reducing vulnerability in hazard-prone countries from this perspective and to ensure that they are adequately and systematically examined where relevant. The guidance note is intended for use by development organisation economists, complementing their existing economic analysis guidelines. It is also of more widespread use in helping to support the development of a strong body of evidence on the net economic benefits of disaster risk reduction. The current paucity of such evidence has proved a major stumbling block in attracting interest and commitment to disaster risk reduction, as there is little sense of the likely economic returns to such investments.

Guidance Note 9: Vulnerability and capacity analysis. This guidance note is the first of three in the series relating to various tools for appraising projects from a social perspective as used by different development organisations. This first one covers vulnerability and capacity assessment and analysis (VCA), introducing basic approaches, explaining how VCA can be integrated into the project planning process and showing how natural hazards and disasters, in turn, can be factored into VCA. The issue of people's vulnerability and capacity in the context of natural hazards is very important in understanding their potential impact and making choices about development interventions. The guidance note focuses on the use of VCA in development projects, but the approach can also be used in disaster risk reduction and post-disaster recovery. It is aimed at staff from diverse disciplines.

Guidance Note 10: Sustainable livelihoods approaches. Sustainable livelihoods (SL) thinking and methods offer a second tool of social analysis for supporting the incorporation of natural hazards and associated disaster risk into development project planning. By giving prominence to vulnerability and external shocks as central to the ways in which livelihoods are shaped, SL approaches provide good opportunities for including hazard and disaster awareness in project planning. This guidance note briefly introduces SL thinking and explains its application to projects and programmes, with particular emphasis on its relevance to hazards and disasters. It reviews methods used in SL approaches to assess hazards, vulnerability and risk, and discusses other factors in applying SL to project cycle management.

Guidance Note 11: Social impact assessment. The third guidance note on social appraisal tools addresses social impact assessment (SIA). By providing an understanding of a community and its social processes, SIA facilitates the identification of the direct and indirect social consequences of disaster risk and the development of appropriate and effective mitigation mechanisms which harness community resources and recognise community reactions to events. The guidance note outlines the principal approaches and methods used in SIA and identifies entry points for introducing natural hazards and related risks. The note is intended for use by project planners and managers in multilateral and bilateral development agencies, national and local government departments, NGOs and private sector organisations. Users will include those managing or undertaking an SIA, supporting them in incorporating disaster risk into their social assessment. The guidance note can also be used by those undertaking disaster risk assessments to understand how techniques of SIA can assist the assessment and mitigation of disaster risk.

Guidance Note 12: Construction design, building standards and site selection. A considerable share of human and direct economic losses from natural hazard events occur as a direct result of damage to the built environment, in turn reflecting poor construction and sometimes inappropriate land use. This guidance note therefore focuses on construction design, building standards and site selection, and their role in risk reduction. The note provides general guidance for design professionals and development organisations concerning the construction of new infrastructure, the strengthening of existing infrastructure and post-disaster reconstruction in hazard-prone countries.

²⁶ This guidance note was jointly prepared by the ProVention Consortium and the Caribbean Development Bank (CDB). Section 2 is based on CDB and CARICOM Secretariat (2004).

Guidance Note 13: Evaluating disaster risk reduction initiatives. This guidance note moves on from tools of project appraisal to address the evaluation of disaster risk reduction activities. This can be a challenging task because the success of disaster risk reduction is ultimately measured in terms of something – a disaster or a particular form or level of loss in the event of a disaster – that does *not* happen. The guidance note sets out the main steps in planning such evaluations, collecting and analysing data and using results, and discusses the main issues associated with these activities. The note is intended for programme managers and policy-makers in organisations of any kind that are involved in any form of disaster risk reduction activity, either free-standing or within wider development or post-disaster recovery initiatives. (See also Box 3.)

Box 3

The ProVention Disaster Risk Reduction Monitoring and Evaluation Sourcebook

The Tools for Mainstreaming Disaster Risk Reduction project has also included the development of a web-based *Disaster Risk Reduction Monitoring and Evaluation Sourcebook*. This sourcebook complements and extends Guidance Note 13 on monitoring and evaluation (M&E), providing many practical examples of M&E, as well as links to useful reference material online and a bibliography of off-line publications. The sourcebook provides background on the general purpose and approaches to M&E. It also looks specifically at why disaster risk reduction M&E is different from ‘normal’ M&E, including the neglect of M&E in many disaster risk reduction projects and the reverse logic in measuring disaster risk reduction impacts and benefits.

Specific topics covered by the sourcebook include:

- Definitions and terminology
- A typology of disaster risk reduction programmes and projects
- Resource availability and scope in M&E
- Approaches and methods specific to disaster risk reduction, including alternative approaches to measuring disaster risk reduction
- Selection of the measurement approach and indicators
- Qualitative and quantitative data collection methods
- Processing and analysing data
- Report writing and presentation of results
- Summaries of disaster risk reduction M&E case studies

The sourcebook is located at http://www.proventionconsortium.org/M&E_sourcebook

Guidance Note 14: Budget support. The final guidance note addresses the topic of budget support. There is an ongoing shift away from project-based assistance towards general and sector budget support. This shift offers considerable potential for supporting governments in strengthening their countries’ resilience to natural hazards. This note therefore provides guidance on how to ensure that disaster risk is adequately and systematically examined in developing programmes of budget support in hazard-prone countries and that governments are encouraged and supported in managing disaster risk appropriately and reducing vulnerability. It is intended for use by development organisation staff involved in the design, implementation and evaluation of budget support.

3. Critical factors for success

The development of practical guidelines on the integration of disaster risk concerns within development organisation country programming, project design and evaluation represents only one strand in a series of steps required to ensure successful mainstreaming in hazard-prone countries. As already indicated, certain other actions are already under way. These and further critical measures are elaborated upon below and summarised in Figure 2. They are presented as sequential steps in Figure 2 but, in practice, there may be considerable overlap between each stage.

Figure 2 Steps to successful mainstreaming



Step 1. Awareness-raising

- *Appreciation and understanding of the relevance of disaster risk reduction to sustainable development.* Increased awareness of the potential importance of examining and, if necessary, addressing disaster risk is critical, on the part of both governments and development organisations, in striving for sustainable development and poverty reduction.
- *Accountability.* Most fundamentally of all, development organisations and governments need to accept greater accountability for hazard-related human, physical and economic losses. Such losses pertain to countries and governments rather than development organisations. However, development organisations are accountable for ensuring that their resources are used effectively and responsibly. Governments, in turn, need to assume greater responsibility for their countries' and peoples' vulnerability and to actively seek to reduce risk.

Step 2. Enabling environment

- *Appropriate development organisation policies, strategies and institutional capacities.* Overarching development organisation policies and strategies need to pay due attention to disaster risk reduction, regarding it as a development issue rather than the responsibility of humanitarian departments. Revised policies and strategies need to be reflected in appropriate institutional arrangements.
- *Government prioritisation of disaster risk reduction.* As development organisation aims and objectives are increasingly aligned with national development and poverty reduction strategies, it is essential that governments themselves prioritise risk reduction as a critical development challenge in high-risk countries and develop related policies, capabilities and legislative and institutional arrangements. Development organisations need to explore incentives for encouraging governments in this process.

Step 3. Development of tools

- Programming, appraisal and evaluation tools are required to investigate countries, sectors and individual projects at risk from natural hazards, provide detailed information on the nature and level of risk and ensure that appropriate risk reduction measures are taken.

Step 4. Training and technical support

- Development organisations need to provide appropriate internal training and technical support to support the integration of disaster risk concerns into development.

Step 5. Change in operational practice

- *Early assessment.* It is essential that hazard-related issues are considered during the very early stages of country programming and project design so that they can be fully and systematically taken into account and appropriately addressed where relevant. Country strategies and related country environmental analyses (see **Guidance Note 4**) should indicate in which countries mainstreaming is required.
- *Adequate supporting information.* Sufficient information is necessary to permit a full and accurate assessment of disaster risk and its appropriate treatment. Countries may require support in strengthening their information base – for instance, in improving hazard data collection and analysis (see **Guidance Note 2**).
- *Cost minimisation.* Disaster risk analysis should be integrated into country programming and project design at minimum cost. Pooling of relevant information and related analysis within the development community and with governments would help achieve this.
- *Treatment of low-probability, high-impact risks.* Climatological hazards are most likely to be identified as potential risks, reflecting their shorter return periods and thus higher probability that they will occur over the life of a project or country strategy. In contrast, risks emanating from earthquakes and volcanic hazards, with much longer return periods, may be discounted. However, even if ignored from an economic perspective, it is important to ensure that earthquake and volcanic risks are adequately considered from a safety perspective, taking rights to safety and protection into account.
- *Transparent, inclusive and accountable consultation.* The consultative process must give a voice to poor and marginalised groups, who are often among the most vulnerable to natural hazards, and ensure that their interests are adequately addressed and their rights protected.
- *Adequate upkeep and maintenance of development investments.* Mechanisms for ensuring that development investments are adequately maintained and remain in good condition are essential in ensuring that their designed level of hazard resilience is maintained.

Step 6. Measuring progress

- Internationally agreed targets for disaster reduction should be established or disaster risk reduction concerns explicitly incorporated within the Millennium Development Goals, providing a common focus for development organisations and governments against which progress in mainstreaming can be measured.

Step 7. Learning and experience sharing

- The development community, together with other stakeholders, should make a concerted effort to monitor, share and learn from its experience in mainstreaming disaster risk reduction into development.

Box 5 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.²⁶

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

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²⁶ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

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The full guidance note series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Collecting and Using Information on Natural Hazards

Guidance Note 2

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

Collection and use of information on hazards is part of many project and programme planning tools. This guidance note focuses on the basic processes of acquiring and using such information. It covers key elements of natural hazards information, its place in the project planning/management cycle, tools for gathering information, providers of information and issues to be considered when collecting and analysing data. Owing to the diversity of natural hazards and the types of information and data collection methods relating to each, this note can be no more than an introduction (see Further reading).

1. Introduction

A range of natural hazards threatens lives and development (see Table 1). By understanding and anticipating future hazard events, communities, public authorities and development organisations can minimise the risk of disasters. Failure to do so can be highly damaging to development programmes and projects (see Box 1). Yet development planners often fail to consider the threat of natural hazards sufficiently, and hazard and disaster risk management is often carried out independently of development activity. Even where hazards are taken into account, proper assessments are often thought to be too costly and time-consuming.

Programme and project planners and managers should understand the characteristics, location, frequency and magnitude of hazards and their potential impact on property and people. They should understand which hazards present a risk in the places where they work and the main characteristics of those hazards. They do not need to be hazards specialists, though they may need to work alongside them and, therefore, should know how to identify and contact experts in this field.

Table 1 Types of natural hazard

Type	Description	Examples
Hydro-meteorological	Natural processes or phenomena of atmospheric, hydrological, oceanographic or climatological nature	<ul style="list-style-type: none"> ■ Floods, debris and mudflows ■ Tropical cyclones, storm surges, wind, rain and other severe storms, blizzards, lightning ■ Drought, desertification, wild fires, temperature extremes, sand or dust storms ■ Snow avalanches

Geological

Natural earth processes or phenomena

- Earthquakes, tsunamis
- Volcanic activity and emissions
- Mass movements, landslides, rockslides, liquefaction, submarine slides
- Surface collapse, geological fault activity

Biological

Processes of organic origin or those conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances

- Outbreaks of epidemic diseases, plant or animal contagion and extensive infestations

Source: Modified from UN/ISDR (2004), p.39.

Box 1

Some consequences of using, and neglecting, hazards information in development planning

A study in 2003 examined factors influencing coastal erosion along a 60-kilometre coastline in La Union in the Philippines. Extensive data were collected on wave and wind action (including typhoons), slope angles, earthquakes and associated subsidence, shoreline substrates, presence and absence of natural buffers such as mangroves and coral reefs, shifts in the position of a river mouth, mining and other land uses, and coastal protection structures. As a result of the study's findings, municipal authorities decided to relocate settlements and schools, redesign seafront structures and rehabilitate mangroves.

In 1987 a report to the government of the Caribbean island of Montserrat highlighted the risks from the Soufrière Hills volcano to the capital, Plymouth, and many other facilities in the southern part of the island. The report was ignored and development continued regardless, even though the extensive damage to buildings caused by Hurricane Hugo in 1989 provided an opportunity for change. In a series of eruptions beginning in 1995, large areas in the south of the island were affected. Much of the capital was destroyed and many other facilities, including the airport, were made unusable. Three-quarters of the remaining population, and most of the critical facilities, had to be relocated permanently. More than 60 per cent of the land area is now officially designated as unsafe for human habitation or activity.

Sources: Berdin, R. et al. 'Coastal erosion vulnerability mapping along the Southern coast of La Union, Philippines'. In ProVention Consortium, *Applied Research Grants for Disaster Risk Reduction: Global Symposium for Hazard Risk Reduction, July 26–28, 2004*. Geneva: ProVention Consortium, 2004, pp 51–68. Available at: <http://www.proventionconsortium.org/themes/default/pdfs/AG/berdin.pdf>; Siringan, F.P. et al. 'A challenge for coastal management: large and rapid shoreline movements in the Philippines'. In UN/ISDR, *Know Risk*. Geneva: United Nations International Strategy for Disaster Reduction, 2005, pp. 218–19; Clay, E. et al. *An Evaluation of HMG's Response to the Montserrat Volcanic Emergency*. 2 vols. London: Department of International Development (UK), 1999.

2. Natural hazards information: key elements

Natural hazards information helps project planners to:

- recognise and understand natural hazards in the project area;
- identify knowledge gaps;
- identify risks to the project from natural hazards, now and in the future; and
- make decisions about how to deal with those risks.

Information on the following key features of natural hazards is needed to identify past, present and potential hazards and their effects:

- *Location and extent*. Is the programme or project area affected by one or more natural hazards, what types of hazard, and where?
- *Frequency and probability of occurrence*. How often are hazard events likely to occur (in both the short and the long term)?

- *Intensity/severity.* How severe are the events likely to be (e.g., flood levels; speed of winds and volume/rate of rainfall during hurricanes; magnitude and intensity of an earthquake)?
- *Duration.* How long will the hazard event last (from a few seconds or minutes in the case of an earthquake to months or even years in the case of drought)?
- *Predictability.* How reliably can we predict when and where events will happen?

Information about the speed of onset of a hazard event is principally relevant to disaster preparedness and early warning systems but may also have a bearing on planning decisions (e.g., planning secure evacuation routes).

Project planners should also be aware of:

- secondary hazards resulting from a hazard event (e.g., landslides triggered by an earthquake or heavy rainfall; fires in buildings set off by earthquakes; dam failure due to floodwaters);
- hazards outside the project area that could affect it (e.g., by cutting off supplies of power or raw materials, displacing communities); and
- how hazard events occur, including not only natural physical processes but also the impact of human activities that create or exacerbate hazards (e.g., deforestation causing slope instability and hence landslides).

The potential impact of the project itself on existing or potential hazards is normally dealt with through environmental impact and social impact assessments (see **Guidance Notes 7 and 11**), but it is a significant issue that must be assessed during project planning, with appropriate mitigation measures incorporated into project design.

Hazards are not static phenomena and hazard risk exposure will change over time. Ideally, therefore, one should understand future changes in hazard risk over given periods: a ‘probabilistic’ hazards assessment, rather than a ‘normative’ one based on current conditions. This is particularly relevant to climate change, which may have a significant effect on the patterns and trends of natural hazards and disasters. Note, too, that hazards can have positive as well as negative effects (e.g., floods deposit fertile sediments).

Hazards information should be used to support decision-making about how the project will manage any hazard threats that are identified. If the threat is not regarded as significant, changes to project design may be unnecessary. If it is severe, planners may decide not to go ahead in that location. In between these extremes, a variety of structural and non-structural mitigation measures may be introduced to protect the project or programme and its target groups.

The project appraisal (or preparation) process involves weighing up a number of different factors (environmental, social, economic, etc.), as well as hazards. Projects may have competing objectives that have to be balanced. Planners must, therefore, agree explicitly and openly in each case how much weight to give to particular hazards in their design decisions.

3. Use of hazards information in the project cycle

Hazards data collection and analysis should begin at the earliest possible stage in the project cycle and continue throughout the planning process, generating progressively more detailed information (for more information on the project cycle, see **Guidance Note 5**).

Significant¹ hazards should be identified early in the cycle, during the project identification phase. If significant threats are identified, further information gathering and analysis will be required.

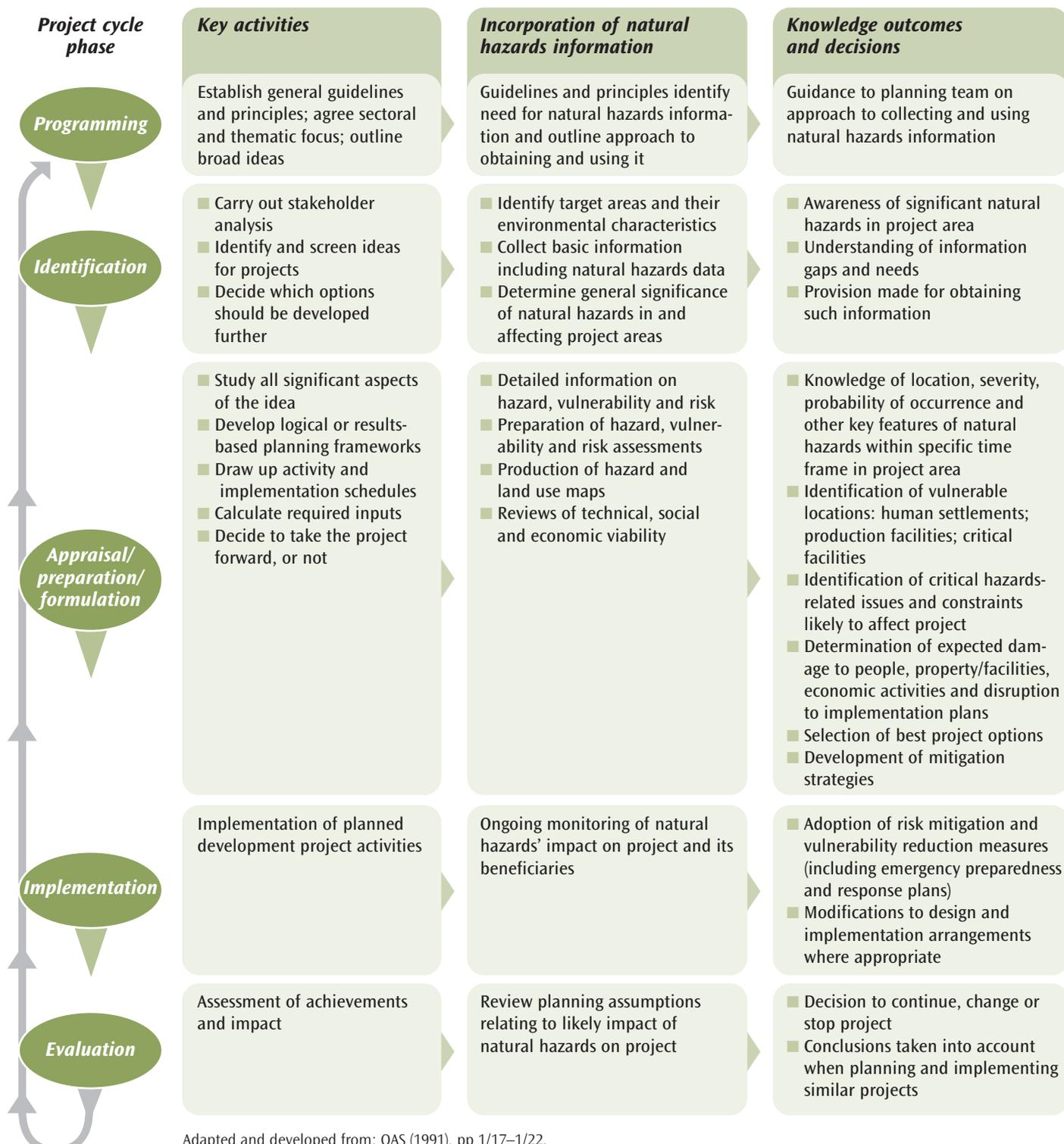
In the identification and appraisal phases, collection and interpretation of hazards information usually form part of (or feed into) other essential project appraisal activities, especially risk analysis, vulnerability assessment and environmental appraisal (see **Guidance Notes 6, 7 and 9**). They can also be incorporated into various economic and social appraisal methods (see **Guidance Notes 8, 10 and 11**) and into decisions on construction design and site selection (see **Guidance Note 12**). It is important that hazards information and assessment do not stand alone but are fully integrated into these other planning tools.

¹ It is not only large-scale hazard events (e.g., major earthquakes) that may be significant as far as an individual project is concerned. Small-scale, localised hazards (e.g., floods, landslides) may also be important if they are numerous and widespread in the project area.

The amount of information required and its form (including the level of accuracy, speed of data collection and scale) will vary according to the nature of the hazards and the type of project, as well as the phase of planning and the type of appraisal tool being used (see Section 4).

Table 2 presents a model for incorporating hazards questions and decisions into the project cycle (note that hazards monitoring and updating information continue after project implementation has begun).

Table 2 Incorporation of hazards information in the project cycle



Adapted and developed from: OAS (1991), pp 1/17–1/22.

4. Hazards information: needs, types and sources

Information needs and types

Planners draw on a variety of hazards data, depending on the nature of the project and the hazards concerned, as well as the data's accessibility and applicability.² Much of this information is likely to be scientific, comprising spatial and numerical data relating to the hazard, particularly in the form of maps (see Box 2), ongoing monitoring, scientific studies and field survey reports. New technologies such as remote sensing and geographical information systems (GIS) are revolutionising capacity to analyse hazards. Such data can also be used to model potential hazard events.

Box 2 Hazard maps

Mapping is a central tool in hazard identification and assessment. Maps can accurately record the location, probable severity and likelihood of occurrence of hazards and display this information clearly and conveniently. They can be to any appropriate scale or level of detail, making them equally useful for national- and local-level planning.³

The type of information recorded varies according to the hazard under investigation. In the case of earthquakes, for instance, it might include geological fault lines, areas of recorded seismic activity and types of soil and bedrock; for floods, topography, geomorphology and previous areas of inundation.

Mapping may be based on a range of data sources (e.g., existing maps, remote sensing, surveying). Additional information from photography, field surveys and other sources can be overlaid onto base maps – geographical information systems are making this much easier. Community hazard mapping exercises can also be undertaken. Communities are often knowledgeable about the location and nature of local hazards and their causal factors. Such information is particularly valuable in identifying and appraising localised hazards but community-level outputs can also feed into higher-level mapping and planning.

Maps are a good medium for communicating hazards information to decision-makers but often need interpreting – to both non-specialists, who may not be used to seeing information in this form, and educated users, who may be unfamiliar with the particular formats and symbols being used. In all cases the meaning of the data presented should be thoroughly discussed and understood.

Table 3, which focuses on the main geological and hydro-meteorological hazards worldwide, outlines the information needs of development planners and the main data types, or methods of acquiring data, in each case. The method(s) selected will depend upon the availability of resources and the intended application of the data collected.

Table 3 Hazard information: Types, sources, assessment methods

Type of hazard	Information needed by development planners	Data types/sources/assessment methods
Hydro-meteorological		
<i>Floods (river and coastal)</i>	<ul style="list-style-type: none"> ■ Extent and location of flooded or flood-prone area ■ Depth and duration of flood ■ Velocity of water flow ■ Rate of rise in water level and discharge ■ Amount of mud deposited or held in suspension ■ Frequency and timing of occurrence (including seasonality) 	<ul style="list-style-type: none"> ■ Historical records of frequency, location, characteristics and impact of past events ■ Meteorological data: rainfall (and snowmelt) records and monitoring (e.g., rain gauges) ■ Topographic mapping and height contouring around coastlines, river systems and catchment areas; geomorphological mapping; sequential inundation stages mapping

² For example, the study of coastal erosion in the Philippines (Box 1) drew on documentation (especially maps) of shoreline and bathymetric (water depth) changes, new bathymetric and GPS (global positioning system) surveys, interviews with local residents and aerial photographs.

³ Three-dimensional mapping is also possible, using software for digital elevation modelling; so is four-dimensional mapping, with computerised animations incorporating a time component.

Type of hazard	Information needed by development planners	Data types/sources/assessment methods
	<ul style="list-style-type: none"> ■ Rainfall (and snowmelt) volumes and intensities in flood-prone areas and their surroundings ■ Natural or man-made obstructions to flows and flood-control structures ■ Warning period ■ In coastal areas: tidal ranges and patterns of on-shore winds; height of sea-surges induced by cyclones 	<ul style="list-style-type: none"> ■ Natural resources and land use mapping ■ Estimates of capacity of hydrology system and catchment area ■ Hydrological data on flows, magnitude (including flood peak discharges) and frequency of floods, river morphology, infiltration properties of soil ■ Hydrological estimates of future flood discharges, flows and associated characteristics; flood frequency analysis ■ In coastal areas: tidal and sea-level records, meteorological data on windspeeds and directions ■ Long-term and seasonal weather forecasts; climate change models
<i>Windstorms (including hurricanes/tropical cyclones and tornados)</i>	<ul style="list-style-type: none"> ■ Locations and extent of areas likely to be affected ■ Frequency of occurrence (including seasonality) and directional patterns ■ Velocity and direction of wind; wind and gale severity scales (e.g., Beaufort); local hurricane/typhoon scales ■ Associated pressure conditions, rainfall and sea/storm surges ■ Warning period 	<ul style="list-style-type: none"> ■ Historical and climatological records of frequency, location, characteristics (including cyclone and tornado paths) and impact of past events on the project area and neighbouring areas (or countries) facing similar conditions ■ Meteorological records of wind speeds and direction at weather stations ■ Long-term and seasonal weather forecasts; climate change models ■ Topography and geomorphology of affected land areas (where there is risk of flooding from heavy rainfall or sea surges; see also flood data)
<i>Drought⁴</i>	<ul style="list-style-type: none"> ■ Rainfall levels, deficits ■ Frequency and timing of rainfall and drought occurrence (including seasonality); length of drought periods ■ Water levels (groundwater, rivers, lakes, etc.) ■ Water retention qualities of soils ■ Warning period ■ Associated biological features (e.g., pest infestation, invasive plants) 	<ul style="list-style-type: none"> ■ Rainfall and snowmelt monitoring (e.g., rainfall gauges) and mapping ■ Soil type and moisture content surveys/analysis ■ Water source surveys and monitoring ■ Vegetation surveys (including mapping, aerial photographs) and crop production monitoring ■ Historical records of frequency, location, characteristics and impact of past events (including long-term records of rainfall fluctuations) ■ Long-term and seasonal weather forecasts; climate change modelling
Geological		
<i>Earthquakes</i>	<ul style="list-style-type: none"> ■ Location and extent of known seismic hazard zones, epicentres, faults, fault systems, etc. ■ Magnitude (energy release at epicentre) and intensity (severity of ground shaking) of earthquakes in the area ■ Other geological, geomorphological, hydrological features that influence ground shaking and deformation 	<ul style="list-style-type: none"> ■ Zoning and micro-zoning (mapping/recording all seismological, geological, hydrogeological parameters needed for project planning in a given area, based on sources below) ■ Maps of seismic sources (faults, fault systems) ■ Geological, geomorphological maps and surveys (see also landslides)

⁴ The focus here is on meteorological drought (i.e., when rainfall drops below a certain level) and hydrological drought (reduction in water resources), that is to say on the hazard itself, rather than agricultural drought (impact of the other two kinds of drought on crop yields).

Type of hazard	Information needed by development planners	Data types/sources/assessment methods
	<ul style="list-style-type: none"> ■ Potential secondary effects: landslides, mudslides, avalanches; floods resulting from dam failures or tsunamis; fires; pollution from damage to industrial plants ■ Frequency of events 	<ul style="list-style-type: none"> ■ Data on past occurrence of earthquakes, their location, characteristics (magnitude, intensity, etc.) and effects ■ Calculations of maximum ground accelerations
Volcanoes	<ul style="list-style-type: none"> ■ Location of volcanoes and current state of volcanic activity (active, dormant, extinct) ■ History, frequency and character of each volcano's eruptions and the processes that produce them ■ Areas at risk from eruptions; radius of fall-out or direction of flow of eruptive materials ■ Volume and type of material ejected (e.g., ash falls, pyroclastic flows, lava flows, lahars, gas emissions) ■ Explosiveness and duration of eruption ■ Warning period 	<ul style="list-style-type: none"> ■ Geological studies and maps, based on geological survey evidence of frequency, extent, nature of previous eruptions ■ Hazard/zoning maps (based on geological data) ■ Historical records of frequency, location, characteristics and impact of past events ■ Monitoring and observation/recording of precursory phenomena (including seismicity, ground deformation, hydrothermal phenomena, gas emissions)
Landslides	<ul style="list-style-type: none"> ■ Volume and type of material dislodged, area buried or affected, velocity ■ Natural conditions affecting slope stability (composition and structure of rock and soil, inclination of slopes, groundwater levels) ■ Other external triggers: seismicity, rainfall ■ Vegetation and other land use (including building activities, landfill, man-made mounds, garbage pits, slag heaps, etc.) 	<ul style="list-style-type: none"> ■ Identification of location and extent of previous landslides or ground failures by surveys, mapping, aerial photography ■ Mapping/surveys of rock formations and characteristics, surface geology (soil types), geomorphology (slope steepness and aspect), hydrology (esp. groundwater and drainage) ■ Historical records of frequency, location, characteristics and impact of past events ■ Identification of probability of triggering events such as earthquakes, cyclones, volcanic eruptions ■ Vegetation and land use mapping and surveys ■ Zoning maps, based on the above

Sources: Adapted from: Borton, J. and Nicholds, N. *Drought and Famine*. New York: United Nations Development Programme, Department of Humanitarian Affairs (UNDP/DHA), Disaster Mitigation Training Programme module, 1994. Available at: http://www.undmtp.org/english/droughtandfamine_guide/drought_guide.pdf; Coburn, A.W., Spence, R.J.S. and Pomonis, A. *Disaster Mitigation*. New York: UNDP/DHA Disaster Mitigation Training Programme module, 1994. Available at: http://www.undmtp.org/english/Disaster_mitigation/disaster_mitigation.pdf; UNDRO. *Mitigating Natural Disasters: Phenomena, Effects and Options. A Manual for Policy Makers and Planners*. New York: Office of the United Nations Disaster Relief Co-ordinator, 1991.

Information providers

The following list outlines the main types of hazard information provider:

- Vulnerable communities and other local stakeholders, whose environmental knowledge can be obtained through surveys and participatory appraisal.
- State disaster management agencies, planning organisations, other ministries and departments,⁵ and public utilities (which generate hazard, risk, vulnerability and disaster impact data sets and maps). The military often have good hazards data, although it may not be easy to obtain (see Access to information in section 5).
- National and international scientific research and monitoring institutions such as meteorological offices, volcano observatories, geological surveys (which produce maps showing hazards and hazard-prone zones, install and operate monitoring systems and maintain the data sets collected, and carry out surveying, research and modelling) and space investigation agencies (which collect remote observation data).
- International development and disaster management organisations, notably regional management disaster agencies and documentation centres, and United Nations (UN) operational agencies (which produce diverse information materials including maps, disaster impact data, research studies and field reports).

⁵ Many different government departments may collect this kind of data, for instance, agriculture, health, transport and defence departments, and national organisations responsible for building codes and standards.

- Other non-state organisations, such as libraries, archives, the media, universities, research institutes, insurance companies and non-governmental organisations (also with varied information products).

Information gathering and dissemination initiatives are expanding at all levels, particularly the international (often with the support of UN and other international agencies) or bilateral donors. Hydro-meteorological hazards are particularly well served (see Box 3). The media and the Internet are also becoming increasingly important channels for dissemination. There are now a number of online databases containing high-quality information on hazards and disasters. The UN International Strategy for Disaster Reduction's publication *Living with Risk* (2004) lists many global, regional and national providers of hazards information, much of it available online.

Box 3 Collecting and disseminating hydro-meteorological information

The World Meteorological Organization (WMO) coordinates a global network of national meteorological and hydrological services from 187 member countries, which collect and share weather, water and climate data. Information is collected from 18 satellites, hundreds of ocean buoys, ships, aircraft and nearly 10,000 land stations. More than 50,000 weather reports and several thousand charts and digital products are disseminated each day through the WMO's global telecommunications system. This information is used for analysis of atmospheric and climatological conditions to produce forecasts and warnings, particularly for extreme events. At the national level, these agencies maintain data archives and databases providing historical data that can be used to assess future events and trends.

Source: World Meteorological Organization. 'Reducing risks of weather, climate and water-related hazards'. In UN/ISDR, *Know Risk*. Geneva: United Nations International Strategy for Disaster Reduction, 2005, pp 74-5.

5. Critical factors in data collection and use

Information on hazards should be accurate, reliable and comprehensible to planners (or at least capable of being explained easily, where it has been produced for other users or purposes). It must also cover all significant hazards.

Access to information

At an early stage, project and programme planners should consider where relevant and reliable hazards information is located and the potential ease or difficulty of obtaining it (including the likely time and resource implications).

Much of the information may be in the public domain (see section 4, Information providers). But in some countries it may remain restricted. Maps, for instance, are sometimes considered too militarily, politically or commercially sensitive to share. Most information from official sources is subject to regulations governing access and disclosure. Considerable time and effort may be necessary to obtain even open-access information from slow-moving bureaucracies. Project planners should encourage transparency and knowledge building by sharing their own findings with other organisations.

Box 4 Challenges in access to information

Following the 2001 earthquake, the Gujarat State Disaster Management Authority in India commissioned the Delhi-based consultancy TARU to produce a comprehensive hazard risk and vulnerability atlas covering the 25 districts and 226 sub-districts that make up the state. Completed in 2005, the atlas covers risks from six natural and man-made hazards and the physical, social and economic vulnerability of the population, buildings, infrastructure and economy.

One of the main challenges to this ambitious undertaking was the collation and validation of public data from over 20 departments and agencies at state and national levels, all of which had to be digitised and

incorporated into a common spatial database. Demographic data and information on settlements, industries and commercial establishments were relatively easy to obtain. However, obtaining map data was more difficult because of the Indian government's security restrictions on public access to maps of areas bordering Pakistan, which includes much of Gujarat. To overcome this problem, extensive use had to be made of remote sensing to construct thematic maps and locate roads, bridges and settlements; this was costly. In addition, no topographical or bathymetric data for Gujarat are in the public domain, although this was crucial to assessing risk of flood and storm surge inundation; here, the project had to use NASA data.

Collating and validating large hazard event time series and geographically precise risk data was a major challenge. Multiple sources were drawn upon to enable triangulation and consistent data series, especially for drought (precipitation), earthquakes and cyclone tracks to produce statistically acceptable sample sizes to fit extreme value distributions. The availability of data from only one public source on flooding and chemical accidents was a particular challenge, as cross-validation was not possible.

No systemic vulnerability or fragility functions exist for India or Gujarat's physical infrastructure, economy, populations and communities. These had to be painstakingly estimated using past disaster loss studies and stratified sample surveys across the state. In some areas, especially in the case of infrastructure vulnerability, international cases and research were used to benchmark fragility functions, as an adequate record of local loss was not available. A mixed sample of events across India was used to estimate the fragility functions for post-disaster loss of life.

Source: Information provided by A. Revi, Director, TARU, Delhi, India.

Data quality

Planners will seek to obtain as much existing hazard information (processed or raw data) as possible for their assessments, drawing upon a variety of information providers (see section 4, Information providers). A high level of accuracy and detail is often possible in hazard assessment, for example, visually through maps, remote sensing and GIS, and in prediction such as complex flood models that model rainfall to run-off, the movement of floodwaters through waterways and flood plains, and inundation areas. (Simulations and scenarios can also be useful in assessing how the proposed project might exacerbate or mitigate hazards and how future development might affect the predominant hazard patterns in the project area.)

However, in many situations it will be necessary to work with incomplete or outdated data sets. Not all countries have extensive hazards data; many find it difficult to collect and maintain comprehensive data sets because of cost and skills shortages. Early consultation with technical experts will help to identify and overcome such problems.

Carrying out new studies is costly and time-consuming but field surveys (e.g., mapping topography and vegetation, taking soil samples) may be required where recorded information is limited, to verify data from other sources or to resolve uncertainties.

It may not be necessary to rely on sophisticated technologies and outside specialists in surveying. Visual surveys by experienced people can identify areas at risk from landslides; simple stream gauges or flood marks can be used to monitor water levels and identify areas likely to be flooded; and local people's knowledge of hazards is often more accurate and extensive than outsiders appreciate. Many community projects carry out participatory surveys (e.g., transect walks, community mapping, timelines and seasonal calendars) that complement or compensate for more formal scientific data.

Hazards information is often not collected or presented consistently, and so is to be found in a variety of formats (e.g., mapping to different scales). Project planners should be clear from the start about the formats they wish to work in, bearing in mind their compatibility with other information systems in use by the organisation concerned, and the types and formats in which existing data are most likely to be available. This has time and resource implications, which have to be factored into the planning process. Consistency in recording data is equally essential and is not always straightforward (e.g., cataloguing hazards can be complicated where a primary hazard such as a cyclone triggers secondary hazards such as floods and landslides).

A great deal of valuable evidence about the location, impact and frequency of hazard events may be obtained from historical records (written and oral), archaeological findings, professional reports or research studies of various kinds, local observation, damage reports, and newspaper and magazine articles. On the Internet, the volume of open-access geospatial information such as maps and satellite images is growing rapidly. Planners commonly use quantitative and qualitative evidence from such sources, particularly where other data are missing or difficult to obtain. Online disaster data sets and national risk indices provide additional information for country-level programming (see **Guidance Note 4**).

In all cases, planners must make their own judgements about the quality and relevance of the information that is available.

Capacity to collect and use data

Information is collected for a purpose: to guide decision-making. Adequate time and resources should be allocated to the assessment of hazards based on the data gathered. Planners often overemphasise data collection compared to analysis. As noted above, hazards information is usually collected to feed into other project appraisal activities, particularly risk analysis.

Information collection and analysis systems should be as simple and practical as possible, based on planning teams' human, technical and material capacities. The cost and time needed for assessments must also be taken into account.

Assessments using existing or less detailed data, or focusing on selected key hazard characteristics, may be deemed sufficient in some cases,⁶ but in many instances additional scientific or technical expertise will be needed. Adoption of new technologies (e.g., GIS, remote sensing) may place considerable demands on human and system capacities.

Highly technical information generated by scientists or engineers may need explaining to non-scientific users. It is advisable to bring different technical specialists (including natural and social scientists, and planners) together at the earliest possible stage to facilitate mutual understanding and communication.

Uncertainty and decision-making

Understanding hazards can be a complex process because it is often based on a combination of data sets. For example, in assessing landslide hazards at a particular site, scientists will look at past history, slope steepness and orientation, bedrock, rainfall, groundwater and vegetation, because specific combinations of these factors are associated with different types of landslide. A planner would add land use to this list, as development activities can increase landslide hazard risk, even in areas not previously affected. Where there are multiple hazards the challenge becomes more complex, because different assessment techniques and results have to be brought together.

It may not be possible to assess some features of the hazard owing to limitations in the current state of scientific knowledge. Evidence may not be clear-cut, even to experts. Probabilistic calculations of hazard risk are often problematic. For example, it is difficult to predict the location and timing of landslides precisely, although there is sufficient understanding of landslide processes for estimates of potential hazards. Similarly, estimates of frequency often have to be derived from records of previous events. Experts may disagree over interpretations of evidence.

It is important to define clearly what information is needed for decision-making, and the level of detail required, before starting data collection. This should be reviewed from time to time as the planning and appraisal process progresses, and the information needs and availability become clearer. It is also essential to identify explicitly gaps and ambiguities in the evidence and areas where the analysis is contested. In all cases, clear procedures for reaching planning decisions are required, which should be laid down in advance.

⁶ For example, the recent Kathmandu Valley Earthquake Risk Management Project (KVERMP), where the emphasis was on informing and mobilising local institutions to protect existing urban developments, chose to use the available geological and seismological data, allied to an imported methodology for developing damage scenarios, rather than undertake new seismic micro-zoning and soil amplification studies. Dixit, A.M. et al. 'Hazard mapping and risk assessment: experiences of KVERMP' in ADPC (2004).

Box 5 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.⁷

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

⁷ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Further reading

ADPC. *Proceedings: Regional Workshop on Best Practices in Disaster Mitigation – Lessons Learned from the Asian Urban Disaster Mitigation Program and Other Initiatives, 24–26 September 2002, Bali, Indonesia*. Bangkok: Asian Disaster Preparedness Center, 2004. Available at: <http://www.adpc.net/audmp/rlw/default.html>

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Organization of American States Caribbean Disaster Mitigation Project website contains reports, studies and other documents illustrating the application of hazards information in mitigating the impact of natural disasters on development: <http://www.oas.org/cdmp>

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Poverty Reduction Strategies

Guidance Note 3

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note addresses the issue of poverty reduction, providing information on the integration of disaster-related issues into the preparation of poverty reduction strategies (PRSs) and other poverty reduction initiatives in hazard-prone countries and the identification of 'win-win' opportunities for reducing poverty and strengthening hazard resilience. It is intended for use by national governments in preparing PRSs and by international development organisations in supporting governments in this process.

1. Introduction

Since the late 1990s, poverty reduction has become the principal objective of development strategies in many developing countries. This shift in emphasis has been in part spearheaded by the Poverty Reduction Strategy initiative, which was launched in 1999 by the World Bank and the International Monetary Fund (IMF) to complement the Heavily Indebted Poor Countries (HIPC) initiative. Under the initiative, qualifying countries are required to produce and implement Poverty Reduction Strategy Papers (PRSPs) in order to obtain permanent debt relief. By 2005, the PRSP had become the primary tool in nearly 60 low-income countries for articulating poverty reduction and growth strategies.¹ The international development community, including international financial institutions, United Nations (UN) agencies, bilateral donors and non-governmental organisations (NGOs), have expressed strong support for this PRS process and increasingly use country PRSPs as the basis for designing their own programmes of assistance and coordinating with governments and other development partners.

PRSPs outline a country's macroeconomic, structural and social policies and programmes to reduce poverty and promote pro-poor growth. They are nationally owned documents prepared by individual governments, based on a detailed and thorough analysis of poverty and strategies for supporting pro-poor growth and drawing on extensive consultations with key stakeholders, including civil society and the private sector.

The rising importance attached to poverty reduction has been influential in thrusting disaster risk management up the agenda as exposure to risk and income shocks, including those emanating from natural hazards, is widely acknowledged as one of the fundamental dimensions of poverty (see Box 1).² In theory, economic growth and poverty reduction could, of themselves, reduce the vulnerability of the poor to natural hazards, with no explicit risk reduction strategy required. However, this ignores the facts that vulnerability is both a cause and a symptom of poverty, implying that gains in poverty reduction may be unsustainable if disaster risk is not tackled, and also that the development process can influence vulnerability negatively as well as positively. Win-win solutions for reducing poverty and strengthening hazard resilience therefore need to be identified and pursued.

¹ World Bank. *Toward a Conflict-Sensitive Poverty Reduction Strategy: Lessons from a Retrospective Analysis*. Report No. 32587. Washington, DC: World Bank, 2005. Available at: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000160016_20050714160728&searchMenuPK=64187283&theSitePK=523679

² See, for instance, World Bank (2002).

Box 1 Poverty and disasters

Poverty and vulnerability to natural hazards are closely linked and mutually reinforcing. Disasters are a source of hardship and distress, potentially temporarily forcing certain groups below the poverty threshold and also contributing to more persistent, chronic poverty. Disasters can result in the loss of lives, homes and assets, disrupt livelihood opportunities, schooling and provision of social services, erode savings and create health problems, sometimes with long-term consequences. Disasters can also disrupt ongoing poverty reduction activities and force a diversion of related financial resources into relief and rehabilitation efforts. Poverty can be further reinforced by deliberate risk-averting, ex-ante livelihood choices that poorer households may make. For example, poorer households may choose to forgo the potential benefits of higher yielding or more profitable crops in favour of more hazard-tolerant ones.

Poor and socially disadvantaged groups, in turn, are among the most hazard vulnerable, reflecting their social, cultural, economic and political environments – for instance, the substandard quality and, often, dangerous location of housing (e.g., on flood plains, riverbanks or steep slopes); lower levels of access to basic services, particularly for the rural poor and illegal squatters; uncertain ownership rights, reducing incentives to manage resources sustainably or invest in structural mitigation measures; often more vulnerable livelihoods; and limited access to financial resources, constraining their ability to diversify livelihoods and recover post disaster. The poor can also exacerbate their own risk where limited livelihood opportunities force over-exploitation of the local environment. Meanwhile, the covariate nature of natural hazards implies that there is limited scope for formal and informal community-based support systems in the aftermath of a disaster.

Current state of the art

An increasing number of PRSPs explicitly recognise that natural hazards and related vulnerability play a role in determining forms and levels of poverty and in influencing broader macroeconomic performance. Over 15 of them include related disaster risk management measures. However, these measures are typically very narrowly and traditionally conceived. For instance, they outline plans to strengthen warning systems and disaster response capabilities and to target relief and rehabilitation assistance towards the poor (e.g., Ghana, Malawi, Mozambique) and/or to strengthen the resilience of the agricultural sector (e.g., Malawi, Mozambique), for example by the adoption of improved seeds. Very few go that fundamental step further, seeking to integrate disaster risk management concerns into broader development strategies and programmes and to tackle it more holistically (notable exceptions include Bangladesh (see Box 2) and Cambodia). Moreover, there are some glaring omissions, involving highly disaster-prone countries where the impact of recent disaster events on levels of poverty may be mentioned in passing but there is no discussion of measures to reduce risk.

Various international initiatives are now under way to advocate for greater consideration of hazard-related issues in PRSPs in relevant countries and to develop tools and mechanisms to support this process. A number of development organisations are involved in these initiatives, including the United Kingdom's Department for International Development (DFID), the UN's International Strategy for Disaster Reduction (UN/ISDR), the United Nations Development Programme (UNDP) and the World Bank. The Hyogo Framework for Action 2005–2015, adopted by the World Conference on Disaster Reduction in January 2005 and signed by 168 nations and multilateral institutions, specifically calls for the integration of disaster risk reduction considerations into poverty reduction strategies.³

Box 2 An exemplary case: The 2005 Bangladesh PRSP

The Bangladesh PRSP is exceptional in both the importance it attaches to disaster risk management and the extent to which it seeks to integrate disaster risk management into broader development activities. Disaster risk management is not explicitly included as part of the four strategic blocks or four supporting strategies on which the PRS is based. However, the extent to which the PRS ensures comprehensive disaster risk management, environmental sustainability and mainstreaming of these concerns into the national development process is identified as one of ten key goals on which the success of the PRS will be judged.

³ UN/ISDR. *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*. World Conference on Disaster Reduction, 18–22 January 2005, Kobe, Hyogo, Japan. Geneva: United Nations International Strategy for Disaster Reduction, 2005, page 6, para 16 (i) (b). Available at: <http://www.unisdr.org/wcdr/intergover/official-doc/L-docs/Hyogo-framework-for-action-english.pdf>

Sixteen policy matrices were developed as instruments through which the PRS would be operationalised, also including one specifically on comprehensive disaster management. This matrix outlines six strategic goals:

- To mainstream disaster management and risk reduction into national policies, institutions and the development process, including the introduction of a disaster impact and risk assessment to be undertaken in preparing new projects.
- To strengthen disaster management and risk reduction institutional capacity.
- To strengthen knowledge management, including with regard to sharing and applying information.
- To enhance community-level capacity for disaster risk reduction.
- To ensure social protection of vulnerable groups.
- To strengthen governance in the area of disaster risk management.

Various disaster risk management goals and actions are also included under other policy matrices, including flood protection; strengthening of flood forecasting and warning systems and predictive capacities for other natural hazards; and various programmes to support those affected by disasters, for example through the provision of humanitarian relief, loans for small businesses and housing.

Factors underlying this emphasis on disaster risk management in the PRS include the high frequency of disasters in Bangladesh, affecting considerable segments of the population; strong recognition within the country of the need for a shift in weight from disaster response and recovery to a more comprehensive risk reduction approach; and the prior development of a five-year Comprehensive Disaster Management Programme (2004–2008) aimed at achieving this shift.

Advocated good practice

Four essential actions are required as part of the preparation of a PRS to ensure that disaster risks are adequately assessed and managed:

- An early assessment of vulnerability to natural hazards should be undertaken in hazard-prone countries.
- Rational, informed and explicit decisions should be taken on whether and how to address significant risks.
- The role of disasters and associated risks in contributing to other characteristics of poverty and their potential implications for the achievement of related strategic objectives should be carefully explored.
- Post-disaster support should be planned ahead of time to support both rapid recovery and enhanced resilience to future events, particularly of the poor.

This guidance note outlines detailed measures for ensuring that these actions are accomplished.

2. Basic steps in merging disaster risk concerns into the PRS process

The scope and emphasis of PRSPs vary between countries, reflecting different social, economic, financial, political and natural environments. However, a broadly similar preparation process is followed. Measures required to ensure that natural hazards and related vulnerability are adequately and systematically examined and addressed at each step in this process are outlined below. These measures, particularly those described in Step 1, are also relevant in undertaking poverty assessments and developing poverty reduction programmes and pro-poor policies in non-HIPC countries.

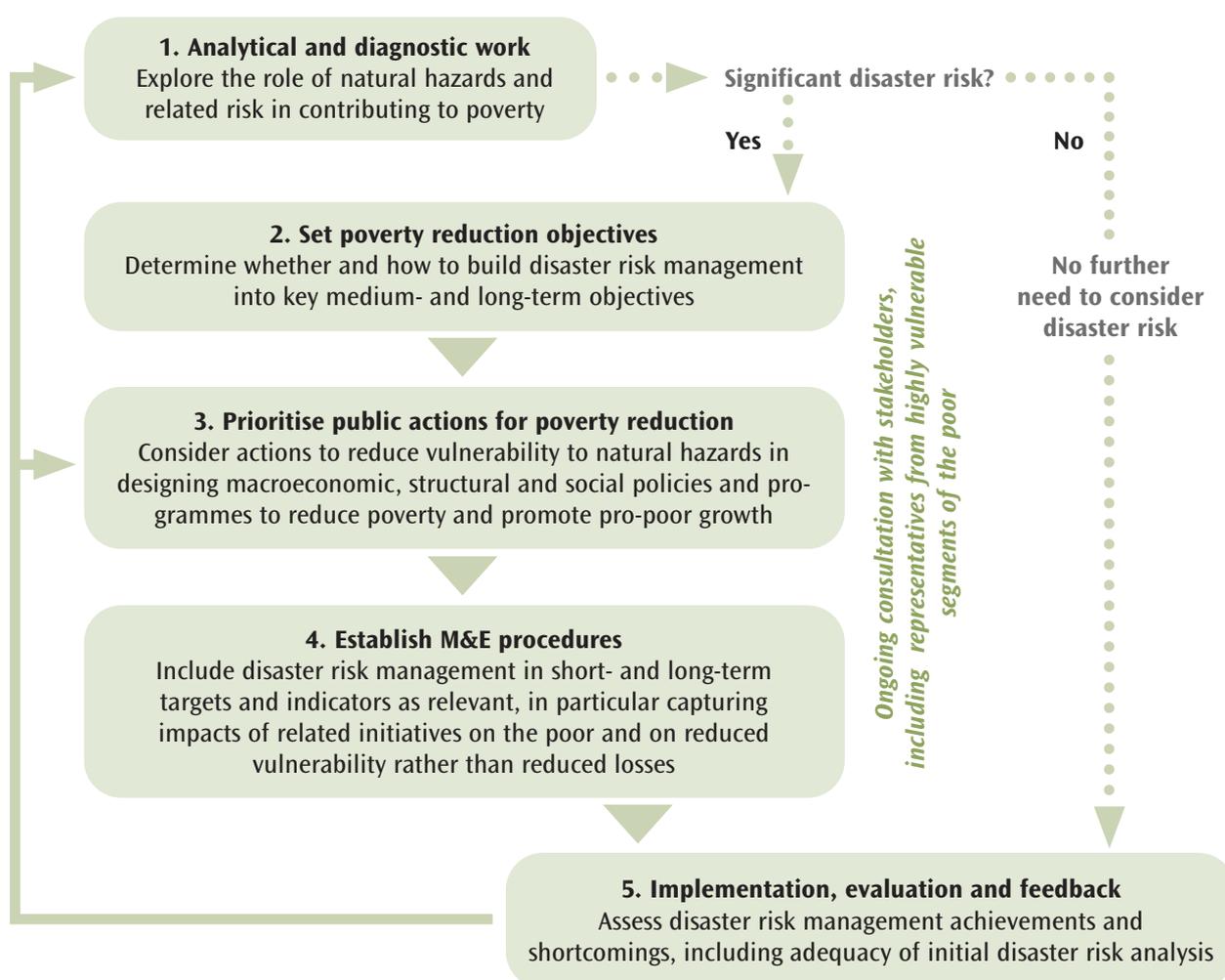
Step 1. Analytical and diagnostic work

Consider the role of vulnerability to natural hazards as part of the broader analysis to identify the poor, analyse the severity of poverty, identify correlated factors and underlying determinants, and examine the constraints and priorities of the poor.

In hazard-prone countries, the assessment should seek to establish which segments of the population are particularly vulnerable to natural hazards and what the implications are for levels and forms of poverty. Specific points to consider include:

- Types, magnitude, scale and probabilities of hazards faced in different parts of the country. As a first step it may be helpful to superimpose spatial hazard maps (see **Guidance Note 2**) on poverty maps, assuming both are available.
- Factors contributing to vulnerability (e.g., occupation, type and location of housing, access to credit and social safety nets). The analysis should differentiate between groups because forms and levels of vulnerability can vary enormously (for instance, between income groups, geographical areas, rural and urban areas, male- and female-headed households, ethnic groups and communities facing different types of hazard).

Figure 1 Integration of disaster risk concerns into a poverty reduction strategy



- Potential direct and indirect consequences of disasters for levels of income and well-being of different groups (e.g., in drought-prone, rural areas, droughts can increase the time required to collect water, with consequences for remunerative activities).
- Strategies to minimise disaster risk and their implications for income (e.g., choice of crops grown).
- Strategies to cope with and recover from disaster events (e.g., changes in crop production, income diversification, increased use of common property or open access resources, withdrawal of children from school, distress sale of assets), their implications for levels of poverty and related constraints to recovery (e.g., restricted access to credit).
- Role of past disaster risk management and poverty reduction strategies in influencing forms and levels of vulnerability, both positively and negatively.

- Impact of past macroeconomic policies and structural reforms on vulnerability to natural hazards, particularly of the poor (see **Guidance Notes 4 and 8**).
- Impact of past disasters on levels and forms of poverty, including associated movements in and out of poverty (see Box 3). Has post-disaster support benefited the poor and has it been appropriate to their needs?
- Implications of changes in vulnerability over time (e.g., due to rapid economic growth (see below) or the spread of HIV/AIDS) for the effectiveness of formal and informal disaster risk management strategies. The implications of climate change also need to be considered, exploring the resilience of the poor in the face of increasingly frequent and intense climatological hazard events.

Box 3 Living near the edge: Disasters and the ‘near-poor’

Strategies to reduce vulnerability need to take into account the needs of the ‘near-poor’, as well as the poor, as disasters can force additional people into poverty. For instance:

- In El Salvador, the two earthquakes in 2001 led to an estimated 2.6–3.6 per cent increase in poverty.⁴
- In Honduras, the percentage of poor households increased from 63.1 per cent in March 1998 to 65.9 per cent in March 1999 as a consequence of Hurricane Mitch in October 1998. The number of rural households living in extreme poverty or indigence rose by 5.5 percentage points.⁵
- In Vietnam, it is estimated that a further 4–5 per cent of the population could be pushed into poverty in the event of a disaster.⁶
- In Aceh, Indonesia, the 2004 tsunami is estimated to have increased the proportion of people living below the poverty line from 30 per cent to 50 per cent.⁷

Regressions of fluctuations in levels of poverty against the incidence of hazard events (or an appropriate proxy such as fluctuations in staple crop yields or deviations from mean rainfall) can be useful in determining the extent of vulnerability of the poor and near-poor to natural hazards. Quantitative data collated to compile poverty profiles can also provide key information in helping to determine underlying causes. If sufficient, disaggregated data are available, variations in income or consumption of the different groups over time can be taken as proxies for vulnerability and regressed against factors such as occupation, asset holdings and gender of household heads to explore factors determining vulnerability. However, vulnerability is complex and requires additional qualitative analysis using tools such as sustainable livelihoods and vulnerability and capacity analyses, even where quantitative data are available, to ensure development of appropriate strategies to strengthen resilience (see **Guidance Notes 9, 10 and 11**). Any such existing analysis and case evidence on the impact of recent disasters on the poor should be sought to help support this process and minimise further work.

Step 2. Set poverty reduction objectives

Use the findings of Step 1 to determine whether and how to build disaster risk management into the key medium- and long-term objectives.

There is no right or wrong way to do this. There may be a strong rationale, for instance, for including disaster risk reduction as a sectoral or sub-sectoral goal, rather than a primary objective even in a high-risk country (see Box 4). However, it should be borne in mind that a wide, eclectic range of factors can determine vulnerability to natural hazards and that a broad perspective should therefore be maintained in trying to explore the best ways of tackling it, rather than being forced by the targets and objectives set to seek solutions categorised by sector.

4 World Bank. *Memorandum of the President of the International Bank for Reconstruction and Development and the International Finance Corporation to the Executive Directors on a Country Assistance Strategy for the Republic of El Salvador*. Report No. 22932 ES. Washington, DC: World Bank, Central America Country Management Unit, Latin America and the Caribbean Region, 2001. Available at: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSPIB/2001/11/28/000094946_01110804162761/Rendered/PDF/multi0page.pdf

5 Honduras PRSP. Available at: http://povlibrary.worldbank.org/files/Honduras_PRSP.pdf

6 ADB et al. *Vietnam Development Report 2004*. Joint Donor Report to the Vietnam Consultative Group Meeting, Hanoi, December 2–3, 2003. Hanoi: Asian Development Bank, Australian Government’s Overseas Aid Program, UK Department for International Development, Gesellschaft für Technische Zusammenarbeit (GTZ), Japan International Cooperation Agency, Save the Children UK, United Nations Development Programme and World Bank, 2004. Available at: <http://www.worldbank.org.vn/news/VDR04%20Poverty.pdf>

7 DFID. *Reducing the Risk of Disasters – Helping to Achieve Sustainable Poverty Reduction in a Vulnerable World: A Policy Paper*. London: Department for International Development (UK), 2006. Available at: <http://www.dfid.gov.uk/pubs/files/disaster-risk-reduction-policy.pdf>

Box 4 Practices in incorporating disaster risk management into PRS objectives

In practice, disaster risk reduction is rarely, if ever, selected as a key PRS objective. However, it has been incorporated into other PRS objectives in various ways:

- Disaster risk reduction has been identified as an issue under other key priorities such as a general reduction in vulnerability (e.g., Cambodia, Ghana, Malawi, Nicaragua (2001), Vietnam).
- It has been identified as a secondary priority, complementing achievement of selected primary goals (e.g., Mozambique).
- Some aspect of disaster risk reduction has been implicitly prioritised through other sub-goals, for instance to reduce the general vulnerability of agricultural activity (e.g., Burkina Faso).
- It has been included as part of sectoral sub-priorities (e.g., Laos (under Agriculture) and Tajikistan (under Environment and Tourism)).

Step 3. Prioritise public actions for poverty reduction

In high-risk countries, consider actions to reduce vulnerability to natural hazards in designing macroeconomic, structural and social policies and programmes to reduce poverty and promote pro-poor growth and in allocating public resources. Selected disaster risk reduction measures should be appropriate and feasible according to the findings of Step 1 above, key PRS objectives, estimated costs and benefits of the various disaster risk reduction options, available resources, institutional capacities and the effectiveness of past disaster risk reduction measures. The positive and negative impacts of other poverty reduction actions on hazard resilience, and their own vulnerability to hazard events, should also be explicitly considered.

Sectoral policies and programmes. There are a wide range of potential measures to reduce vulnerability to natural hazards, such as the development of drought- or flood-tolerant, short-cycle and relatively high-yielding crop varieties; expansion of irrigation networks; support to promote the growth of disaster-related microinsurance schemes (e.g., weather derivatives as currently being introduced in Mongolia to support herders); hazard-proofing of critical pro-poor social and productive infrastructure; and the development of early warning systems.⁸ There are also a number of mechanisms that can be pre-designed for responding to disaster events (Box 5). In selecting and designing these various measures, it is important to consider whether they will be pro-poor – for instance, whether sea defences will favour locations occupied by lower-income groups or whether poor households will have the skills and resources to access and utilise warning systems effectively. In view of financial constraints, low-cost measures should be particularly emphasised, such as community-based disaster risk management programmes, which could potentially provide solutions that are both sustainable and, if determined inclusively, sensitive to the needs and existing coping strategies of the poor.

Box 5 Post-disaster social safety nets

Publicly funded social safety nets may be needed to support poor households during and after a disaster, providing humanitarian relief, supporting the recovery of livelihoods and helping to ensure that poor households are not forced into further poverty (e.g., via the erosion of assets). Recent analysis for Ethiopia and Honduras, for instance, indicates that a safety net meeting basic food needs and, in some cases, minimal cash income can allow the chronically poor to divert efforts from survival-type coping strategies (such as distress sale of remaining productive assets) to more remunerative activities that might build assets and increase earnings.⁹

These safety nets should be established ahead of time, carefully targeted towards the poor and designed to support rapid recovery and, where possible, enhanced resilience to future hazard events. They should seek to complement, rather than undermine, household coping strategies and ensure that existing inequalities are not exacerbated (e.g., by only supporting licensed and registered operators). They should also be sensitive to the fact that some segments of the poor may be relatively hazard-resilient (for instance, urban unskilled factory workers) while some segments of the non-poor, such as farmers, may be highly vulnerable, temporarily falling into poverty as a consequence of a disaster and so potentially requiring targeted support.

⁸ For a much fuller discussion of possible measures, see UN/ISDR, *Living with Risk: A Global Review of Disaster Reduction Initiatives*. Geneva: United Nations International Strategy for Disaster Reduction, 2004. Available at: http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng.htm

⁹ Carter, M.R., Little, P.D., Mogues, T. and Negatu, W. *Shocks, Sensitivity and Resilience: Tracking the Economic Impacts of Environmental Disaster on Assets in Ethiopia and Honduras*. University of Addis Ababa, University of Kentucky and University of Wisconsin, 2004. Available at: <http://ideas.repec.org/p/wpa/wuwpdc/0511029.html>

The appropriate type of safety net measure implemented will depend on the nature of the hazard experienced, the characteristics of affected poor households and the impact of the event. Possible options include:

- One-off cash or quasi-cash grants to help replace lost assets (e.g., livestock), rebuild livelihoods and protect remaining assets.
- Support to microfinance institutions to withstand disaster-induced liquidity pressures and to extend loans to disaster victims.
- Public works programmes to create employment, targeting the poor via low wage rates.
- Fee or tax waivers, such as waiver of certain agricultural taxes, school fees or health-care charges.

In high-risk areas, implications for vulnerability to natural hazards should also be considered in determining other strategies and programmes for reducing poverty. This is important both to help ensure that the full benefits and costs of different options are captured, including potential trade-offs between the achievement of PRS objectives and risk reduction, and to provide some overview of the expected net impact of a PRS on vulnerability to natural hazards, particularly for the poor. For example:

- Improving rural road networks can open up markets for new crops and non-agricultural products, potentially facilitating diversification of income into less hazard-vulnerable activities and improving access to disaster-affected rural communities.
- Expanding credit availability for the poor can similarly support income diversification into more hazard-resilient activities.
- Improving solid waste collection can reduce risk of flooding in urban slums.
- Or, on the negative side, promotion of fisheries can lead to environmental degradation, reducing protection against natural hazards. (See also Box 6.)

Box 6 Ensuring poverty reduction does not exacerbate disaster risk

UNDP and UN/ISDR have developed a matrix highlighting ways of ensuring that individual sectoral contributions towards the achievement of the Millennium Development Goals (MDGs), which are closely aligned to poverty reduction objectives, do not exacerbate disaster risk (UNDP and UN/ISDR, 2006). For instance, in relation to MDG 1, Target 1, which aims to halve the proportion of people whose income is less than US\$ 1 a day by 2015, the matrix includes the following points:

- *Agriculture*. While increasing agricultural productivity to raise the incomes of the rural poor and generate rural jobs, it is critical to provide for drought-resistant cropping strategies, including contingency cropping patterns to match late or early rains, floods or droughts, closely linked to meteorological monitoring and forecasting.
- *Water and sanitation*. While improved water supply for productive activities can raise economic growth through agriculture, urban manufacturing and service sectors, care has to be taken to ensure balanced utilisation of groundwater, ensuring that extraction does not exceed the rates of recharge and that impacts of future droughts are not exacerbated.
- *Slum upgrading and urban planning*. While providing security of tenure can improve labour market participation and access to credit markets, care has to be taken to enforce and apply land use by-laws that are consistent with hazard risk mapping. Urban infrastructure, including transport systems, is necessary for establishing manufacturing and service industries, but should be made hazard resilient through retrofitting and strengthening to conform to assessed hazard risks.
- *Transport*. Roads, railroads and ports lower transport costs and thereby increase the real incomes of the poor, but transport systems need to be made hazard resilient.

By highlighting interventions required by different sectors, this matrix supports government ministries/departments and NGO counterparts in understanding their responsibilities in relation to potential trade-offs between disaster risk and poverty reduction and in identifying required disaster risk reduction interventions. UNDP and UN/ISDR plan to extend this work further to provide more specific sectoral guidance.

Ideally, all potential options for reducing poverty should be quantitatively analysed to determine how to allocate resources. Where cost-benefit analysis is used, any significant direct and indirect disaster risk-related costs and benefits of each option should preferably be captured (see **Guidance Note 8**). In practice, cost-effectiveness analysis is

often more feasible, entailing the comparison of unit costs (in terms of cost per poor person or household served) of achieving different intermediate outcomes. In such cases, it is more difficult to take disaster risk reduction benefits into account quantitatively, except where they affect unit costs. However, disaster risk-related costs and benefits should be qualitatively considered in making the final selection of options. This selection is ultimately an informed matter of judgement.

Macroeconomic and structural policies. Economic growth is widely identified as the single most important factor influencing reductions in poverty, with macroeconomic stability, in turn, considered essential for high and sustainable growth.¹⁰ However, disasters can cause significant macroeconomic instability, disrupting productive activities, causing a deterioration in fiscal and external trade balances and reducing both short- and medium-term rates of growth (see **Guidance Note 8**). Moreover, economic growth does not necessarily imply a decline in vulnerability to natural hazards. In the earlier stages of economic development, disasters can actually exacerbate vulnerability, both for individual vulnerable groups and for the broader macroeconomy (see **Box 7** and **Guidance Note 14**). In high-risk countries, macroeconomic policies should, therefore, take vulnerability to natural hazards into account, considering the relative vulnerability of different sectors in promoting growth and exploring win-win options for strengthening hazard resilience and securing sustainable economic development. Projections of future growth performance, poverty reduction achievements and resources available for public expenditure also need to be realistic, taking into account the impact of possible disasters, in order to support successful development planning (see **Guidance Note 14**).

Box 7 Economic growth and hazard vulnerability

The relationship between the level of development of an economy and its vulnerability to natural hazards is hugely complex, reflecting the fact that development is a non-linear process with many different paths. However, as evidence confirms, during earlier stages of economic development, vulnerability can increase at both micro- and macroeconomic levels. Poor and socially disadvantaged groups can become more vulnerable as socio-economic change leads, for example, to the breakdown of familial support and traditional coping mechanisms, increasing reliance on monetary earnings rather than in-kind production and movements of people to occupy and seek livelihoods in more hazard-prone places. Moreover, during earlier stages of development, rapid urbanisation is typically unplanned; building and land use codes are poorly enforced; little regard is paid to the state of the environment; and natural resources, such as forests and groundwater, are exploited, exacerbating the impact of future hazard events (see **Guidance Note 7**). Meanwhile, growing sectoral, geographical and financial integration increases the indirect macroeconomic multiplier effects of adverse performance in a particular sector or region on the rest of the economy, potentially turning local crises into national ones.

At higher levels of development, disaster-related physical losses are much higher but the economic impacts of disasters decline again proportionately, in part due to increased investment in mitigation and preparedness measures, improved environmental management, greater access to financial resources and lower associated opportunity costs and to a reduction in the scale of absolute poverty and thus of household vulnerability. A greater share of private sector economic assets is also likely to be adequately insured against disaster and the burden diffused by global reinsurance.

Source: Benson, C. and Clay, E.J. *Understanding the Economic and Financial Impacts of Natural Disasters*. Disaster Risk Management Series, No. 4. Washington, DC: World Bank, 2004. Available at: http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000012009_20040420135752

*Governance.*¹¹ In high-risk countries, efforts to improve governance should include mechanisms to ensure that:

- appropriate policy frameworks exist to mainstream disaster risk reduction as a central element in development planning;
- strong institutional, legislative and regulatory arrangements and capacities are in place for disaster risk management;

¹⁰ See, for instance, World Bank (2002).

¹¹ See, for instance, UNDP, ProVention, UN-HABITAT and UNV (2005) for more in-depth discussion.

- there is adequate financial provision for disaster risk management, including appropriate financial planning for potential disasters (see below);
- all relevant stakeholders, including poor, vulnerable groups, participate in disaster risk management policy and decision-making;
- powerful interest groups do not subvert efforts to reduce hazard vulnerability of the poor;
- property rights of the poor are secure, encouraging investment in mitigation;
- the delivery of post-disaster support reaches those most in need;
- opportunities for related corruption are minimised (e.g., via well-designed and properly implemented financial controls and systems of accountability relating to the use of relief and reconstruction funds); and
- governments and other institutional actors are held to account for their disaster risk management decisions and actions.

Decentralisation is an important vehicle for mainstreaming disaster risk reduction, fostering local participation and empowerment and improving accountability. However, in order to ensure that local governments are able to fulfil their disaster management responsibilities, devolution of responsibilities must be accompanied with commensurate assignments of power and financial resources.

Recognition of potential problems of governance that disasters can create is also required, relating, for example, to the considerable pressure disasters can place on administrative systems and the disruption they can cause to processes of consultation and participation.

Costs, budget and financing. Disaster risk should be taken into account in allocating public resources, with appropriate provision made for disaster risk reduction and potential disasters (see **Guidance Notes 4 and 14**).

There is a tendency to finance disaster relief and rehabilitation efforts in part via the reallocation of previously committed development resources, disrupting the achievement of other objectives. Large-scale inflows of external relief and reconstruction assistance post disaster can also create absorptive problems, impacting on all areas of public expenditure. However, systems of prioritisation of expenditure, a broader element of good fiscal management, can play an important role in ensuring that key poverty reduction programmes are protected. If post-disaster expenditure occurs on a regular, annual basis, predesignated calamity funds should be established as well.

The use of medium-term expenditure frameworks is also important, helping to ensure that risk reduction needs are not entirely overshadowed by shorter-term, more immediate, but perhaps ultimately less important, demands.

Step 4. Establish monitoring and evaluation procedures

If a PRS is expected to contribute to improved disaster risk management, it should include relevant short- and long-term targets and indicators and related systems for monitoring and evaluating implementation and achievements, particularly impacts on the poor (see Box 8).

Ideally, indicators should be quantitative (with related baseline data from which to measure progress), precise, readily and affordably attainable, pertinent and sufficient to assess performance. It may also be relevant to use indicators disaggregated by geoclimatic or geophysical zones. Outcome indicators should be based on reduced vulnerability rather than reduced losses because a disaster may not occur over the life of the PRS. Disaster risk reduction outcomes should additionally be linked to the attainment of broader PRS objectives, including MDGs in the case of MDG-based PRSs.

It is also important to consider the potential consequences that disasters (and other shocks) could have on PRS implementation (via physical damage or reallocation of resources), impact and outcome, both to ensure that realistic indicators and targets are set and as a further check in ensuring that potential implications of disasters have been adequately considered and addressed. In high-risk countries, it may be more appropriate to include range, rather than point, or 'with' and 'without' disaster indicators and targets for all PRS objectives. (See **Guidance Note 13** for further discussion.)

Box 8**Monitoring and evaluation (M&E) indicators for disaster risk reduction**

Existing PRSPs include various input and output indicators for disaster risk reduction, for instance relating to planned expenditure on particular activities, the design and approval of relevant policies, delivery of training and the construction of structural mitigation infrastructure. A few, including those that seek to integrate disaster risk reduction concerns into broader development strategies and programmes, also set specific disaster-related outcome and impact indicators, in some cases measuring the achievement of disaster risk reduction indirectly through other output indicators (see also **Guidance Note 4**):

- The 2002 Vietnam PRSP, which aims to halve the number of people falling back into poverty due to calamities and other risks by 2010.
- The 2005 Bangladesh PRSP, under which implementation of a comprehensive disaster management programme is expected to contribute towards a 50 per cent decline in the number of people living below the poverty line, gainful employment and reduced loss of output, properties and lives.
- The 2002 Cambodia PRSP, which aims to reduce the area of agricultural land damaged by floods and droughts, the monetary value of flood losses and the number of people affected by drought.

Step 5. Implementation, evaluation and feedback

Assess disaster risk management achievements and shortcomings as part of the evaluation and draw on lessons learned to enhance the effectiveness of successor PRSPs. The evaluation should consider whether the original analysis of disaster risk was sufficient; whether disaster risks were appropriately and cost-efficiently addressed; the effectiveness and sustainability of related activities; whether PRS achievements and outcomes are potentially threatened by future hazard events; and how any disasters occurring over the course of the PRS have affected its outcome. These issues should be explored in evaluating PRSPs in all disaster-prone countries, whether or not disaster risk was explicitly addressed. (See **Guidance Note 13** for further guidance on evaluation.)

In the event of occurrence of a major disaster during implementation, it may be necessary to adjust a PRS. In such circumstances, any changes should be transparent and rational relative to the key objectives of the PRS.

Repeated step. Participatory consultation

Consultations on the contribution of disasters to problems of poverty and related options for strengthening resilience should be repeated several times during the preparation of a PRS, for instance, in providing supplementary information for use in the diagnostics work; in determining programmes of action; and in evaluation and lesson learning.

Known highly vulnerable groups, both poor and non-poor, should be included in this process to determine their concerns, including perceptions of risk, behavioural response and priorities in strengthening resilience. In particular, the views of female-headed households, the aged, the disabled and other potentially socially excluded groups should be explicitly sought as these groups are often particularly vulnerable to natural hazards.

Other stakeholders with relevant knowledge and expertise should also be consulted, including civil society organizations (who are often the most active in driving the risk reduction agenda), civil servants in relevant line ministries and departments (e.g., social welfare, agriculture, transport, health) in national and local government, specialist disaster-related public agencies, the private sector and academic and research institutions.

3. Critical factors for success

- *Prior recognition of the potential importance of disaster risk reduction.* Prior recognition of the likely significance of natural hazards and related vulnerability in contributing to poverty together with an appreciation of vulnerability as a development, rather than a humanitarian, issue are critical in ensuring that the topic receives adequate attention in the initial analytical and diagnostics work for a PRS and the related consultative process and, thus, in the resulting strategy itself.
- *Political will and accountability.* Governments and the international development community need to accept their accountability to the poor to reduce disaster risk by pledging their long-term commitment to risk reduction. Short-term returns may be very limited, assuming no hazard event, but longer-term paybacks can be substantial.

- *Technical support.* Clear, readily accessible guidance needs to be developed to support governments in analysing and addressing disaster-related aspects of poverty.
- *Advocacy capacity of vulnerable groups.* The views and needs of vulnerable groups need to be heard and understood. This is a potentially challenging task as such groups can be difficult to define and typically cannot be reached via a single entry point.
- *Cost minimisation.* Disaster risk concerns should be integrated into PRSs at minimum cost. Pooling of existing analysis on vulnerability to natural hazards and the impact of disasters on the poor would help reduce the cost of preparing PRSs. Giving due concern to disaster risk reduction in the design of other poverty-reduction measures, rather than treating risk reduction as a separate activity, could also help reduce implementation costs significantly.

Box 9 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.¹²

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

¹² The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Further reading

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Available at: <http://www.unisdr.org/wcdr/thematic-sessions/cluster1.htm>

World Bank. *A Sourcebook for Poverty Reduction Strategies*. Washington, DC: World Bank, October 2002. Available at: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPA/0,,contentMDK:20175742~menuPK:435735~pagePK:148956~piPK:216618~theSitePK:430367,00.html>

Individual PRSPs and other related documents can be downloaded at:

<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPRS/0,,contentMDK:20200608~pagePK:210058~piPK:210062~theSitePK:384201,00.html>

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Country Programming

Guidance Note 4

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note addresses the issue of country programming, providing guidance on how to assess disaster risk and identify related risk reduction opportunities both to protect the effectiveness of development assistance programmes and to support countries in strengthening their own disaster risk management strategies. It is intended as a basic, generic guide for use by all types of international development organisation, complementing existing country programming guidelines.

1. Introduction

All international development organisations apply some form of programming framework through which problems, needs and interests are analysed, sectoral and thematic areas of focus identified and the broad level and composition of assistance outlined. Except in the case of the smallest non-governmental organisations (NGOs), this framework is typically applied at a country level. Institutions apply many different names to the resulting plans, including Country Strategy Papers (CSPs), Country Assistance Programmes (CAPs), Country Assistance Strategies (CASs) and, in the case of the United Nations (UN), Common Country Assessments (CCAs) from which UN Development Assistance Frameworks (UNDAFs) are developed. Time frames for country plans are typically three to five years, giving them strategic significance. In the case of international financial institutions (IFIs), if a particular area of focus is not identified in a country plan then no related projects can be undertaken (with the notable exception of post-disaster response).

Consideration of natural hazards and related risks in country programming may be critical in securing sustainable long-term development and ensuring the effectiveness of an organisation's individual country strategies. Achievement of objectives can be hindered in both the short and, potentially, the medium term by the occurrence of a disaster, whether in terms of, for example, broad country goals, such as reductions in the level of poverty, or more specific targets, such as the proportion of roads in good condition or levels of access to electricity and clean water. Indeed, the process of country programming provides an important opportunity to address disaster risk in a strategic and coordinated fashion, exploring the complex, cross-cutting and multi-faceted nature of vulnerability from human, social, environmental and economic perspectives and identifying appropriate, proactive risk management solutions.

Current state of the art

Historically, only very recently-occurring disasters have typically received any attention in country strategies, often implicitly regarded as one-off aberrant events hindering achievement of short-term goals. Both in these and in other country strategies for hazard-prone countries, potential future hazard events, related challenges to longer-term sustainable development and important interplays and trade-offs between forms and patterns of development and vulnerability to natural hazards have all too often been ignored (see Box 1).

Box 1 Ignoring disaster risk

A recent review of the extent of attention given to disaster-related issues in the World Bank's Country Assistance Strategies revealed that 44 per cent of current CASs for countries that have received Bank disaster-related support do not mention natural hazards. Even in those 40 countries in which the Bank has supported four or more disaster-related projects, one-third of the CASs contain no mention of natural hazards. The report concluded that "when formulating country lending programs, the Bank needs to elevate the importance of disasters, especially for highly vulnerable countries" (p. 26).

Source: World Bank (2006).

Since the late 1990s, however, the importance of disaster risk reduction has been increasingly recognised in development organisation (and government) policies. This shift has been driven by an increasing understanding of disasters as unresolved problems of development and by a gradual upward rise in reported disaster losses, in turn primarily reflecting growing economic and social vulnerability (see **Guidance Note 1**). Attention is now turning to the integration of disaster risk concerns into country programming and mainstreaming disaster risk management within development initiatives. The Hyogo Framework for Action 2005–2015, adopted by the World Conference on Disaster Reduction in January 2005 and signed by 168 nations and multilateral institutions, specifically calls upon international organisations to "integrate disaster risk reduction considerations into development assistance frameworks, such as the Common Country Assessments, the United Nations Development Assistance Framework and poverty reduction strategies".¹ To facilitate this mainstreaming process, some development organisations have begun to develop quantitative measures of risk (see Box 2). A few, including both multilateral and non-governmental organisations, are also beginning to adapt country programming procedures to require specific consideration of disaster risk management in high-risk countries (see, for instance, Box 3).

The extent of their success will depend on a number of factors (see last section), including the interrelationship between the degree of freedom and scale of assistance that particular development organisations have and a government's own priorities. For instance, IFIs have large lending portfolios but these may need to be negotiated with governments who, in turn, can be unwilling to borrow for disaster risk management (see below). Bilateral organisations may have a largely technical assistance and grant focus, concentrating assistance on self-determined priority sectors. NGOs often have particular areas of specialism, focusing their relatively few resources on these.

Box 2 Disaster risk indices

Increasing recognition of the importance of mainstreaming disaster risk reduction within broader development has spawned a number of initiatives to develop indicators of national and sub-national risk. Such indicators are intended to allow development practitioners to judge the relative importance of disaster risk in decisions on country programming and to provide an initial basis for identifying requirements for strengthening disaster risk management, although their use and relevance are still to be tested. They also provide a quantification of risk that, in some cases, is appropriate in monitoring and evaluating programme performance (see **Guidance Note 13**).

These initiatives include:

- UNDP's Disaster Risk Index² – a global assessment of national disaster risk developed by the United Nations Development Programme (UNDP) to demonstrate how development can contribute to risk. The index calculates the average risk of deaths per country in large- and medium-scale disasters associated with earthquakes, tropical cyclones and floods.
- World Bank/ProVention's Hotspots project³ – a global, sub-national assessment of risk calculated for grid cells rather than for countries as a whole, intended to provide a rational basis for prioritising risk reduction

¹ UN/ISDR. *Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters*. World Conference on Disaster Reduction, 18–22 January 2005, Kobe, Hyogo, Japan. Geneva: United Nations International Strategy for Disaster Reduction, 2005, p. 16, para. 32(e). Available at: <http://www.unisdr.org/eng/hfa/hfa.htm>

² UNDP (2004).

³ World Bank. *Natural Disaster Hotspots: A Global Risk Analysis*. Disaster Risk Management Series No. 5. Washington, DC: World Bank, 2005. Available at: <http://www.proventionconsortium.org/themes/default/pdfs/Hotspots.pdf>. See also <http://geohotspots.worldbank.org/hotspot/hotspots/disaster.jsp> for an online interactive map.

efforts and highlighting areas where risk management is most needed. Risks of both mortality and economic losses are calculated as a function of the expected hazard frequency and expected losses per hazard event.

- Inter-American Development Bank (IDB)/Instituto de Estudios Ambientales (Environmental studies institute) Americas Program⁴ – a series of national and sub-national indices of disaster risk for Latin America and the Caribbean for use in country programming. Four indicators have been developed, measuring a country's performance in disaster risk management, its financial capacity to meet recovery costs, localised levels of risk and prevailing conditions of national-level human vulnerability.
- ECHO's Disaster Risk Index⁵ – a measure of national risk developed for use in determining the priority country focus for the disaster reduction activities of the European Community Humanitarian Office (ECHO). ECHO's index combines information on natural hazards, vulnerability and, where available, national coping capacity.

Resulting scores and rankings of countries vary depending on how risk is defined. For instance, small island economies tend to dominate tables based on physical damage relative to economic size. In contrast, medium-sized countries that have experienced devastating catastrophes top UNDP's index based on fatalities.

Nevertheless, with careful interpretation, these indicators provide policy-makers with a potentially very useful data set for use in decision-making and evaluation. For instance, ECHO's Disaster Risk Index, developed in 2003, has already been used to inform internal decisions about allocation of resources between disaster-prone countries and has begun to stimulate debate about priorities. IDB is beginning to make use of recently available indicators under the Americas Program as performance indicators in relevant country strategies. The World Bank is using Hotspots to target CASs under preparation in highly vulnerable countries and encourage them to prioritise disaster risk management. And at least one development NGO is beginning to use UNDP's disaster risk indicators to help determine in which countries it operates.

Box 3 Formalising the integration of disaster risk management into country programming – IDB's initiative

In March 2005 the board of the Inter-American Development Bank endorsed an action plan for improving disaster risk management. Under the plan, a series of actions will be undertaken over the next three years relating to country programming and portfolio management, policy and organisational strengthening. The action plan is intended to position IDB to carry out its commitment to a more proactive stance to disaster risk management, helping countries to reduce preventable losses due to disasters and safeguarding the effectiveness of IDB's development assistance, and to consolidate disaster risk management in operations. A new disaster risk management policy explicitly incorporating commitments in the action plan is expected to be presented for approval before the IDB Board of Directors by the end of 2006.

In high-risk countries, IDB will evaluate the disaster risk in cooperation with the country and adjust country strategies and programming accordingly. Assessments will include country-specific risk evaluations to evaluate probable losses, economic impact and capacity to finance recovery/reconstruction; geographical areas and sectors at high risk that warrant priority intervention; and institutional capacity to manage risk. New country strategies and programming memoranda will discuss disaster risk, including how IDB proposes to manage it. Programme performance monitoring reports for high-risk countries will also explicitly consider the impact of disaster events.

Source: IDB (2005).

4 IDEA/IDB. *Indicators of Disaster Risk and Risk Management: Main Technical Report*. Manizales and Washington, DC: Instituto de Estudios Ambientales, Universidad Nacional de Colombia and Inter-American Development Bank, Sustainable Development Department, 2005. Available at: <http://idea.manizales.unal.edu.co/ProyectosEspeciales/adminIDEA/CentroDocumentacion/DocDigitales/documentos/Main%20technical%20report%20IDEA.pdf>

5 De Haulleville, A., Jegillos, S. and Obsomer, V. *Overall Evaluation of ECHO's Strategic Orientation to Disaster Reduction: Main Report*. Brussels: European Community Humanitarian Office, 2003.

Advocated good practice

Three essential actions are required as part of country programming to ensure that disaster risks are adequately assessed and managed:

- Disaster risks should be explicitly examined as part of the preliminary country analysis undertaken at the start of the process.
- Rational, informed and explicit decisions, linked to transparent assignments of accountability and responsibility, should be taken on whether and how to address significant risks.
- The contribution of disasters and related risks to other development challenges and their potential implications for the achievement of country programme strategic objectives should be carefully explored.

This guidance note outlines detailed measures for ensuring that these actions are accomplished.

2. Basic steps in merging disaster risk concerns into country programming

The scope, level of detail and emphasis of a country strategy varies between development organisations depending on their areas of specialism, their developmental approach and the scale of assistance provided. However, a broadly similar preparation process is followed and approximately the same steps taken, if in varying order. Measures required to ensure that disaster risks are adequately examined and addressed in each of these steps are outlined below and summarised in Figure 1. The UN CCA and UNDAF are not explicitly discussed but much of the below is relevant to these, too (see also Box 4).

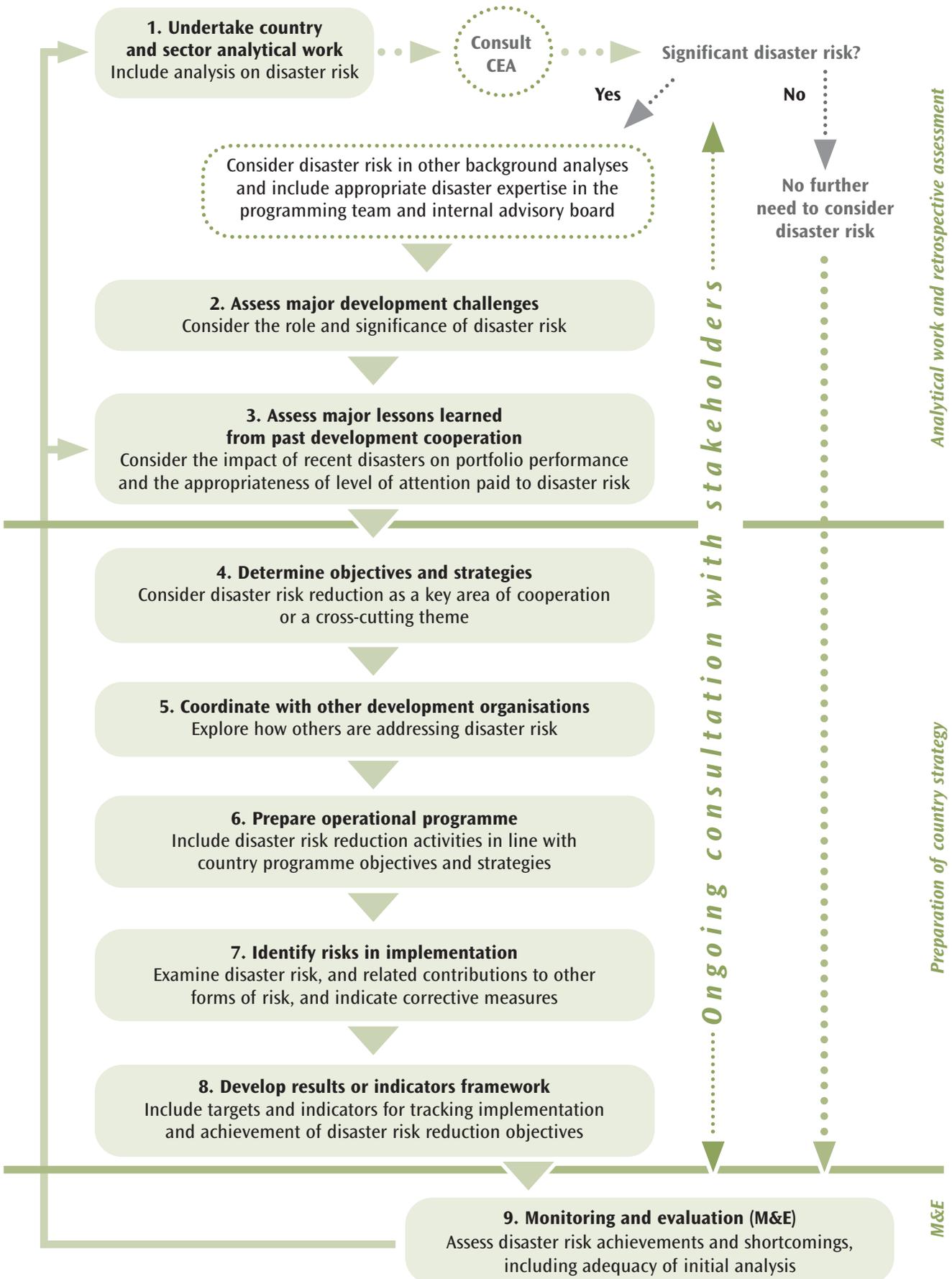
Box 4 Integrating disaster risk reduction concerns into UN country programming

In undertaking country programming, United Nations agencies begin by jointly preparing a Common Country Assessment, in which they assess the key causes of poverty in a country and analyse the country's progress towards achievement of the Millennium Development Goals (MDGs). From this, a UN Development Assistance Framework is developed, providing a common strategic framework for the operational activities of the UN system, setting out collective priorities and linking these to outputs and outcomes of individual UN agency country programmes. The UNDAF is centred on achievement of the MDGs together with commitments, goals and targets of the Millennium Declaration and international conferences, summits, conventions and human rights instruments of the UN system. Each UN agency then draws up its own Country Programme Document.

UNDP and the United Nations International Strategy for Disaster Reduction (UN/ISDR) are currently developing guidelines illustrating how, when and where disaster risk reduction can be integrated into this CCA/UNDAF process. These guidelines outline step-by-step procedures for incorporating disaster risk reduction into the process, including into the analytical work and problem tree analysis, and indicate who within the UN Country Team should play a key role in relevant areas. They also include annexes providing guidance on the incorporation of disaster risk reduction dimensions into the UNDAF results matrix, within sector-specific actions; guidance on the incorporation of disaster risk reduction concerns into the MDGs (see **Guidance Note 3**); a checklist for evaluating the incorporation of disaster risk reduction concerns into the CCA/UNDAF process; and good practice examples.

Source: UNDP and UN/ISDR (2006).

Figure 1 Integration of disaster risk concerns into country programming



Analytical work and retrospective assessment

Step 1. Undertake country and sector analytical work

Include analysis of disaster risk as a fundamental component in establishing a country's economic, social, environmental, institutional, legislative, political, civil and cultural context and major trends.

Stand-alone analysis of disaster risks does not have to be very lengthy (see Box 5) and, in the case of specialised development organisations, should be tailored to concentrate on their particular areas of focus. Indeed, given the multi-dimensional, cross-cutting nature of vulnerability and the potentially important implications of disaster risk for other development challenges, much can be gained by considering disaster risk within the context of other background analyses. However, many development organisations rely in part on secondary studies undertaken by others. Such documents should be assessed to determine whether they pay adequate attention to disaster risk and collectively provide an informed assessment. The following provides an indicative list of assessments that may be consulted or undertaken in developing a country strategy and how each of these, in turn, should ideally address disaster risk concerns where significant:

- *Poverty reduction strategies (PRSs)*. PRSs, the primary government tool in many low-income countries for articulating poverty reduction and growth strategies and thus a key starting point for determining development organisation country programming, should pay due regard to disaster-related issues, in both analysing forms of vulnerability underlying poverty and selecting poverty reduction actions. **See Guidance Note 3** for a detailed discussion.
- *Country environmental analysis (CEA)*. CEAs should include collation of basic natural hazard data and provide an overview on forms and levels of vulnerability. This, together with available disaster risk indices (see Box 2), should provide sufficient information to determine the potential importance of considering disaster risk in undertaking other forms of background analysis and preparing the country strategy. **See Guidance Note 7** for a fuller discussion.
- *Economic assessments*. Assessments should explore the nature and extent of economic vulnerability to disasters, in particular considering whether the macroeconomic framework is capable of sustaining major disaster shocks and ways of enhancing economic resilience. In high-risk countries, any economic forecasting exercises should be extended to consider major disaster scenarios. **See Guidance Notes 3, 8 and 14** for a more comprehensive discussion.
- *Public expenditure reviews*. See Box 6.
- *Social assessments*. **See Guidance Note 11**.

Box 5 Disaster risk profiling

A disaster risk profile should cover the following topics, providing at least a brief, factual summary under each heading and drawing on existing secondary studies, rather than primary research, to the extent possible to minimise costs:

- Type of hazards faced, magnitudes and probabilities of occurrence (**see Guidance Note 2**).
- Disaster risk indicator scores (see Box 2).
- Summary historical disaster losses, in terms of human and economic costs, and any trends over time.
- Risk scenarios, exploring probable losses and related socio-economic impacts of future events.
- Key vulnerable groups and regions.
- Government's broad approach to disaster risk management, including particular areas of emphasis and key activities.
- Government policies, commitments and practice with regard to social protection.
- Relevance of disaster risk to the country's broad development agenda.
- Relevant legislation, including that relating to land use and building codes.
- Institutional capacity to mitigate against, prepare for and respond to disasters.
- Financial capacity to meet recovery and reconstruction costs and use of risk sharing/transfer mechanisms, such as insurance.
- Civil society disaster-related concerns and activities.
- Development organisation-specific information on past and ongoing risk reduction activities, post-disaster assistance and impact of disasters on other projects.
- Disaster risk management activities of other development organisations.

Box 6 Disasters and public expenditure reviews

The World Bank's public expenditure reviews (PERs) are intended to inform decisions on public expenditure, exploring the rationale of past public spending decisions, including their implications for the poor, and providing recommendations to governments on the composition and, to some extent, size of future public expenditure. IFIs draw on PERs in preparing country strategies because they place donor lending within this broader context.

In disaster-prone countries, preparation of PERs should include analysis of the broad budgetary impacts of disasters and related financial responsibilities. Disasters can create significant budgetary pressures, reducing projected revenues and placing additional demands on remaining resources, with potential wider long-term implications for development as well as short-term resource constraints. Fiscal impacts of disasters can be particularly severe in low-income countries with existing problems of governance and poor fiscal and monetary management.⁶ PERs should explicitly consider:

- How past post-disaster relief and reconstruction operations have been funded and ensuing consequences for broad expenditure and revenue targets, public borrowing and, since disasters typically result in widespread reallocation of resources, previously planned expenditure.
- Whether existing levels of public expenditure on risk reduction are appropriate relative to the levels of risk faced, economic and social returns to risk reduction and the reasonable responsibilities and obligations of government.
- Whether disaster risk financial management strategies are adequate and efficient. If post-disaster expenditure occurs on a regular, annual basis, predesignated calamity funds should be established. Greater use of financial risk transfer instruments may be required to help meet the cost of potential large-scale reconstruction programmes.

Sectoral studies. Various sectoral studies may be undertaken or consulted (for instance, on agriculture, transport, education, health or small and medium-sized enterprises). Again, these should include assessments of disaster risk, including analysis of the impact of past disasters, the vulnerability of physical and social infrastructure and disaster risk-related implications of ongoing reforms and structural changes. They should also outline required measures to reduce risk, including any adjustments to other planned objectives and activities – for instance, to ensure that higher mean agricultural productivity gains are not accompanied by greater inter-annual fluctuations in yields, reflecting an accompanied rise in vulnerability to climatic variability.⁷

Some development organisations also apply checklists to ensure that background studies have covered particular issues. These checklists should cover disaster-related concerns.

Following completion of Step 1, if a country is found to face significant disaster risk, the composition of the programming team and related internal advisory groups should be reviewed to ensure that they contain adequate disaster expertise. Remaining steps in country programming should also take disaster risk into account, as indicated below.

Step 2. Assess major development challenges

Consider the disaster risk context of a country in describing and analysing its current situation and medium- and long-term development outlook. The assessment should consider whether hazards and related vulnerability are themselves a major development challenge and whether they are a contributory factor underlying other major challenges (for instance, high incidence of poverty, macroeconomic or financial instability, weak governance, poor competitiveness or weak environmental management). The assessment should also examine the implications of disaster risk for achievement of the development organisation's own overarching priorities (e.g., poverty reduction and sustainable development).

Step 3. Assess major lessons learned from past development cooperation

Assess the impact of any past disaster events on portfolio performance, how these impacts might have been reduced, whether the level of attention paid to disaster risk in the existing country strategy was appropriate and

⁶ For a fuller discussion of these issues, see Benson, C. and Clay, E.J., *Understanding the Economic and Financial Impacts of Natural Disasters*. Disaster Risk Management Series No. 4. Washington, DC: World Bank, 2004. Available at: http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&id=000012009_20040420135752

⁷ See UNDP and UN/ISDR (2006) for further discussion.

whether post-disaster opportunities to reduce future risk were fully exploited, within the room for manoeuvre permitted by the strategy. The assessment should also consider whether the sustainability of the organisation's development achievements are potentially threatened by future hazard events (for instance, through damage to infrastructure or the collapse of livelihoods). The assessment should draw on relevant experience from other development organisations and governments as well as its own.

Preparation of country strategy

Step 4. Determine country programme objectives and strategies

Consider disaster risk reduction as a potential key area of cooperation or cross-cutting theme based on analysis of priority development challenges and objectives, lessons from past cooperation, the comparative advantage of the development organisation (including technical expertise and the nature of in-country experience) and the government's own plans in relation to disaster risk reduction.

Given the large range of problems facing many developing countries, disaster risk reduction is unlikely to feature often as a priority area except in small economies recovering from recent catastrophic events (see Box 7) and under programmes of more specialised NGOs, such as those focusing on food and livelihoods security. For larger development organisations, even where disaster risk reduction does feature as an element in its country plan, the approach taken may be defined by other priorities and emphases (see Box 8). In other cases, disaster risk reduction may be an appropriate cross-cutting theme addressed in all sectors and projects to support the achievement of other key objectives such as sustained economic growth and improved lives and protection of vulnerable groups.

Box 7 Post-disaster challenges and opportunities

A new World Bank CAS was under preparation for Honduras when Hurricane Mitch struck in October 1998, forcing a substantial reformulation of the World Bank's assistance strategy. Poverty reduction remained the overwhelming challenge. However, it was determined that a much larger involvement in infrastructure was now required to support massive reconstruction efforts while also helping to lay the basis for a stronger economy and a more equitable distribution of the benefits from growth.

The resulting CAS, completed in 2000, acknowledged that Mitch had made the development agenda more complex. However, it had also induced some positive changes that the CAS needed to reflect, including greater awareness of the need for decentralisation, a new dynamic in relations between the government and civil society, a sharper focus on the transparency and governance agenda and greater recognition of the need to reduce the country's vulnerability in all its dimensions.

The CAS listed five critical factors for the sustainability of its achievements, in part reflecting good awareness of the importance of disaster risk reduction. These included environmental sustainability to protect the country's valuable natural resources and reduce the effects of natural hazards, and disaster preparedness through capacity building and protection measures.

Source: World Bank. *Memorandum of the President of the International Development Association and the International Finance Corporation to the Executive Directors on a Country Assistance Strategy of the World Bank Group for the Republic of Honduras*. Report No. 20072 HO. Washington, DC: World Bank, Central America Country Management Unit, Latin America and the Caribbean Region, 2000. Available at: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&theSitePK=523679&entityID=000094946_00021805433066&searchMenuPK=64187283&theSitePK=523679

Box 8 Addressing disaster risk reduction through other priorities

The European Commission's regional strategy paper for the Caribbean includes support to disaster management among its non-focal (i.e., lower-priority) sectors. However, the selected approach centres on strengthening a comprehensive regional disaster strategy, in line with the focus of the Commission's support for the region which emphasises intensification of regional integration.

Source: European Commission. *European Community/Caribbean Regional Forum of ACP States Regional Strategy Paper and Regional Indicative Programme for the Period 2003–2007*. Brussels: European Commission, DG Development, 2003. Available at: http://europa.eu.int/comm/development/body/csp_rsp/print/r9_rsp_en.pdf

Step 5. Coordinate with other development organisations

Consider how other development organisations are addressing disaster risk. Based on such analysis, it may be decided not to prioritise disaster risk reduction even in high-risk countries. However, the development organisation should still ensure that its own portfolio and related objectives are adequately protected against disaster and that it does not exacerbate any form of vulnerability (Box 9).

Box 9 Rationalising response to disaster risk

In Bangladesh there are well-established emergency preparedness mechanisms. The United Kingdom's Department for International Development (DFID) has therefore chosen to focus more attention on longer-term development issues that impact on livelihoods including tuberculosis, malnutrition and under-five mortality, while still finding room for some disaster reduction work on the basis of explicit consideration of risks.

Source: NAO. *Department for International Development: Responding to Humanitarian Emergencies. Report by the Comptroller and Auditor General*. HC 1227 Session 2002–2003: 5. London: National Audit Office, 2003. Available at: http://www.nao.org.uk/publications/nao_reports/02-03/02031227.pdf

Step 6. Prepare operational programme

Include disaster risk reduction activities in line with country programme objectives and strategies in preparing the indicative list of assistance and programming resources. If the programme of assistance is tied to conditionalities and disaster risk reduction is a central objective, it may also be appropriate to identify disaster reduction-related conditionalities – for instance, relating to approval of disaster risk management legislation or policies – determining the level of assistance to be provided.

Step 7. Identify risks in implementation

As part of the broader assessment of risk, include an explicit discussion of disaster risk and its potential implications for both a country's overall development and the development organisation's own programme objectives and effectiveness (Box 10). The analysis should also consider how disaster risk could contribute to other forms of risk, such as institutional, environmental, financial, economic, institutional and political risk; and indicate measures to mitigate significant disaster risks.

Box 10 Recognising disaster risk: Country programming in the Dominican Republic

An IDB country programme evaluation for the Dominican Republic, covering the period from 1991 to 2003, concluded that past country strategy papers had included insufficient analysis of growing vulnerability to natural hazards, which has increased due to the swift degradation of natural resources, persistent poverty and rapid, haphazard urbanisation. The 2001–2003 CSP did support reform stressing a preventive and anticipatory approach to disaster risk and a participatory, decentralised and multi-sector concept of institutions, but the loan for a related disaster prevention programme was cancelled before disbursements began.

Building on these lessons learned and concerns about the fact that the Dominican Republic had yet to put in place the institutional and inter-territorial coordination mechanisms needed to prevent, mitigate and respond to natural hazards, the 2005–2008 CSP identified disasters as a risk to IDB’s programme, potentially jeopardising achievement of the strategy’s objectives. The proposed operations programme included a sector facility for disaster prevention and risk mitigation to develop and strengthen related institutional capacities. However, the CSP also stated that: “While the operations program addresses this issue as a development challenge and calls for specific actions, the fact remains that large-scale disasters could have the effect of shifting the operations program and the portfolio towards emergency relief operations. While the operations program does propose actions to reduce vulnerability to disasters, the Bank’s ability to mitigate this risk is limited” (pp 29–30).

Sources: IDB. *Country program evaluation: Dominican Republic, 1991–2003*. Washington, DC: Inter-American Development Bank, Office of Evaluation and Oversight, 2005; IDB. *Dominican Republic: IDB Strategy with the Dominican Republic*. Washington, DC: Inter-American Development Bank, 2005. Available at: <http://idbdocs.iadb.org/wsdocs/getdocument.aspx?docnum=566406>

Step 8. Develop results and indicators framework

If disaster risk reduction is a key objective, include relevant targets and indicators in the results or indicators framework for monitoring implementation and assessing impact. (See also **Guidance Note 6**.)

Ideally, outcome indicators should be quantitative (with related baseline data from which to measure progress), precise, readily and affordably attainable, relevant and sufficient to assess performance. Indicators based on reduced vulnerability (i.e., reduced probable losses) rather than reduced actual losses should be used to measure achievement of overall programme and longer-term strategic outcomes as a disaster may not occur over the life of the programme. Efforts are under way to develop potentially relevant quantitative indicators at both national and sub-national levels (see Box 2), although those based in part on actual losses should be handled carefully. It should also be determined if preferred indicators will be updated sufficiently frequently to be useful for monitoring and evaluation purposes. Potential opportunities for measuring disaster risk reduction through other outcome indicators should also be explored: for instance, via a decline in the correlation between fluctuations in the percentage of the population with income below US\$ 1 per day and the incidence of hazard events; or the correlation between the prevalence of underweight children and the incidence of hazard events. (See **Guidance Note 13** and UNDP and UN/ISDR (2006) for further information.) It may be important to distinguish between geographic and/or thematic areas of higher and lower risk in selecting indicators.

Progress in implementation of disaster risk reduction activities can be measured using more specific output indicators as relevant (e.g., disaster management legislation enacted; small-scale disaster risk reduction investments piloted; disaster social safety nets fully integrated into the poverty reduction strategy; or public awareness of disaster risks strengthened).

Monitoring and evaluation

Step 9. Monitoring and evaluation

Exploit the opportunity provided by ongoing evaluations of performance to determine whether country strategies need to be adjusted following a disaster; and assess their disaster risk achievements and shortcomings as part of the final, end-of-programme evaluation.

The final evaluation should consider: whether the original analysis of disaster risk was sufficient; whether disaster risk was addressed appropriately and cost-efficiently within the confines of the programme; how any disasters occurring over the course of the programme affected its outcome and effectiveness; and whether the sustainability of the programme’s outcomes are potentially threatened by future disaster events. These issues should be explored in evaluating country programmes in all disaster-prone countries, whether or not they explicitly addressed disaster risk.

Repeated step: Ongoing consultation with stakeholders

Include people who have sufficient knowledge and expertise to raise any critical hazard-related issues, such as essential measures required to address particular aspects of risk and vulnerability; inadequacies in existing disaster response systems and mechanisms, including social protection instruments; how disasters and related risks may

contribute to other development challenges; and how hazard events could potentially hinder the achievement of long-term goals and objectives. Such knowledge and expertise may be found in relevant line ministries (e.g., social welfare, agriculture, transport, health) and specialist disaster-related agencies in national and local government, civil society organizations, the private sector and academic and research institutions. The stakeholder consultation process should take particular care to ensure that known highly vulnerable groups are represented and that their concerns and needs relating to disaster risk reduction are explicitly discussed.

External consultation may be repeated several times at different stages in the preparation of a country strategy.

3. Critical factors for success

- *Appropriate internal policies and strategies.* Overarching development organisation policies and strategies supply the framework within which country programmes are formulated. These policies and strategies need to pay due attention to disaster risk reduction, regarding it as a development issue rather than the responsibility of humanitarian departments.
- *Government prioritisation of disaster risk reduction.* As development organisation country programmes are increasingly aligned with national development and poverty reduction strategies and set out how they intend to contribute to the achievement of national goals, it is essential that governments themselves prioritise risk reduction as a critical development challenge in high-risk countries. This is particularly important where, as is the case for a number of development organisations, country programmes are negotiated with national governments. Development organisations need to explore incentives for encouraging greater government attention to disaster risk reduction. They should also undertake related advocacy work to promote its merits and underline the fact that post-disaster external assistance is often not additional to, but instead erodes away, development funding.
- *Establishment of internationally recognised targets for disaster reduction.* Related to the above, there is a growing tendency towards greater coherence of key development targets, such as the Millennium Development Goals, providing a common focus for both donors and governments. Establishment of similar targets for disaster reduction or explicit incorporation of disaster risk reduction concerns within the MDGs would play an important role in securing greater consideration of disaster risks (see **Guidance Note 3**).
- *Transparent, inclusive and accountable consultation.* The consultative process must give a voice to poor and marginalised groups, who are often among the most vulnerable to natural hazards, and ensure that their interests are adequately addressed and their rights protected.
- *Individual motivation.* Geographical desk officers or task team leaders in charge of the development of individual country strategies must be sensitised to the potential importance of disaster risk.
- *Technical support.* Development organisations need to provide appropriate internal technical support to assist integration of disaster risk concerns into country programming.
- *Cost minimisation.* Disaster risk concerns should be integrated into country programming at minimum cost. Pooling of information and analysis and accurate initial assessments of the importance and relevance of disaster risk would help achieve this. Development organisations should seek to coordinate with others, particularly where their respective country programmes follow the same cycles (e.g., follow PRS or electoral cycles).

Box 11

Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.⁸

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

IDB. *Bank Action Plan for Improving Disaster Risk Management 2005–2008*. GN-2339-1. Washington, DC: Inter-American Development Bank, 2005. Available at: <http://www.iadb.org/sds/doc/idbdisasteractionplan-05-08-e.pdf>

UNDP. *Reducing Disaster Risk: A Challenge for Development*. New York: United Nations Development Programme, Bureau for Crisis Prevention and Recovery, 2004. Available at: <http://www.undp.org/bcpr/disred/rdr.htm>

UNDP and UN/ISDR. *Integrating Disaster Risk Reduction into CCA and UNDAF: Guidelines for Integrating Disaster Risk Reduction into CCA/UNDAF*. Geneva: United Nations Development Programme and United Nations International Strategy for Disaster Reduction, 2006. Available at: <http://www.unisdr.org/eng/risk-reduction/sustainable-development/cca-undaf/cca-undaf.htm#2-3>

UN/ISDR. *Living with Risk: A Global Review of Disaster Reduction Initiatives*. Geneva: United Nations International Strategy for Disaster Reduction, 2004. (See, especially, Chapter 3.) Available at: http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng-p.htm

World Bank. *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. Washington, DC: World Bank, Independent Evaluation Group, 2006. Available at: <http://www.worldbank.org/ieg/naturaldisasters/report.html>

⁸ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Project Cycle Management

Guidance Note 5

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note looks at tools for incorporating disaster risk in the project cycle as a whole, particularly in the planning phases. It explains the project cycle approach, gives guidance on integrating disaster risk management into the project cycle and identifies some tools to support this. It is intended primarily for use by people working in development organisations on project design and management, but is also relevant for personnel of governments and private organisations. Specific tools for aspects of project and programme planning are covered in other notes in the series.

1. Introduction

The rapid escalation in the incidence and impact of severe disasters in recent decades is a recognised threat to sustainable development and poverty reduction. Donor and operational agencies spend billions of dollars every year on relief and rehabilitation, but at the same time, they may well see their development projects damaged by natural disasters. Despite this, many development organisations have been slow to adopt disaster risk reduction as a core objective or take measures to protect their projects against hazards. Yet it may not cost a great deal to incorporate risk management into development projects. Many standard project planning tools can be used to do this with little or no modification.

Development organisations should adopt a systematic disaster risk management approach to identifying, assessing and reducing risks of all kinds associated with hazards that might affect both project performance and beneficiary groups. This should be an integral part of the way such agencies carry out their development work in hazard-prone areas, not an add-on or one-off action.

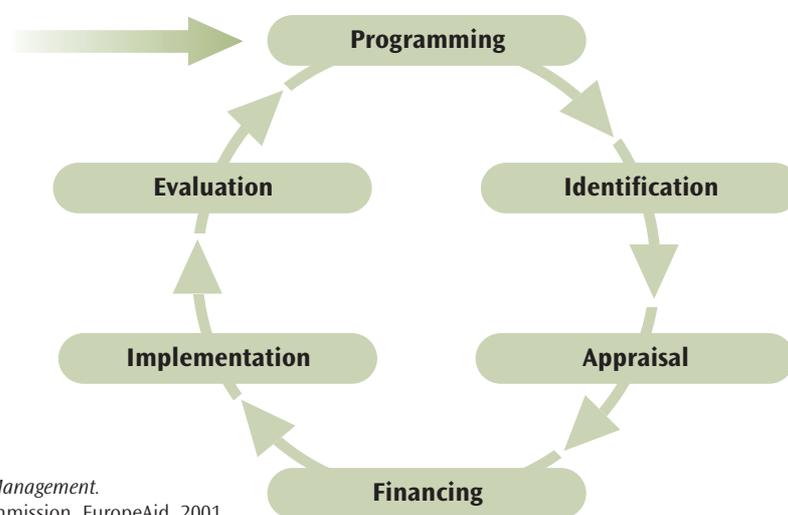
2. The project cycle

A project is “a series of activities aimed at bringing about clearly specified objectives within a defined time-period and with a defined budget”.¹ In reality, this simple definition covers an enormous variety of project types, in terms of size, aims, focus and methods. Nevertheless, there are many basic similarities.

The ‘project cycle’ is a way of viewing the main elements that projects have in common, and how they relate to each other in sequence. The precise formulation of the cycle and its phases varies from one agency to another, but the basic components are shown in Figure 1 below.

¹ European Commission (2004).

Figure 1 The project cycle



Source: EC.
 Manual: *Project Cycle Management*.
 Brussels: European Commission, EuropeAid, 2001.

- **Programming.** The establishment of general guidelines and principles for cooperation, agreement of sectoral and thematic focus and outlining of broad ideas for projects and programmes.
- **Identification.** Within the programme framework, problems, needs and interests of possible stakeholders are analysed; ideas for projects and other actions are identified and screened. The outcome is a decision on whether or not the options developed should be studied in more detail.
- **Appraisal (or preparation).** All significant aspects of the idea are studied, taking into account stakeholders' views, relevance to problems, feasibility and other issues. Logical or results-based management frameworks, and activity and implementation schedules, are developed and the required inputs are calculated. The outcome is a decision to take the project forward, or not. In some organisations' project cycles, this phase is described as 'preparation' or 'formulation', the term 'appraisal' being applied more narrowly to a review of all the planning work to date and the resulting decision on whether or not to proceed.
- **Financing.** A decision is taken by the relevant parties about whether or not to fund the project, based on the appraisal. Some project cycles refer to this stage as 'negotiation' or 'approval', and it may involve both the implementing agency and other stakeholders. (Note that financing is not always a separate stage and financial decisions may be taken at different points in the cycle – e.g., at the end of the identification or appraisal phases – depending on the particular procedures being followed.)
- **Implementation.** The agreed resources are used to carry out the planned activities and achieve objectives. Progress is assessed through monitoring to enable adjustment to changing circumstances. At the end of implementation, a decision should be made about whether to close or extend the project.
- **Evaluation.** This assessment of the project's achievements and impact examines the relevance and fulfilment of objectives, efficiency, effectiveness, impact and sustainability. It leads to a decision to continue, change or stop a project, and its conclusions are taken into account when planning and implementing similar projects.

Most agencies adopt a 'project cycle management' approach: a sequence of actions to develop, implement and evaluate projects that leads in turn into new projects. The aim of project cycle management is to improve the management of projects (and programmes) by ensuring that all relevant issues and conditions are taken into account during design and implementation. In application, project cycle management consists of a set of design and management concepts, techniques and tasks that is used to support informed decision-making.

Projects are not prepared in isolation. Some sort of country or sectoral approach sets the framework within which they can be designed. Among national governments, international donor agencies and many non-governmental organisations (NGOs), this approach may be formalised as a country strategy that sets clear and firm priorities regarding areas on which to focus, types of intervention, partnership arrangements and other operational matters (**see Guidance Note 3**). Projects may also have to conform to a range of other cross-cutting policies or strategies (e.g., on gender, environmental protection, participation) that have been adopted by the agency concerned.

For some bilateral and multilateral donors or lenders, country-level programme assistance is now the main channel for development assistance. Programme assistance comprises contributions to a country for general development purposes rather than specific project activities. It includes budget and balance-of-payments support (see **Guidance Note 14**).

Incorporating disaster risk management into the project cycle

Disaster risk management should be factored into all stages of the project cycle. The initial planning stages of the cycle (programming – identification – appraisal; see Figure 1) are the key entry points at which disaster risk issues can be factored into projects. But disaster risk should not be forgotten during the other stages of financing, implementation and evaluation, and the various activities that take place within them. The different phases in the project cycle are not separate but part of a process of planning, action and reflection that, in an ideal world, feeds lessons from one project into others.

Project cycle management guidelines assume explicitly that there will be a thorough appraisal (or preparation) stage looking at all relevant issues. The main aspects likely to be covered are outlined in Table 1. Appraisal findings are typically presented as a formal project document or financing proposal which is submitted to senior managers or boards for approval.

Many tools that are potentially useful in introducing disaster risk management (e.g., economic appraisal, environmental appraisal, vulnerability analysis, social livelihoods analysis and social impact assessment) are likely to be deployed extensively during the appraisal phase. Hazards information is also important here. Logical and results-based management frameworks, which are commonly used in project design, address some kinds of risk explicitly though often inadequately. Table 1 also identifies potential entry points for using these various tools.

Table 1 Main elements in project appraisal (preparation)

<i>Area of appraisal (or preparation)</i>	<i>Key issues/features</i>	<i>Planning tools/entry points for incorporating disaster risk reduction</i>
Situation analysis	<ul style="list-style-type: none"> ■ Policy and programme context: policy objectives and strategies of the agency planning the project, national/local governments and other international donors and agencies working in the country or district concerned ■ Review of relevant initiatives (completed, ongoing and planned) by the agency and others; lessons learned; complementarity and linkages to proposed project ■ Stakeholder analysis: views of all who might be affected by a project, positively and negatively, and how they could be affected ■ Institutional capacity assessment of institutions responsible for project implementation ■ Problem analysis: identifies the state and negative aspects of an existing situation and establishes cause–effect relationships 	<ul style="list-style-type: none"> ■ Information on significant natural hazards affecting project collected and analysed (Guidance Note 2) ■ Problem analysis (Guidance Note 6) ■ Preliminary stakeholder analysis (Guidance Note 6) ■ Initial environmental screening (Guidance Note 7) ■ Examination of economic rationale for the proposed intervention (Guidance Note 8) ■ Scoping (or national-level) vulnerability and capacity analysis (Guidance Note 9) ■ Identification of major livelihoods issues to be assessed (Guidance Note 10) ■ Scoping of main social impacts (Guidance Note 11) ■ Assessment of construction standards, relevant land use and building code legislation and implementation capacities, and construction capabilities (Guidance Note 12)

Area of appraisal (or preparation)	Key issues/features	Planning tools/entry points for incorporating disaster risk reduction
Project description and implementation arrangements	<ul style="list-style-type: none"> ■ Analysis of project purpose and objectives, identifying achievable solutions to the problems ■ Strategy selection: analysis and description of strategies to be used for attaining the objectives (and rejected alternative approaches) ■ Target groups: location and characteristics ■ Project components, activities and implementation schedule ■ Inputs and costs ■ Expected outputs, outcomes, impact ■ Performance indicators; monitoring and evaluation systems ■ Coordination and management structures; organisational procedures ■ Proposed financial management/financing plan ■ Accompanying measures by government and project partners 	<ul style="list-style-type: none"> ■ Objectives analysis and overview analysis of alternatives (Guidance Note 6) ■ Develop understanding of target groups through further vulnerability and capacity analysis, sustainable livelihoods analysis and social impact assessment methods (Guidance Notes 9, 10, 11) ■ Determination of hazard safety objectives of any physical structures and related measures to ensure that selected building design and implementation arrangements satisfy these objectives (Guidance Note 12) ■ Development of an environmental management plan and monitoring programme (Guidance Note 7) ■ Development of public involvement programme and engagement of stakeholders (Guidance Notes 9, 10, 11) ■ Determination of monitoring and evaluation targets and indicators (Guidance Note 6) ■ Development of a risk management plan and risk monitoring arrangements (Guidance Note 6)
Feasibility and sustainability	<ul style="list-style-type: none"> ■ Economic and financial viability: economic cost–benefit or cost-effectiveness analysis; rates of return ■ Environmental impact of the project; environmental management plans ■ Technical feasibility; adoption of relevant standards; use of appropriate technologies ■ Socio-cultural aspects: recognition of local norms and attitudes; stakeholder consultation; participation and ownership by beneficiaries; gender equity; targeting of support at vulnerable groups ■ Governance: policy support; institutional and management capacities to deliver and sustain project outcomes ■ Risks: key factors outside the direct control of project managers that could have a negative impact on the project, now or in the future; possible adverse effects of project on community resilience; risk management/mitigation arrangements 	<ul style="list-style-type: none"> ■ Detailed investigation of key features of natural hazards in project area and their potential impact on project and communities (Guidance Note 2) ■ Environmental assessment and evaluation, including environmental analysis of alternatives (Guidance Note 7) ■ Economic appraisal, including economic analysis of alternatives (Guidance Note 8) ■ Thorough vulnerability and capacity analysis (Guidance Note 9) ■ Detailed sustainable livelihoods assessment and analysis involving field data collection. Multi-stakeholder analysis and design workshops (Guidance Note 10) ■ Comprehensive social impact analysis (Guidance Note 11) ■ Detailed analysis of project site selection, construction design and related implementation capacity (Guidance Note 12) ■ Analysis of risks and assumptions (Guidance Notes 6, 7, 8, 12)

Adapted from European Commission (2004); World Bank. *Guidelines for Completing the Project Appraisal Document*. Washington, DC: World Bank, 2002. Available at: <http://info.worldbank.org/etools/docs/library/37492/GuidelinesforCompletingProject.pdf>

Most agency operational guidelines are explicitly holistic, assuming that all relevant aspects of a project will be considered. In theory this provides space to consider disaster risk. In practice, however, the significance of different appraisal tools within the overall appraisal varies widely, according to:

- The nature and scale of the project being undertaken.
- The resources of the agency involved, which may limit the range of issues that can be taken into account and how thoroughly they can be assessed.

- The agency's overarching objectives (e.g., a development organisation primarily concerned with poverty reduction will analyse a project primarily through that lens).
- The type of project (for example, large-scale infrastructural development usually requires extensive environmental and social impact analysis, whereas social development projects may focus on community participation in project design).

There may also be wide variations in the quality of preparation and appraisal between agencies and even within individual organisations; nor should it be assumed that staff automatically follow their agencies' guidelines properly. Additional efforts will probably be needed to institutionalise disaster risk reduction fully within agency structures, systems and culture – a process commonly referred to as 'mainstreaming'. Institutional mainstreaming is not well understood and little guidance is available but tools for supporting and assessing the process have recently been developed (see Box 1). It is essential that the incorporation of disaster risk reduction at project and programme level be linked to institutional mainstreaming: they are part of a single process of improving capacity to address disaster risk.

Box 1 Measuring organisational mainstreaming of disaster risk reduction

Two tools have been developed recently to assess the level to which disaster risk management has been mainstreamed within development organisations and to stimulate further engagement with the issue:

- Tearfund's *Mainstreaming Disaster Risk Reduction* evaluation method looks at six key areas of mainstreaming (policy, strategy, geographical planning, project cycle management, external relations and institutional capacity), setting out levels of attainment for each, with indicators.
- Christine Wamsler's *Operational Framework for Integrating Risk Reduction* is a detailed, comprehensive model that covers both operational and institutional dimensions, with indicators and guidance on implementation. Although written primarily for agencies working in human settlement development, it can easily be modified for use by a wider range of development organisations.

Sources: La Trobe and Davis (2005); Wamsler (2006).

Project planning requires negotiation and agreement with a range of stakeholders who might be involved in financing, approving and implementing the project, and benefiting from it (e.g., donors and lending agencies, national governments, implementing partners or sub-contractors and beneficiary communities). For example, negotiations with national governments play a crucial role in deciding the shape and composition of projects financed through multilateral and bilateral aid grants and loans. Parties to such negotiations should not lose sight of disaster risk as a cross-cutting theme, which can be overlooked amidst the competing pressures from other issues and interest groups.

3. New tools for integrating disaster risk reduction

There is a recognised need for integrated approaches to mainstreaming disaster risk reduction issues into the planning phases of project cycle management as a whole, to complement efforts to adapt specific tools deployed within the project cycle. Innovative work in this area has been taking place recently, notably in Latin America.

Two basic approaches are being used:

- *Checklists*. Setting a series of questions relating to disaster risk reduction, which must be answered when developing project planning documents.
- *Entry points*. A focus on the process of planning, ensuring that relevant issues are considered during different stages in the project management cycle.

The difference between the two approaches should not be exaggerated, being to some extent a matter of emphasis. They are not mutually exclusive. A process-focused approach will probably involve checklists of some kind and it is unlikely that checklists will be developed for individual project documents or project cycle phases independently of the planning process as a whole. Either approach can be as simple or complex as the agency's programme/project design systems to which they are applied.

The Inter-American Development Bank (IDB) has developed a checklist to support analysis and assessment of natural hazards and related risks in its lending programmes (see Box 2). The inter-agency RUTA guidelines for risk management in rural development projects adopt an entry point approach (see Box 3 and Table 2). Other models are currently under development by governments and development agencies but are not publicly available.

Box 2 Inter-American Development Bank's risk management checklist

This approach, currently being introduced, comprises a series of questions covering a wide range of relevant issues, to be asked during project preparation. It is presented in three stages: background, frame of reference and specific questions.

■ Background (identification and evaluation of natural hazards)

The initial question presented in the background is to establish if the project area and sector are affected by natural hazards. This requires the project team to identify the hazards, the population at risk, exposed geographical areas and economic sectors, the most visible forms of vulnerability and the frequency, intensity and impact of previous disasters. If a threat is identified, the project team proceeds to the second set of questions.

■ Frame of reference (political and institutional framework)

This comprises four questions that evaluate the adequacy of government policies, institutions and strategies related to vulnerability, principally in the sector where the project will intervene. The adequacy of the information available for decision-making is also evaluated.

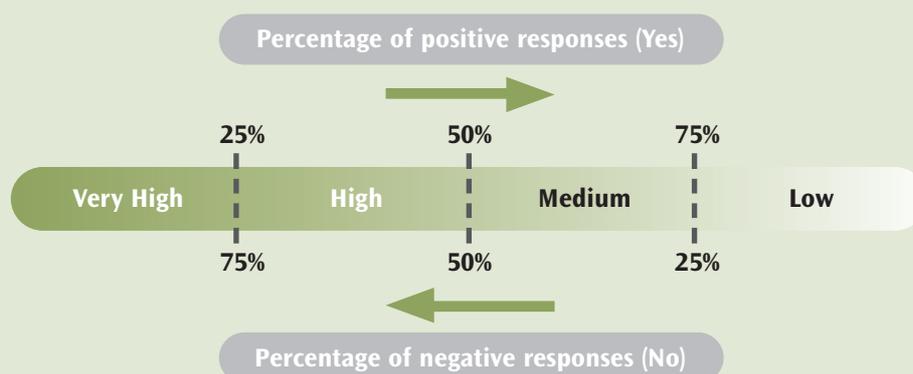
■ Specific questions

This section contains 19 questions, arranged under three main headings:

- The project (analysis of structural and non-structural measures).
- Execution of the project (questions about the institutional setting, coordination and planning mechanisms, incentives and monitoring).
- Feasibility (technical, institutional, socio-economic, financial).

The format is relatively simple, involving only a three-level qualitative assessment (yes–no–partially) with additional space for comments. The IDB acknowledges that it may not be possible to answer every question in the checklists when drawing up individual project planning documents, because data may not be available. In some cases, the information that is needed can be obtained subsequently using other planning tools (e.g., environmental or social impact assessments). What is important, however, is that all the questions are asked.

Interpretation of the results is similarly straightforward. Upon completion of the checklist, the sum of negative answers is calculated as a percentage of the total number of answers. If negative answers (excluding the first question) are less than 25 per cent of the total, the risk to project objectives and local communities from hazards is considered to be low, implying that the project design is adequate with regard to risk management (although specific aspects may still need improvement). A proportion of 25–75 per cent negative answers indicates deficiencies in project design requiring correction to make the project sufficiently resilient. Where the proportion rises above 75 per cent, the impact of hazards could endanger the project and populations, requiring additional preventive measures in project design.



The IDB is aware that its project planners and counterparts have demanding workloads and schedules. The checklist guidelines therefore state clearly that the main aim is not to add new sets of obligatory guidelines or criteria to project design, but to raise operational teams' awareness of risk and provide a set of tools to help them integrate risk management into the project cycle. Nevertheless, use of the checklists is fundamental to the whole process of project design.

Source: Keipi, Mora Castro and Bastidas (2005).

Smaller organisations such as NGOs often use simpler guidelines or checklists in designing their development projects or approving partners' applications for support. Typically these are checklists of key criteria or issues for consideration. They may contain a long list of such issues, which are often phrased in general terms (e.g., 'projects should work with the very poor in areas where the needs of people are greatest') although the extent of research and analysis required to deliver answers varies from one organisation to another. In such cases, it is relatively easy to insert additional questions relating to risk reduction in simple language. For example:

- Projects should give consideration to the likelihood of disasters, including conflicts, and, where appropriate, prepare both the community and the project itself to respond to disaster situations.
- Are disaster prevention and/or disaster preparedness included in the partner's ongoing work?
- Will the project reduce people's vulnerability to man-made and natural hazards? How?

Box 3 RUTA guidelines for incorporating risk management into rural development projects

The Unidad Regional de Asistencia Técnica (RUTA) developed these guidelines for planners and managers of field projects at different scales of operation.² RUTA is an agency mandated to provide technical assistance in sustainable rural development to Central American ministries of agriculture, and supported by national governments and international agencies.

The guidelines aim to strengthen the focus on risk reduction throughout the project cycle. The starting point is to identify entry points for disaster risk management at the project identification and formulation phases, and to highlight the key issues to address: the guidelines set out a framework for doing this (see Table 2). However, there is also guidance on actions to ensure the disaster risk management approach is adopted at other phases in the project cycle. This is presented in the form of issue/question frameworks, flow charts and decision-making trees.

These generic tools make up only a small part of the guidelines, which also contain advice on analysing community capacities and vulnerabilities, assessing the strengths and weaknesses of different institutional actors, identification of natural hazard risk and evaluation of sectoral vulnerability. Referring specifically to rural development, the guidelines provide fairly generalised question frameworks for identifying a range of potential threats to agriculture, the environment, economic growth, human resources, infrastructure and education. In several cases, these are supported with advice on the types of data that should be collected in order to respond to the questions. There is also guidance on how to ensure that relevant issues are included in terms of reference for consultants engaged in project design or evaluation.

Source: Kiesel (2001).

² The guidelines were published in Spanish in 2001, but remain unavailable online or in other languages. To obtain copies, contact <http://www.ruta.org>

**Table 2 RUTA guidelines for risk management in rural development projects:
Entry points in the project cycle**

<i>Phase</i>	<i>Entry point</i>	<i>Action</i>
Identification	Preparatory studies	In the terms of reference (TOR) for consultants developing preparatory and pre-feasibility studies, include questions such as the following: <ul style="list-style-type: none"> ■ Are natural hazards capable of creating disasters relevant factors in this project? Which ones, and why? ■ Could the project increase risk? ■ What risks could have a direct impact on the project? ■ What could be the potential impact of the project in preventing disasters? ■ Ensure consultation with relevant organisations ■ Include risk management and reduction as a specific point in donors' key issues and guidelines
	Participatory planning workshops	<ul style="list-style-type: none"> ■ Ensure relevant information (studies, data, etc.) is available ■ Ensure that participation and consultation with stakeholders includes organisations and individuals with knowledge of risk management ■ Check that the problem analysis includes attention to matters relating to management of risk reduction and how problems are defined ■ Analyse if interventions are specifically directed towards management of risk reduction (activities and assumptions) ■ Examine socio-cultural and institutional policies, management capacity and economic and financial viability against sustainability criteria ■ Develop and revise indicators
	Draft proposals	Ensure that issues relating to the management and reduction of risk are covered in the draft of the financing proposal, in the following important sections: <ul style="list-style-type: none"> ■ Problem identification ■ Documentation available ■ Activities ■ Assumptions ■ Risks ■ Sustainability factors
Formulation	Terms of reference for feasibility studies	<ul style="list-style-type: none"> ■ Include disaster risk management in the TOR for consultants carrying out the feasibility study ■ Make reference to studies, reports and relevant data, and consult with relevant organisations
	Analysis of financing proposal	Consider management of risk reduction in the analysis of the financing proposal. Analyse in particular: <ul style="list-style-type: none"> ■ All relevant problems linked to risk management ■ Interventions that take this activity into account in their activities and assumptions ■ Verify if there are 'killer assumptions' connected to risk management (i.e., vital conditions that have not been verified that could put a project or some of its activities at risk from the start) ■ If risk management has been fully taken into account regarding the sustainability of the intervention

Source: Kiesel (2001), p. 26 (unofficial translation).

4. Critical factors for success

In applying tools of any type to help incorporate disaster risk reduction into project cycle management, the following points should be borne in mind:

- Broad coverage of key issues is essential: tools must not miss important stages in project planning or components of projects; nor should they leave out important aspects of risk and the factors that create it.

- Each user organisation must make its own decisions about how much research is required to identify relevant issues or answer questions for effective decision-making and integration of disaster risk reduction into the project cycle. This is likely to depend on its capacities and existing ways of working (i.e., the degree of rigour already required for project design and appraisal) but should be consistent with them.
- Organisations can choose to adapt their existing methods and planning tools, or adopt new purpose-designed tools (e.g., those of IDB and RUTA), according to their perceived effectiveness. However, the chosen method must be capable of fitting within the organisation's project cycle management systems and approaches. Avoid situations where different appraisal tools or checklists used to assess different issues are not linked to each other or integrated within the overall project management process.
- Agencies must be clear to their staff about whether tools are voluntary or compulsory, about their purpose and about when and where to use them. Some may be designed for use at specific stages in project design, while others are linked explicitly to certain types of project document.
- Where an agency's project planning guidelines cover a large number of development issues, adding an additional issue – disaster risk reduction – to this long list may not be sufficient by itself to raise the profile of the subject within the organisation.
- Development organisations should be aware that their staff may be reluctant to use additional checklists and guidelines, particularly where the project appraisal process is already extremely lengthy and costly, or where staff are overworked. The risk that they may pay only lip service to this or any other new issue should be acknowledged. There may, therefore, be a need for internal advocacy about the benefits of adopting a disaster risk management approach.
- Staff must be trained to use planning tools effectively, whether they are new or adapted ones. Organisations may also need to make some investment in lesson learning and sharing regarding the implementation of relevant approaches.
- Training alone may not be enough to ensure effective adoption of tools. Management and technical support (e.g., technical advisers, helpdesks) may be needed.
- Whatever method is adopted for integrating disaster risk management into the project management cycle, it is important to ensure that it is effective in assessing risk and that project design and implementation are adjusted accordingly. To a large extent, this will depend on the quality of an organisation's planning, monitoring and evaluation systems overall.

Box 4 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.³

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

³ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

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World Bank, 'Project Cycle' page on the World Bank website: <http://web.worldbank.org/WBSITE/EXTERNAL/PROJECTS/0,,contentMDK:20120731~menuPK:41390~pagePK:41367~piPK:51533~theSitePK:40941,00.html>

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Logical and Results-Based Frameworks

Guidance Note 6

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note addresses the topic of logical and results-based frameworks, providing guidance on the systematic consideration of disaster-related issues in the application of these tools to the design, implementation and evaluation of all projects in hazard-prone areas, including both disaster risk reduction and other development projects. It encourages consideration of the potential disaster risks faced by a project and appropriate mitigation measures, and of the potential impact of a project on vulnerability to natural hazards. This guidance note is intended for use by development organisation project preparation teams and implementing officers.

1. Introduction

Logical framework, or logframe, analysis is a popular tool for project design and management. Originally developed for military planning purposes, it was introduced for use in development projects by the United States Agency for International Development (USAID) in 1969 and is now widely employed by many multilateral and bilateral development organisations and non-governmental organisations (NGOs). Logframe analysis provides a structured logical approach to the determination of project priorities, design and budget and to the identification of related results and performance targets. It also provides an iterative management tool for project implementation, monitoring and evaluation. Logframe analysis begins with problem analysis followed by the determination of objectives, before moving on to identify project activities, related performance indicators and key assumptions and risks that could influence the project's success.

Results-based management is a related, more recently developed tool that some development organisations have introduced since the 1990s.¹ Results-based management is more heavily focused on the performance, achievement and sustainability of outputs, outcomes and impacts, rather than the management of project activities. It begins with the strategic objective of a project and works down to determine what intermediary results and thus what activities, processes and resources are needed to achieve that objective. As with logframe analysis, it is based on an internal logic relating to cause and effect relationships between inputs, activities and results. It includes the development of a results-based framework, basically comprising a simplified logframe table focusing on objectives and intermediate results against which the project's progress is tracked during implementation and any required adjustments in project design and activities accordingly made. This framework is linked, among other things, with a risk analysis of factors potentially threatening the project's success. Results-based management may be used for the design, implementation and evaluation of individual projects, programmes and strategies.

Both logframe analysis and results-based management provide natural tools for use in considering potential disaster risks faced by proposed development projects because analysis of risks and assumptions forms an integral part of each tool. In addition, they include an analysis of alternatives, facilitating the exploration of ways of addressing disaster risk and strengthening a project's hazard resilience and sustainability, in the context of both disaster risk reduction and more general development projects. The performance-based emphasis of results-based management

¹ Managing for Development Results (MfDR) is a further related, even more recently developed and still-evolving tool. In the words of OECD-DAC (2006): "Although results-based management is nearly synonymous with MfDR as we currently understand it, some approaches to results-based management have focused only on accountability. MfDR goes further, incorporating newer ideas about collaboration, partnership, country ownership, harmonization, and alignment. MfDR provides a higher management standard because it asks all stakeholders to focus continuously on country outcome performance, rather than on short-term results."

can be particularly valuable in ensuring that project activities and objectives are appropriately modified to take account of the impact of any disasters occurring during project implementation. Logical frameworks are also living documents, providing a framework through which to examine such impacts. Finally, both are participatory tools, providing a structure for consulting and integrating various stakeholder interests and concerns, including those relating to disaster risk, into design.

Current state of the art

In practice, the potential value of logframe and results-based management tools in analysing and addressing disaster risk within the context of general development projects appears to have gone largely unutilised. Rather than entailing an in-depth analysis over a period of months or even years, application of the tools often boils down to an 11th hour box-filling exercise to satisfy bureaucratic requirements in preparing final project documentation for approval by development organisation boards or external funding bodies. As such, early windows of opportunity to adapt the design of a project to mitigate or manage the potential impacts of disaster and other risks are largely lost and the analysis and related treatment of risks are often superficial. For instance, in agricultural projects it is not uncommon to see an assumption along the lines of favourable climatic conditions included at all levels of a logframe matrix but no explicit measures included to ensure that the project's success is not jeopardised by climatic extremes. Disaster risk may even be deliberately ignored if there is no way of adequately addressing the risk at such a late stage in project development or where it could jeopardise the securing of third-party funding.

Advocated good practice

Three essential practices are required in applying logframe analysis and results-based management tools to ensure that disaster-related issues are adequately assessed and managed in hazard-prone countries:

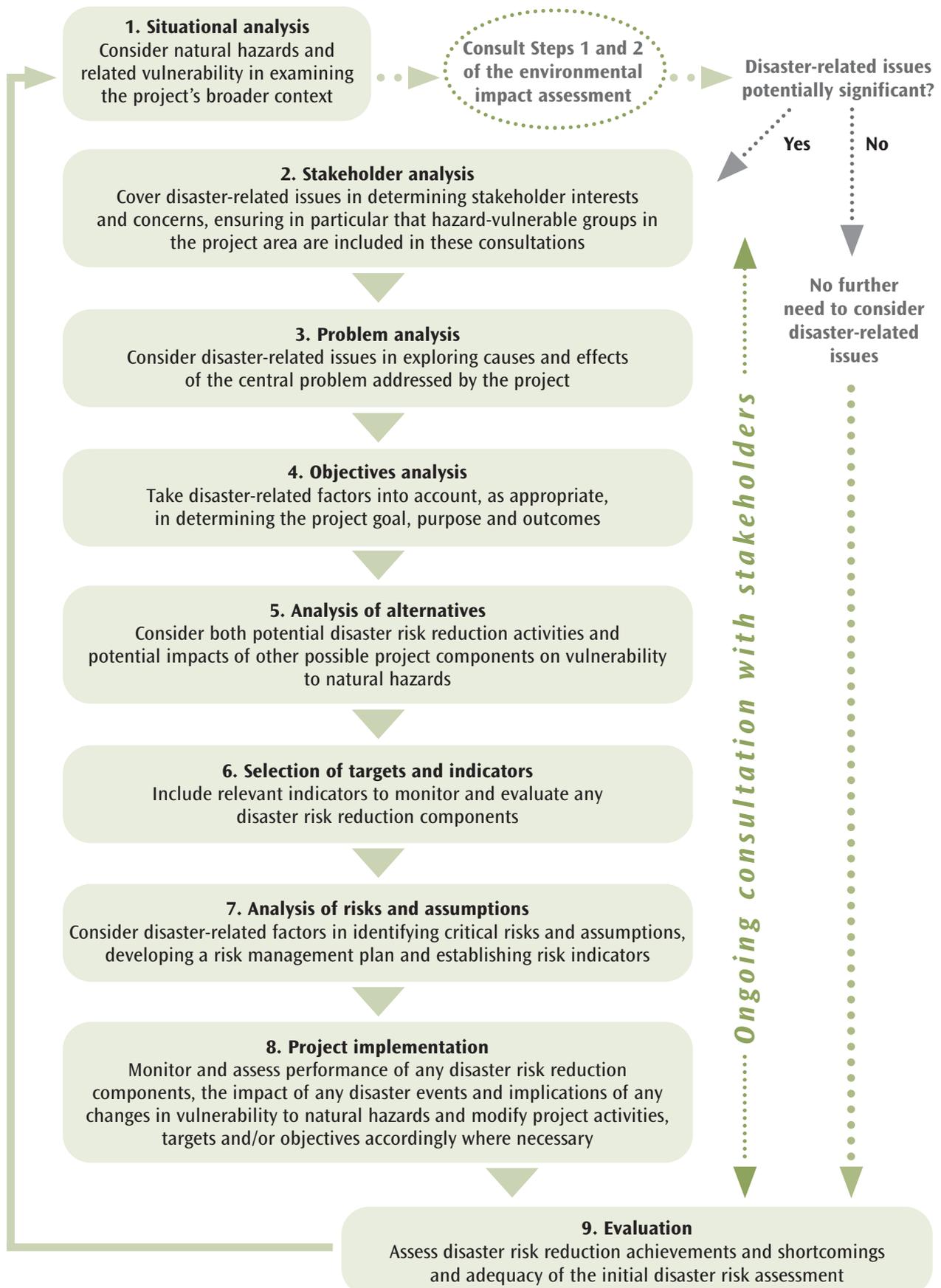
- Application of the tools should begin very early on in the preparation of a project to maximise their potential value in ensuring that disaster-related issues are properly identified, analysed and addressed.
- Disaster-related concerns should be considered at every stage of the analysis, not just in the assessment of risks and assumptions.
- Logframe matrices and results-based frameworks should be carefully reviewed in the event of a disaster to explore whether any adjustments are required to project goals and activities to ensure that envisaged achievements remain realistic and sustainable.

2. Basic steps in merging disaster risk considerations into logical and results-based frameworks

Measures required to ensure that disaster risk and related opportunities for reducing and managing vulnerability are adequately and systematically considered at each step in the application of logframe and results-based management tools are outlined below. There are slight variations in the form and order of steps undertaken by different development organisations, particularly between those employing logframe analysis and results-based management. However, the basic generic steps – as covered below and summarised in Figure 1 – are broadly similar. Key divergences between logframe analysis and results-based management are indicated.

This guidance note is intended to supplement existing guidelines on logframe analysis and results-based management tools, focusing specifically on where and how to take disaster risk concerns into account rather than providing full, comprehensive guidance on all aspects of the tools.

Figure 1 Integration of disaster risk concerns into logframe analysis and results-based management in hazard-prone countries



Disaster risk management checklists are also useful tools in helping to guide logframe analysis and results-based management. The Inter-American Development Bank (IDB) has devised such a checklist, specifying a wide-ranging series of questions to be asked during project preparation (see **Guidance Note 5**, Box 2).

Step 1. Situational analysis

Consider natural hazards and related vulnerability in undertaking an initial background exploration of the wider context and influences of all projects in hazard-prone countries (see also **Guidance Note 2** and **Guidance Note 7**, Steps 1 and 2). If disaster-related issues are likely to be of direct relevance to the success and outcome of a particular development project they should be considered at all stages of the logframe or results-based management analysis. If they are considered to be only of indirect relevance, they should be re-visited at Step 7 (Analysis of risks and assumptions). If no potentially significant disaster-related issues are identified, there is no further need to consider them until Step 9 (Evaluation).

All of the steps outlined below are relevant in preparing, managing and evaluating disaster risk reduction projects.

Step 2. Stakeholder analysis

Include disaster-related issues in undertaking an early analysis to determine stakeholder interests and concerns and to begin to determine realistic project targets and objectives for both disaster risk reduction and other development projects in hazard-prone areas. Relevant technical knowledge and expertise should also be sought.

It is particularly important to give local communities a voice to explain any impacts of disaster-related issues on their living and working environments, their perceptions of risk, behavioural responses and priorities in strengthening resilience and to comment on the vulnerability-related implications of proposed interventions (e.g., the impact of a coastal fisheries project on the exposure of farmers to sea surges). Hazard-vulnerable groups located in the project area should be included in this process, even where they have not been identified as a key beneficiary group.

A careful definition of project beneficiaries in terms of their vulnerability to natural hazards may, in fact, help define the scope even of a more general development project. For instance, beneficiary groups could be categorised as highly hazard-prone as well as, say, poor and food insecure, implying that a project aimed at poverty reduction should perhaps explicitly address disaster risk in striving towards its overall goal.

Further stakeholder consultations should occur at subsequent steps in the application of logframe analysis and results-based management tools. These consultations should build on the initial analysis to ensure that stakeholder interests and concerns, including those relating to natural hazards, are integrated into the design of the project, reflected in its objectives and activities and taken into account in any subsequent adjustments during implementation.

Step 3. Problem analysis (or situational and cause-and-effect analysis)

In undertaking logframe analysis, consider disaster-related issues in identifying the central problem the project seeks to address, exploring its causes and effects and identifying those affected.

The role of past disasters and continuing disaster risk, including the related impact on behaviour (e.g., via the selection of crops for production), should be taken into account in analysing underlying causes of the problem. Any impact or effect of the central problem on vulnerability to natural hazards should also be explored (e.g., the vulnerability-related implications of environmental degradation). In the case of disaster risk reduction projects, vulnerability to natural hazards itself is the central problem to be analysed.

Step 4. Objectives analysis

Take disaster-related factors into account in determining the strategic objective, goal or impact of a project, its project development objective, purpose or outcome and intermediate objectives or outputs. In the case of logframe analysis, these objectives are determined by translating the effects identified in the problems analysis (Step 3) into positive statements or objectives (e.g., an increase in crop yields in years of lower rainfall), using causes to determine means–end relationships (that is, how to move from the root causes of a problem to the achievement of objectives) and, if necessary, balancing out objectives. In results-based management, the strategic objectives are identified first, building down through the sequence of cause–effect relationships to determine lower-level objectives and, thus, project activities.

Project strategic objectives are increasingly aligned with country programming goals (which, in turn, are linked to poverty reduction strategies and Millennium Development Goals). Given the large range of problems facing many developing countries, disaster risk reduction is unlikely to feature often as a strategic objective except in small economies recovering from recent catastrophic events and under programmes of more specialised NGOs, such as those focusing on food and livelihoods security (see **Guidance Note 4**). However, in hazard-prone countries disaster risk reduction could directly contribute towards the achievement of other strategic objectives such as sustained economic growth, improved lives and protection of vulnerable groups, increased incomes of small-scale farmers or the establishment of a managed system of protected, productive and sustainable natural resources. As such, a disaster risk reduction project could be decided upon to help achieve these other strategic objectives. Such a project would have a specific disaster-related development objective (see Box 1).

In other development projects, disaster risk reduction could be selected as an intermediate objective directly contributing towards achievement of the project development objective. In more hazard-prone countries, inclusion of disaster risk reduction components could be particularly important in ensuring the sustainability of a project's benefits and achievements. For instance, a project to improve housing conditions could include intermediate objectives relating to strengthened building codes and land use regulations to support enhanced hazard resilience. Alternatively, disaster risk reduction elements could be included as key assumptions relating to planned activities to be undertaken by partner agencies or, where they are important but beyond the realistic or direct scope of the project, rephrased as project risks (see Step 7). Any disaster risk reduction intermediate objectives or outputs should be precisely defined, verifiable (see Step 6) and feasible within available project resources.

Step 5. Analysis of alternatives

Include potential disaster risk reduction activities as relevant in determining and appraising possible project components for achieving the project's intermediate objectives or outputs and selecting the optimal project strategy. Causal links between project activities and intermediate objectives or outputs should be clear.

The positive and negative impacts of other possible project components on vulnerability to natural hazards (e.g., via their environmental impact – see **Guidance Note 7**) and the impact of potential future hazard events on the success and sustainability of possible project components should also be considered and any required adjustments accordingly made (e.g., hazard-proofing building design (see **Guidance Note 12**)). In hazard-prone countries, this is important even in cases where the project itself does not include any explicit disaster risk reduction components or where hazard-related issues were not identified as a cause or effect of the problem being tackled. (See also **Guidance Note 8** on analysis of project alternatives and **Guidance Notes 7, 8, 11 and 12** on project appraisal more generally from economic, environmental, social and technical perspectives.)

The implications of a project for vulnerability to natural hazards of non-beneficiaries should also be considered in the analysis of alternatives, as arising both intentionally (e.g., in the case of deliberate diversion of floodwaters) and unintentionally (e.g., where construction of infrastructure would block drainage of water – see **Guidance Note 7**, Box 1).

Step 6. Selection of targets and indicators

Determine relevant indicators to monitor and evaluate project performance and success, including a few indicators for each disaster-related project development objective and intermediate objective, and specify base and target values. Indicators should signify the level of success needed in order to accomplish expected achievements at the next level of the logframe matrix or results-based framework. Indicators should be specific and tangible, measurable in quantity or quality, time and location; easy and cheap to collect; relevant and informative for decision-making purposes; and reliable. Related targets should be realistic. Indicators are not required for strategic objectives as these are beyond the responsibility of individual projects and thus are not monitored within a project context.

Measuring the performance and achievements of disaster risk reduction measures poses certain challenges relating to the fact that the design hazard event² may not occur over the life of the project and thus the benefits and impact of related disaster risk reduction activities may not be directly measurable. Such challenges concern in particular those measures intended to strengthen resilience against geophysical hazards, such as earthquakes, volcanic eruptions and tsunamis. In such cases, leading or process indicators are required that will at least provide some sign of progress towards the achievement of project objectives (e.g., the number of schools constructed to withstand

² The specified magnitude of a particular type of hazard against which the disaster risk reduction measure is intended to strengthen resilience. The measure may provide little or no protection against greater events and even, in some circumstances, exacerbate such losses (see **Guidance Note 8**).

earthquakes). Leading or process indicators are also required in situations where the full benefits of a project will only become apparent after its completion (e.g., by measuring the progress of a mangrove planting scheme intended to provide protection against sea surges in terms of rates of growth and survival of the trees).

Box 1

The Asian Development Bank's Hunan Flood Management Sector Project, China: Defining project impacts, outcomes, outputs and related indicators

<p>Project impact</p>	<p>Sustainable and inclusive socio-economic growth in flood-prone areas of Hunan Province</p> <p>Indicators</p> <ul style="list-style-type: none"> ■ Number of newly established industrial and commercial enterprises in the project areas increases compared with base year 2006 ■ Land values for commercial and industrial purposes in project areas increases by at least 20% over 2005 levels by 2012 ■ Urban poverty incidence in the project areas is reduced compared with 2003 incidence of 6.7%
<p>Outcome</p>	<p>Flood protection for strategic and priority flood-prone areas in the upper reaches of the four main river basins in Hunan Province is improved</p> <p>Indicators</p> <ul style="list-style-type: none"> ■ Annualized flood damage and disaster relief costs reduced in participating cities as a result of increased standards for flood protection works and improved flood emergency preparedness ■ Direct economic losses from floods and waterlogging reduced compared with current average losses
<p>Outputs</p>	<ol style="list-style-type: none"> 1 Non-structural flood management systems: operational flood warning and management systems for up to 35 municipalities and counties linked to the provincial flood warning and management system <p>Indicators</p> <ul style="list-style-type: none"> ■ Increased warning time against potential floods in project area (current warning time is a few hours to one day) ■ Forecasting and warning data more frequently accurate 2 Structural flood protection, resettlement, and environment management: flood protection works are completed in priority locations as part of Hunan's River Basin Flood Control Plan and the 11th Hunan Provincial Five-Year Plan and in compliance with PRC [People's Republic of China] regulations and Asian Development Bank (ADB) safeguard policies <p>Indicators</p> <ul style="list-style-type: none"> ■ Flood-control level of county-level cities improved to 1 in 20-year return flood from below 1 in 5-year return flood recurrence by end of project ■ Flood-control level of municipal cities improved to 1 in 50- or 100-year return flood by end of project ■ Satisfaction level of the 20,133 relocated persons restored to pre-resettlement levels in terms of income and livelihood ■ Percentage of environment management plan (EMP) monitoring targets achieved 3 Project management and capacity building: operational and strengthened project management and monitoring systems <p>Indicators</p> <ul style="list-style-type: none"> ■ Timely and informative reporting of local project management offices (LPMOs) that reflects accurate and on-time project implementation in line with agreed assurances ■ Domestic systems-based project management and monitoring system, including Project Performance Management System (PPMS) operationalized 4 Flood management sector planning: selected sector assessments and planning to support development of integrated flood management plans (grant financed through the advisory technical assistance) <p>Indicators</p> <ul style="list-style-type: none"> ■ Basin-wide flood warning system development needs assessed; flood insurance appraised with support from advisory technical assistance (TA); next actions for inclusion in future flood management plan agreed upon by key provincial authorities by Year 2008

Source: Excerpt from ADB, *Proposed Loan and Technical Assistance Grant People's Republic of China: Hunan Flood Management Sector Project – Report and Recommendation of the President to the Board of Directors*. Project Number 37641. Manila: Asian Development Bank, 2006.

Use of proxies and alternative indicators may also assist measurement. For instance, in a project aimed at strengthening the drought-resilience of poor households, fluctuations in livestock sales or school enrolment will be easier and cheaper to monitor than movements in household income.

Considerable care is required in thinking through the implications of the achievement of possible indicators and ensuring that appropriate, and collectively fully informative, indicators are selected. The consequences of reliance on particular indicators also require careful thought. For instance, a rise in flood-plain land prices may help capture the benefits of a flood control project. However, rising land prices could also imply that poorer households are forced away into other marginal areas and thus that a second indicator measuring population movements by income group or occupation in and out of the project area might also be required.

In cases where it proves difficult to identify a relevant disaster risk reduction indicator, it may be because the related intermediate objective or output has been defined too broadly or ambitiously and needs to be more closely defined. The magnitude of the hazard event itself may need careful definition to support identification of appropriate indicators, e.g., protection against a 1 in 25-year flood event rather than protection against flooding.

Case examples of performance indicators are presented in Boxes 1 and 2. Further guidance on the selection of indicators and methods and techniques for collection of related data (including the establishment of baseline data where necessary) is provided in **Guidance Note 13**. **Guidance Note 9** also contains useful information on methods and techniques for collection of data, while **Guidance Note 4** (Box 2) discusses various disaster risk indices that have been developed to measure national and sub-national risk, in part for monitoring and evaluation purposes.

Box 2

Monitoring objectives: Project development objectives and related performance indicators

Pan American Health Organization's Emergency Preparedness and Disaster Relief project in the Americas

Project development objective: To lessen the impact of disasters on the population of the Americas by improving the ability of the health sector to prepare for and respond to all types of emergencies and reduce risk to disasters

Related performance indicators:

- The Ministry of Health plays a leading role in the coordination and implementation of a national disaster reduction programme
- Countries (NGOs, governments and the private sector) demonstrate a commitment to reducing the vulnerability of the health sector by taking actions that develop a 'culture' of disaster risk reduction
- The number of health ministries that have invested their own or other national resources in disaster management and reduction

ActionAid's Disaster Risk Reduction through Schools project in seven countries

Project development objective: To make schools in high-risk disaster areas safer, enabling them to act as a locus for disaster risk reduction, institutionalising implementation of the Hyogo Framework within education systems

Related performance indicators:

- Strengthened disaster preparedness for effective response at all levels
- Substantial reduction in losses of lives and property in disasters
- Disaster preparedness and risk reduction mainstreamed in education curriculum
- Schools recognised as focal points in disaster risk reduction and involved in community education and advocacy programmes
- Reduction in underlying risk factors

Practical Action's Mainstreaming Livelihood-Centred Approaches to Disaster Management project in Bangladesh, Peru, Zimbabwe and other countries (to be determined)

Project development objective: National and local development and disaster plans are more responsive and effective in enabling poor communities to reduce disaster risks that threaten their livelihoods

Related performance indicators:

- Local- and national-level support institutions incorporate disaster risk reduction plans into their development practices in project countries
- Poor communities in project locations reduce losses of livelihood assets due to disasters
- Poor communities and local organisations represented in disaster management decisions and planning

Step 7. Analysis of risks and assumptions

Consider disaster-related factors in identifying the set of critical assumptions on which the success and sustainability of the project's overall objectives and individual components will depend, assess and rank related risks, develop a risk management plan and establish risk indicators.³ All stakeholders should be involved in this analysis.

The internal logic of both logframe analysis and results-based management is particularly valuable in exploring the implications of potential disaster risk as it facilitates careful analysis of causal relationships (i.e., the assumptions that must hold in order for the provision of inputs to lead to activities, for the activities to produce outputs and so on).

Critical assumptions may relate to possible risks identified under Step 1 but only considered of indirect relevance to the project; to disaster risk reduction objectives that were considered but not selected under Step 4; or to the successful implementation of disaster risk reduction activities planned by partner agencies. Where project assumptions include steps to be undertaken by others, the various parties' actions should be carefully harmonised.

Hazard-related assumptions should be stated as precisely as possible, specifying orders of magnitude and, if relevant, areas affected (for instance, 'April-October rainfall exceeds 25 cm every year over the life of the project in the project province' rather than 'no drought'), because more minor events may pose little risk to the project and also because more precisely defined assumptions are easier to monitor.

The risk of assumptions not holding should then be assessed in terms of both probability and impact. Both the direct impacts of disasters and their indirect implications for other key assumptions should be considered (see Box 3).

Box 3 Disaster risks to development projects

Natural hazard events could pose potential risks to a development project at any level of a logframe matrix of results-based framework. They could restrict:

- inputs from leading to activities (e.g., if a disaster weakens a government's administrative capacity to manage the project);
- activities from creating outputs or intermediate objectives (e.g., by destroying infrastructure built or crops grown under a project; by implying that volunteers for a training programme are no longer able to attend a course due to disaster-created demands on their time; or by disrupting efforts to strengthen management systems as attention is diverted to relief and reconstruction efforts);
- outputs from achieving the development objective, purpose or outcome of a project (e.g., by destroying infrastructure needed to transport and market project outputs, implying that target increases in rural income are not met; by resulting in the withdrawal of children from school to generate additional family income, limiting achievements of an education project aimed at increasing literacy rates; or by implying that households are no longer able to afford the health-care services provided by a particular project); and/or
- achievement of the project development objective from contributing towards the achievement of the strategic objective, goal or impact (e.g., where disaster-related deaths undermine the achievement of a health project in contributing towards a reduction in rates of mortality and ill-health).

Project inputs could also be affected by a disaster – for instance, if project funding is reallocated to disaster relief and reconstruction efforts or if costs of certain project inputs (e.g., construction materials) rise significantly post disaster. Such preconditions for project implementation do not appear within the logical or results-based management framework but should nevertheless be borne in mind in designing, implementing and evaluating projects in hazard-prone areas.

Similarly, assumptions relating to anticipated activities of partner agencies could be undermined by the direct or indirect impacts of a disaster – e.g., due to the reallocation of financial or other resources.

³ In logframe analysis, critical assumptions are recorded in the right-hand column of the logframe matrix and used to verify its vertical logic. In results-based management, a separate critical risks matrix is developed.

Having determined levels of risk, appropriate disaster risk management options must then be selected. This will in part depend on available project resources, as well as on the severity of the risk and the perceived ability of others to manage a disaster event (see Box 4). Risks can be:

- accepted (appropriate where risks, or remaining risks after other measures are taken, are low and unlikely to endanger achievement of project objectives);
- avoided (e.g., by not continuing with that activity or component of a project or even entirely redesigning a project because the risk is too great and measures to deal with it too expensive and difficult – so-called ‘killer assumptions’);
- mitigated or reduced in likelihood by amending the project design (e.g., using an alternative building design or a different variety of crop), by adding additional features (e.g., an irrigation component) or even initiating a separate disaster risk reduction project; and/or
- transferred (e.g., by insuring the project against disaster risk).

Project objectives could also require adjusting (e.g., by setting a lower crop yield target). Performance indicators should then be specified for remaining risks, particularly those with high ratings, and the risks should be carefully monitored during project implementation.

Box 4 Managing risk – an example from Bangladesh

Significant disaster risk does not necessarily mean that a project should be dropped, as illustrated by a risk analysis undertaken for a UK Department for International Development (DFID) Chars Livelihoods Programme in Bangladesh. This analysis identified seven risks, the first of which was that “environmental change or natural disasters may undermine programme progress”.⁴ However, the analysis continued on to state that:

“...although the probability associated with this risk is high, associated impact [on the DFID Chars Livelihoods Programme] is judged as low, on the basis that previous floods have demonstrated that government, NGOs and development partners are relatively effective and efficient at mobilising resources to deal with the immediate crisis. It is likely that the agencies involved in disaster management would be the same agencies which are partnered with the programme, again reducing the likelihood that programme activities would be seriously disrupted.

In addition, the programme itself has a significant component concerned with improving disaster preparedness and disaster management... This is planned to begin from programme inception, and will itself contribute to improving the efficiency and effectiveness of disaster management operations should the need arise.

Despite the comfort that may be drawn from these factors, it remains true that if a disastrous flood were to occur in the first three years of the programme, it would constitute a severe setback to programme activities which would require reconsideration of the overall programme timetable.”

Source: DFID. *Chars Livelihoods Programme – Annex 9: Risk Analysis*. London: Department for International Development (UK), 2002. Available at: <http://www.dfid.gov.uk/pubs/files/chars-livelihoods-prog.pdf>

Step 8. Project implementation

Monitor the performance of disaster risk reduction project components during implementation using the selected performance and risk indicators and make any appropriate adjustments in inputs, activities, targets and objectives.

In the aftermath of any disaster, all projects under implementation in the affected area should be carefully assessed and objectives, targets and assumptions revised as necessary to take account of any direct or indirect impacts on the project and to reflect any perceived or actual changes in the form and nature of vulnerability to future hazard events. Major changes in vulnerability to natural hazards over the life of the project (e.g., due to deforestation) should also be carefully monitored and any necessary adjustments undertaken to ensure that project outcomes remain sustainable, particularly in highly hazard-prone areas. Unintended impacts of the project itself on vulnerability to natural hazards should also be closely watched. Participatory approaches, involving stakeholders in the monitoring process, can be particularly valuable in determining any changes in vulnerability and making necessary adjustments.

⁴ ‘Natural disasters’ is DFID’s term. The other six risks related to the governance environment, ability to reach the poor, agreement on roles and partnerships, the identification of sufficient suitable partners, resistance from elites and the receptiveness of policy-makers.

Step 9. Evaluation

With the benefit of hindsight, use the logframe or results-based framework to explore:

- whether disaster risks and related assumptions were accurately assessed during project design;
- whether disaster risk was appropriately and cost-effectively addressed by the project;
- the benefits and achievements of any disaster risk reduction-related components;
- whether selected disaster risk-related performance and risk indicators were sufficiently relevant and informative;
- how the direct and indirect impacts of any disasters occurring over the course of the project affected its outcome and achievements;
- whether the impacts of those disasters were handled appropriately within the context of the project; and
- whether the sustainability of the project's achievements are potentially threatened by future hazard events.

Lessons learned from the evaluation should be integrated into future projects.

3. Critical factors for success

- *Understanding of vulnerability and opportunities for disaster risk reduction.* In some quarters, disasters are still viewed as 'acts of god'. Efforts are required to enhance knowledge and understanding of the fact that disasters are not, in fact, unpredictable, unavoidable events to be dealt with by emergency specialists. Instead, if recognised at an early stage in project design, there may be considerable scope for managing disaster risk and enhancing resilience. Better understanding of vulnerability is particularly important in view of the fact that development initiatives themselves can unwittingly create new forms of vulnerability or exacerbate existing ones, sometimes with tragic consequences.
- *Additional assessment of risk.* Disaster risk analyses undertaken as part of logframe analysis and results-based management typically entail a rapid qualitative assessment in order to categorise risks as low, medium or high. In certain cases, however, further analysis may be necessary, possibly within the context of particular appraisal tools (e.g., economic (see **Guidance Note 8**), environmental (see **Guidance Note 7**) or engineering (see **Guidance Note 12**)). The implications of disaster risk for higher-level risks, such as risk to the development organisation's reputation (reputational risk), should also be explored.
- *Treatment of low-probability, high-impact risks.* Climatological hazards are most likely to be identified as potential risks, reflecting their shorter return periods and thus higher probability that they will occur over the life of a project. Drought, in particular, is likely to be identified as a risk factor in projects dependent on water inputs to be undertaken in drought-prone areas. In contrast, risks emanating from earthquakes and volcanic hazards, with much longer return periods, may be discounted. However, it is important to ensure that such risks are adequately considered from a safety perspective, taking rights to safety and protection into account (see **Guidance Note 12**).
- *Development organisation priorities.* The particular emphasis of logical framework and results-based management analysis will in part reflect a development organisation's policies and priorities. In the absence of specific directives to consider disaster-related issues, only limited consideration may be paid to them, even in highly hazard-prone areas.
- *Adjusting project scope and objectives.* The flexibility inherent in logframe and results-based management tools should be fully exploited, treating related frameworks as living documents and constantly revisiting and, when necessary, revising them as project circumstances change.
- *Performance indicators.* Further work is required to support the development of indicators for monitoring and measuring the performance of disaster risk reduction activities (see **Guidance Note 13**).

Box 5 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.⁵

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

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⁵ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Environmental Assessment

Guidance Note 7

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note focuses on environmental assessment, the natural starting point in the design of a project to explore natural hazards and related risk. It provides guidance in analysing the disaster risk-related consequences of potential projects via their impact on the environment and also the potential threat to projects posed by natural hazards, both for development projects in hazard-prone areas and, more briefly, for post-disaster relief and rehabilitation operations. It is intended primarily for use by development organisations but is also relevant for personnel of governments and private organisations involved in the design of individual projects.

This guidance note has been jointly prepared by the ProVention Consortium and the Caribbean Development Bank (CDB). Section 2 of this guidance note is based on CDB and the Caribbean Community's (CARICOM) Sourcebook on the Integration of Natural Hazards into Environmental Impact Assessment (EIA): NHIA-EIA Sourcebook (2004).

1. Introduction

Environmental assessment of projects and programmes has emerged as established good practice. Most development organisations, as well as an increasing number of partner countries, now require all projects to undergo some form of environmental review as a key component of the appraisal process. The basic purpose is to examine the potential environmental consequences, both beneficial and adverse, of the proposed project and to ensure that they are adequately taken into account in the project's design.

It is essential that these environmental assessments cover natural hazards and related risk. The state of the environment is a major factor determining vulnerability to natural hazards. Environmental degradation is widely recognised as one of the key factors contributing to increasing human, physical and financial hazard-related losses. For instance, in many countries deforestation has disrupted watersheds and resulted in siltation of riverbeds, leading to more severe droughts and floods. Increased siltation of river deltas, bays and gulfs, together with the destruction of mangroves, reefs and other natural breakwaters, has also increased the exposure to storm surges and seawater intrusion. Poor land use management, unsustainable agricultural practices and more general land degradation have further contributed to increasing flood losses and the rising incidence of drought.

In order to help redress this rising trend in disaster losses, and also to help counter the anticipated rise in the frequency and intensity of climatological hazards associated with climate change, it is imperative not only that environmental degradation is reversed but also that the disaster-related consequences of potential projects are carefully spelt out as part of the environmental assessment process and taken into account in project design. For instance, clearing mangroves to make way for prawn farming or tourism development may generate substantial livelihood opportunities but it also increases exposure to storm surges and tsunamis. Similarly, environmental assessments should measure potential risk reduction benefits that projects supporting improved environmental management could encompass.

Natural hazards are themselves environmental phenomena which, as demonstrated time and time again, can potentially damage and disrupt projects and jeopardise the achievement of their aims and objectives. As such, the environmental assessment is also the natural place in the project appraisal process to collate data on natural hazards – that is, on types of hazard faced, magnitudes and probabilities of occurrence – in the project area to feed into other forms of appraisal and engineering design as relevant.

Box 1 Ignoring hazards hurts

Ignoring disaster-related issues in the design of projects can exacerbate the duration and severity of flood and drought events. It can also result in subsequent damage to the projects themselves, following the occurrence of a disaster. For instance:

- In the Vietnamese city of Hue, expansion of infrastructure, including bridges, railway lines and roads, has created a barrier across the valley within which the city is located. As a result, excess rainfall can no longer soak away quickly and problems of flooding have become more severe.¹ Similar problems have occurred in several villages in Gujarat, India, following the construction of a donor-funded highway.
- Following widespread devastation caused by Hurricane Hugo in 1989, a new aid-funded hospital was built at the foot of a volcano in the Caribbean island of Montserrat. This hospital was subsequently destroyed by pyroclastic flows after the volcano began eruptive activity again in mid-1995.
- Following the devastating 2004 Indian Ocean tsunami, some housing in Aceh, Indonesia, was reconstructed in flood-prone areas, leaving families vulnerable to future hazard events.

Current state of the art

Development organisations' existing environmental assessment guidelines vary considerably in the extent to which they consider natural hazards and related risk. Historically, there seems to have been relatively little attention to this issue. Even now, guidelines for a number of development organisations do not explicitly mention the disaster-related implications of particular environmental consequences of a project, such as the implications of any effects on forests and vegetation or the availability of surface- and groundwater. Moreover, environmental assessments of post-disaster relief and recovery interventions are often waived to help speed disbursement, despite the fact that they take place in blatantly hazard-prone areas.

However, a number of other development organisations are becoming increasingly aware of the importance of considering natural hazard-related factors in assessing the environmental impacts of proposed projects in hazard-prone areas, in both their environmental assessment policies (see, for example, Box 2) and their guidelines. Some guidelines now explicitly cover assessment of the vulnerability of projects to natural hazards. Others – notably, those for CDB and the United Kingdom's Department for International Development (DFID) – go that critical step further, providing guidance in assessing the vulnerability implications of a project's impact on the environment. Efforts are also under way to encourage greater consideration of environmental issues and future hazard events in the design of post-disaster operations, including by the United Nations Environment Programme (UNEP) and the Office of the United Nations High Commissioner for Refugees (UNHCR).

Box 2 The African Development Bank's policy on the environment: Placing disaster management at the fore

The African Development Bank's environment policy² identifies a number of key environmental issues that have to be addressed in all the Bank's lending operations. These issues were based on the findings of a review of the major constraints and opportunities facing sustainable development in the region. They include enhancement of disaster management capabilities, such as the establishment of early warning systems and preparedness and coping mechanisms to reduce the hazard vulnerability of both people and economies; the maintenance of contingency plans to restore ecological resources; and functions to maintain livelihood

¹ IFRC. *World Disasters Report: Focus on recovery*. Geneva: International Federation of Red Cross and Red Crescent Societies, 2001.

² AfDB/ADF. *African Development Bank Group's Policy on the Environment*. Abijan: African Development Bank and African Development Fund, 2004. Available at: http://www.afdb.org/pls/portal/docs/PAGE/ADB_ADMIN_PG/DOCUMENTS/ENVIRONMENTALANDSOCIALASSESSMENTS/ENVIRONMENT%20POLICY_0.PDF

resources and ecological stability. Other key environmental issues to be addressed in all projects that should also play a key role in enhancing disaster risk management include, for example, the reversal of land degradation and desertification, protection of the coastal zone and protection of global public goods (such as regional climatic forecasting).

Advocated good practice

Three essential actions are required as part of the environmental assessment process to ensure that natural hazard-related factors are adequately assessed and managed:

- The environmental assessment process should include collation of data on natural hazards and related risks as a fundamental first step in broader project scoping and the findings used to determine if disaster risk should be examined in further detail in other components of the project appraisal process.
- Systematic analysis of the potential disaster risk-related consequences of a project via its impact on the environment should be included as a central component of the environmental assessment process in hazard-prone areas.
- Environmental issues should be carefully considered in the design and implementation of post-disaster relief and rehabilitation activities.

These actions are elaborated upon below.

2. Basic steps in merging disaster risk considerations into environmental assessment³

It is recommended that the following measures be taken when carrying out environmental assessments of projects in hazard-prone areas to help ensure that natural hazard-related factors are adequately examined and, where necessary, addressed. These measures, which are also summarised in Figure 1, add few additional requirements to the environmental assessment process and do not require any changes in the basic procedure.

Step 1. Define project and alternatives

In the initial project definition and description, include, at a minimum, information on the “design criteria of projects (e.g., building codes used), soils, geology, slopes and drainage, location relative to coasts and rivers, hazards or damage history” and project-related climate change scenarios to frame the environmental assessment. Where they exist, some of this information should already be contained in country environmental analyses (Box 3) and relevant strategic environmental assessments (Box 4).

Box 3 Country environmental analysis

Country environmental analysis (CEA) is a relatively new analytical tool that a number of multilateral and bilateral development organisations are beginning to apply, in particular to inform overall country programming (see **Guidance Note 4**).⁴ CEA provides systematic analysis of key environmental issues most critical to the sustained development of a country and the achievement of the Millennium Development Goals (see **Guidance Note 3**) and opportunities for overcoming constraints; of the environmental implications of key development policies; and of a country’s environmental management capacity and performance. The tool was developed in response to increasing focus on mainstreaming environmental issues into development policies and planning.

³ This section is based on CDB and CARICOM, *Sourcebook on the Integration of Natural Hazards into Environmental Impact Assessment (EIA): NHIA-EIA Sourcebook*. Bridgetown, Barbados: Caribbean Development Bank, 2004. For a fuller discussion refer to this document, which systematically works through each stage of the EIA process providing generic guidance on where and how natural hazard and climate change adaptation issues should be considered. Text indicated in quotation marks in this guidance note is taken from page 3 of a four-page summary version of the CDB/CARICOM sourcebook, entitled *Integrating Natural Hazards into the Environmental Impact Assessment Process: Mainstreaming Disaster Risk Reduction into Development Project*.

⁴ Some development organisations use the term strategic environmental assessment (SEA) rather than CEA to describe environmental analysis undertaken to inform programming of country assistance (see Box 4).

CEA provides an important opportunity to highlight disaster risks, where significant, and helps ensure that they are adequately addressed. The Asian Development Bank's CEA for Tajikistan, for instance, identifies natural hazards, including drought, landslides and earthquakes, as one of the country's key environmental problems and highlights a related reduction in vulnerability as a major element in promoting environmental interventions to reduce poverty. In order to enhance resilience, it recommends support for activities that contribute to greater physical stability (e.g., prevention of soil erosion); the exploitation of opportunities for simultaneously reducing vulnerability and supporting livelihoods (e.g., drainage of lands prone to mudslides and use of the water collected for irrigation); careful attention to zoning of economic activities; and, more generally, a policy that favours risk reduction over emergency response and reconstruction.⁵

All CEAs should include collation of basic hazard data and background information on past disaster losses to give a preliminary overview of the significance of disaster risk in a country and to provide information that can be drawn upon both in undertaking environmental assessment of individual projects and in country programming. United Nations Development Programme (UNDP) environmental guidelines, for instance, already indicate that country environmental reviews should include baseline data on rainfall, climate, temperatures, seismic faults, cyclones and droughts.⁶

Box 4 Strategic environmental assessment

Strategic environmental assessment (SEA) is a tool for the integration of environmental considerations into policies, plans and programmes at the earliest stages of decision-making. SEA seeks to ensure that broad environmental considerations are integrated into these higher, strategic levels of decision-making taken prior to the identification and design of individual projects, ideally based in part on a participatory process. SEA is applied in some form by many multilateral and bilateral organisations and also by a number of governments. At the country programming level, it is sometimes referred to as CEA (see Box 3).

Like CEA, SEA can provide an important opportunity to highlight natural hazard-related issues, where relevant, and ensure that they are adequately addressed. For instance, environmental analysis by the Asian Development Bank (ADB) of some specific interventions to support the development of irrigation infrastructure in Cambodia found that these interventions could not be considered in isolation from other proposed government and donor irrigation projects and the potential cumulative environmental impacts collectively associated with these schemes. These impacts included those relating to the implications of large irrigation schemes and water withdrawal for the system of flooding (used to economic advantage in Cambodia in normal years) and water flows. In consequence it was proposed that future ADB investments in the irrigation sector should be conditional on integrated basin development planning, which was currently absent in many parts of Cambodia.⁷

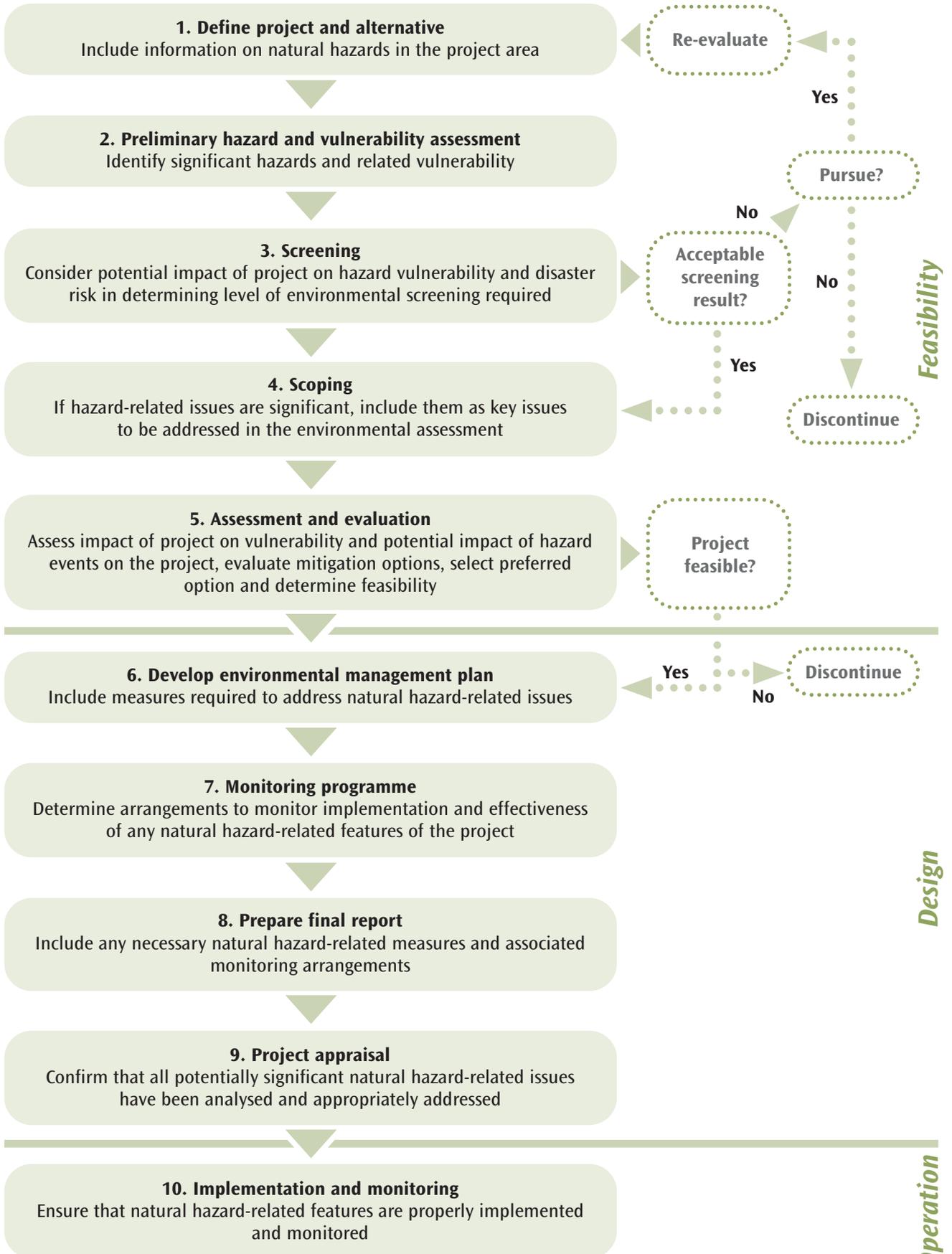
SEA is also a potentially important tool in ensuring that adequate attention is paid to disaster risk in the design of policies, in particular since SEA should include the prioritisation of environmental issues in terms of their effect on economic development and poverty reduction. In hazard-prone countries, disaster and related risks can be a critical factor determining progress in both economic development and poverty reduction (see **Guidance Notes 3 and 8**).

5 ADB. *Tajikistan: Country Environmental Analysis*. Manila: Asian Development Bank, 2004. Available at: <http://www.adb.org/Documents/Reports/CEA/taj-july-2004.pdf>

6 UNDP (undated).

7 ADB. *Cambodia: Country Environmental Analysis*. Manila: Asian Development Bank, 2004. Available at: <http://www.adb.org/Documents/Reports/CEA/cam-may-2004.pdf>

Figure 1 Integration of disaster risk concerns into environmental assessment
(based on CDB and CARICOM, 2004 – see footnote 3)



Step 2. Preliminary hazard and vulnerability assessment

Undertake a preliminary identification of significant hazards and related vulnerability to inform environmental screening and scoping, “including an estimation of [the] frequency or probability of hazard events (initial hazard identification) and [related] severity of impacts on project components and zone of influence (initial assessment of vulnerability)”. (See **Guidance Note 2.**) This assessment should take account of possible shifts in both vulnerability and, due to climate change, the frequency and intensity of hazard events over the life of the project.

Step 3. Screening

Include information from Step 2 in determining the level of both environmental screening and further hazard and vulnerability assessment required.

Projects should be assigned to Category A (full environmental impact assessment (EIA) report) if their environmental impacts are highly likely to contribute to increased vulnerability to natural hazards. Projects should be assigned to Category B (focus EIA report) if their environmental impacts are likely to contribute to increased vulnerability but such impacts are expected to be less adverse than those experienced by Category A projects. These impacts would be site-specific, typically reversible and, in most cases, counteracting mitigation measures could be designed more readily than for Category A projects. Projects should be assigned to Category C if they are likely to have minimal or no adverse environmental impacts.

There may be some cases where a traditional Category A or even Category B environmental assessment, which explores the impact of a project on its surrounding environment, is not required but where a fuller hazards and vulnerability assessment, which explores the impact of the environment on the project, is necessary because natural hazard events could have potentially significant adverse social, economic, structural or environmental impacts on the project. For instance, the construction of schools may have little impact on the environment but hazard-related safety concerns are paramount in building schools in hazard-prone areas.

Step 4. Scoping

Consider natural hazard-related issues in identifying critical issues to be addressed in the environmental assessment (see Box 5). If disaster risks are significant or the proposed project is likely to have a significant impact on vulnerability to natural hazards (i.e., Category A or B projects), these topics should be included in the list of issues for investigation and relevant expertise built into the assessment team. Further information and any related analysis required to inform the environmental assessment – or, if required, a fuller stand-alone hazards and vulnerability assessment – and to provide baseline data for subsequent monitoring and evaluation should then be identified. Information needs include baseline hazard data on the project site, information on significant hazards and their potential impacts on the project, relevant legislation and institutions and climate change assessments.

Box 5 Sectoral checklists⁸

Many environmental assessment guidelines include checklists of environmental sustainability issues that could be relevant in assessing particular types of development intervention. The following list provides some examples pertaining to disaster risk that should be considered in undertaking environmental assessments of projects in hazard-prone areas:

- *Energy.* Impact of hydropower projects on natural water flow and flooding patterns.
- *Transport.* Impact of road construction and associated infrastructure on drainage systems and flooding patterns.
- *Urban development.* Impact of development on the capacity of services and utilities to prevent increased risk of flooding as could occur if, say, drainage systems are inadequate or refuse collection services are limited, resulting in dumping of garbage in drainage systems or waterways.
- *Mining.* Implications for droughts and floods of impact of mining operations on level of groundwater.
- *Agriculture.* Impact on soil erosion and consequences for levels of water retention, downstream siltation and flooding.⁹ Resilience of proposed projects in the event of rainfall deficits. Impact of proposed projects on the capacity of the local population to spread disaster-related and other risks.

⁸ This box draws in part on DFID (2003) and Sida (2002).

⁹ For instance, a study of 1,804 farm plots in three Central American countries hit by Hurricane Mitch demonstrated that farms using agro-ecological methods to prevent soil and water run-off from hillsides lost far less topsoil as a consequence of the hurricane, retained more moisture and were much less vulnerable to surface erosion than plots farmed using more conventional methods. (Source: World Neighbors. *Reasons for Resiliency: Toward a Sustainable Recovery after Hurricane Mitch*. Oklahoma: World Neighbors, 2000. Available at: <http://www.wn.org/Mitch.pdf>)

- *Fisheries*: Disaster risk consequences of clearance of mangroves and other vegetation.
- *Forestry*: Risk reduction benefits of forestry projects (e.g., in providing protection against windstorms, landslides or tsunamis and reducing the risk of flash flooding).

Step 5. Assessment and evaluation

Consider the potential effects of the project (during construction, operation and, if relevant, decommissioning) on the frequency, intensity and consequences of significant natural hazards and the impact of these hazards, in turn, on the project. This assessment will help to determine if each of these effects is acceptable, extending the preliminary hazard and vulnerability assessment conducted in Step 2 both for Category A and B projects and for those requiring a stand-alone hazard and vulnerability assessment. If potential effects are not acceptable, appropriate management, mitigation and adaptation options must be identified to bring them into an acceptable range.

The assessment should begin with a detailed hazard assessment and mapping of significant hazards identified in the screening and scoping stages (see **Guidance Note 2**), also taking into account relevant climate change modelling (e.g., how a rise in sea level might affect storm surges or how changes in precipitation might affect drought and flooding). Where relevant, findings of existing mathematical and computer-based hazard modelling exercises in the project area (for instance, modelling of earthquake, flood or windstorm scenarios) should also be drawn upon. Such exercises, if lacking, should be undertaken for large projects in high-risk areas.

A detailed vulnerability assessment should then be undertaken. From an environmental perspective, the vulnerability assessment should pay particular regard to the expected impact of the project on environmental factors identified as key determinants of any rising or falling underlying trends in vulnerability to natural hazards in the project area. Certain other aspects of the vulnerability assessment may be undertaken in part under other forms of project appraisal, such as engineering design (see **Guidance Note 12**), social impact assessment (see **Guidance Note 11**) and economic analysis (see **Guidance Note 8**), as relevant. In such cases, the EIA team should be held responsible for undertaking the initial screening process to determine if an assessment is required and for providing relevant hazard information to the other appraisal teams. In other cases, vulnerability analysis from these other perspectives may be incorporated within the EIA process.

Consultation with stakeholders should also cover information on natural hazards and related vulnerability. Even from a purely environmental perspective, vulnerability can be highly localised and it is, therefore, essential to seek the views of the local community. Perceptions of risk can also influence behaviour, again making it important to consult different stakeholders.

Disaster risk management measures should then be “selected to reduce the identified risks to an acceptable level and the preferred project alternative identified”, taking policy, legal and institutional factors into account as well as the findings of the vulnerability analysis and of other forms of project appraisal that have been undertaken. Risk reduction measures could entail, say, changes in project design or the addition of environmental protection measures (see **Guidance Note 8** for further discussion on analysis of alternatives). Remaining disaster risks should be considered in the broader assessment of risks and uncertainties associated with the project.

If it has been determined that a project is subject to the impact of climate change, a project climate change adaptation programme should be also developed to address significant impacts and define adaptation measures.¹⁰

Step 6. Develop environmental management and monitoring plans

Include the development of disaster risk management, mitigation and adaptation plans to address natural hazard-related vulnerabilities and risks identified in Step 5.

Step 7. Monitoring programme

“Develop appropriate monitoring programmes to ensure the implementation and effectiveness” of the project’s features related to disaster risk management and climate change adaptation, including monitoring of the impact of the project on vulnerability to natural hazards and the impact of any hazard events on the project.

¹⁰ See also CARICOM’s Adapting to Climate Change in the Caribbean Project (2004) for further information (<http://www.caricom.org/jsp/projects/macc%20project/acc.jsp>).

Step 8. Prepare final report

“Finalise a project document which incorporates the management, mitigation and adaptation measures necessary to address natural hazard vulnerabilities and risks identified” and ensure that the programme for monitoring project implementation and impacts covers the implementation and effectiveness of these measures. This final report should be available for public scrutiny.

Step 9. Project appraisal

“In determining the viability and acceptability of the project against established criteria confirm that

- all potentially significant hazards, as identified in Step 4 (scoping), have been analysed using appropriate methodologies;
- appropriate and sufficient management, mitigation and/or adaptation measures have been identified and incorporated into project design for all potentially significant impacts identified in the detailed hazard and vulnerability assessments (Step 5); and
- it is technically, financially and administratively feasible to implement the necessary (disaster) risk management measures in the proposed project.”

Remaining risk should be clearly indicated.

Step 10. Implementation and monitoring

“Ensure that the specified mitigation/adaptation and monitoring measures are implemented in the project and that the selected measures are appropriate.”

3. Post-disaster environmental assessment

Post-disaster environmental assessments similarly need to explore whether proposed relief, reconstruction and rehabilitation efforts will have acceptable environmental impacts (e.g., environmentally sound selection of sites for refugee camps and sourcing of reconstruction materials) and whether they will strengthen resilience to future natural hazards. In addition, they need to ensure that the response and recovery process addresses environmental problems caused by the disaster (e.g., contamination of water and soil).

Some donor organisation guidelines include checklists on environmental assessment of disaster relief and humanitarian assistance operations (e.g., ADB, DFID and Sida, the Swedish International Development Cooperation Agency) whilst UNHCR has developed a set of guidelines aimed specifically at building environmental considerations into refugee and returnee operations, including assessment of any potentially adverse environmental impacts of particular refugee and returnee situations.

The Benfield Hazard Research Centre and CARE International have developed a more detailed and comprehensive set of guidelines on rapid environmental assessment (REA) in disasters.¹¹ These guidelines focus on assessment of the general context of a disaster; disaster-related factors that may have an immediate impact on the environment; possible immediate environmental impacts of disaster agents; unmet basic needs of disaster survivors that could lead to adverse impacts on the environment; and potential negative environmental consequences of relief operations. The methodology is based on qualitative assessment, drawing heavily on perceptions and often incomplete data, helping to facilitate rapid assessment under difficult circumstances (see Box 6).

¹¹ Kelly (2005).

Box 6 REA applications

The Benfield Hazard Research Centre and CARE International's REA guidelines have been applied a number of times, including in several REAs undertaken by United Nations (UN) agencies. For instance, an REA carried out by UNEP and the UN Office for the Coordination of Humanitarian Affairs (OCHA) of Sri Lanka following the December 2004 Indian Ocean tsunami highlighted urgent environmental concerns relating to the management of tsunami debris and to sewage and sanitation issues in emergency shelter locations.¹²

Recommendations of a UNEP/OCHA REA of the impact of Hurricanes Ivan and Jeanne in Haiti, Grenada and the Dominican Republic in 2004 included the need to address risks to surface- and groundwater in Grenada and immediate and longer-term increased flooding and landslide risks in all three countries.¹³

4. Critical factors for success

- **Sufficient information.** Sufficient information must be available to permit full and accurate assessment of natural hazard-related factors. Particular attention needs to be paid to the fact that there can be highly localized variations in vulnerability, reflecting local environmental and socio-economic conditions. As such, information on site-specific circumstances is required.
- **Early assessment.** It is essential that the environmental assessment process begin at a very early stage in the appraisal process to ensure that its findings can be fully taken into account in the project's design, including via the integration of any necessary disaster risk reduction features.
- **Adequate monitoring.** Strong, effective monitoring arrangements are important to ensure that any required environmental management and mitigation measures specified in project documents are implemented.
- **Awareness of the benefits of assessing disaster risk as part of the environmental assessment process.** Environmental assessment is a costly exercise and disaster risk may be ignored if resources are limited. Strong understanding and awareness of the potential importance of addressing disaster risk is therefore required to make appropriate judgements on its likely significance. CEAs and SEAs offer important tools in this regard, potentially reducing time required for collation of information on natural hazards and providing some indication of the importance of related risks (see Boxes 3 and 4). Pooling of information by different development organizations would also help.
- **Supportive environmental policy.** Finally, but by no means least, environmental policies and related safeguard compliance policies should require satisfactory analysis and related management of disaster risk as part of the environmental assessment process (see Box 2). They should also require environmental assessment of post-disaster relief and recovery interventions.

Box 7 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

¹² UNEP/OCHA. *Indian Ocean Tsunami Disaster of December 2004: UNDAC Rapid Environmental Assessment in the Democratic Socialist Republic of Sri Lanka*. Geneva: Joint United Nations Environment Programme/Office for the Coordination of Humanitarian Affairs Environment Unit, 2005. Available at: http://www.benfieldhrc.org/disaster_studies/rea/environmental_assessment_rapid_ocha_unep_sri_lanka_indian_ocean_tsunami_disaster_december2004.pdf

¹³ UNEP/OCHA. *Hurricanes Ivan and Jeanne in Haiti, Grenada and the Dominican Republic: A Rapid Environmental Impact Assessment*. Geneva: Joint United Nations Environment Programme/Office for the Coordination of Humanitarian Affairs Environment Unit, 2004. Available at: http://www.benfieldhrc.org/disaster_studies/rea/Caribbean_REA.pdf

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.¹⁴

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

Ahmed, K., Mercier, J. R. and Verheem R. 'Strategic Environmental Assessment—Concept and Practice', *Environment Strategy No 14*. Washington, DC: World Bank, 2005. Available at: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:20687523~pagePK:210058~piPK:210062~theSitePK:244381,00.html>

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UNHCR. *UNHCR Environmental Guidelines*. Geneva: Office of the United Nations High Commissioner for Refugees, 2005. Available at: <http://www.unhcr.org/cgi-bin/texis/vtx/protect/openssl.pdf?tbl=PROTECTION&id=3b03b2a04>

¹⁴ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Economic Analysis

Guidance Note 8

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note addresses the issue of economic analysis, providing information on how to ensure that disaster risk and related options for reducing vulnerability are adequately and systematically examined from an economic perspective in scoping development projects. The note also provides direction on the economic appraisal of disaster risk reduction projects. This guidance note is intended for use by economists in development organisations, complementing their existing economic analysis guidelines.

1. Introduction

The basic purpose of project-based economic analysis is to help design and select projects that contribute to the welfare of a country and its people.¹ Cost-benefit and related economic appraisal approaches are applied to determine the highest return to investment in a project, facilitate a rational comparison of available options and ensure that investment decisions are accountable. Economic analysis is also potentially useful in identifying and clarifying the issues involved in making particular decisions.

Consideration of disaster risk concerns as part of the economic appraisal process is an essential step in ensuring that development gains in hazard-prone countries are sustainable and in highlighting related issues of responsibility and accountability. Natural hazards can have potentially serious implications for the economic viability of development projects, damaging or destroying physical infrastructure and capital equipment, and resulting in additional indirect and secondary project and broader socio-economic effects. However, such losses are not inevitable. Indeed, there can be potentially high returns to disaster risk reduction investments in hazard-prone areas (Box 1), in the form of both specific disaster risk reduction projects and the disaster-proofing of other development projects. Such investments can also have significant additional indirect benefits for the broader economy and sustainable development (Box 2).

Box 1 Disaster risk reduction can 'pay'

- One US dollar spent by the United States Federal Emergency Management Agency (FEMA) on hazard mitigation saves an estimated US\$ 4 on average in future benefits according to a study of FEMA grants (including for retrofitting, structural mitigation projects, public awareness and education and building codes).²
- A planned polder system in Peru, supported by Gesellschaft für Technische Zusammenarbeit (GTZ), the German technical development agency, whereby floodwaters would be diverted in a polder retention basin, has been calculated to have an estimated benefit-to-cost ratio of 3.8. A GTZ-supported integrated water management and flood protection scheme in Indonesia has an estimated ratio of 2.5.³

¹ Belli et al. (1998).

² MMC/NIBS (2005).

³ Mechler (2005).

- Non-governmental organisation (NGO) interventions to reduce the impact of flooding in Bihar and of flooding and drought in Andhra Pradesh, India, have estimated benefit–cost ratios of 3.8 and 13.4, respectively.⁴
- A Vietnam Red Cross mangrove planting programme in eight provinces in Vietnam to provide protection to coastal inhabitants from typhoons and storms cost an average US\$ 0.13 million a year over the period 1994 to 2001, but reduced the annual cost of dyke maintenance by US\$ 7.1m. The programme also helped save lives, protect livelihoods and generate livelihood opportunities.⁵
- Spending 1 per cent of a structure’s value on vulnerability reduction measures can reduce probable maximum loss from hurricanes by around a third in the Caribbean, according to regional civil engineering experts.⁶

Box 2 Macroeconomic impacts of disasters

Risk reduction investments play a collective, broader role in reducing macroeconomic vulnerability to natural hazards and supporting efforts to alleviate poverty. These benefits are typically too far removed from individual disaster risk reduction measures to be taken into account in project economic appraisal. However, they may be an important consideration in determining a development organisation’s broader strategic areas of focus in hazard-prone countries (see also **Guidance Note 4**).

Major disasters can have severe negative short-term socio-economic impacts. Disasters result, for example, in loss in productive capacity and thus output and employment opportunities. They may also create balance of payments and budgetary pressures (see **Guidance Notes 4 and 14**), disrupt financial and credit markets and exacerbate poverty (see **Guidance Note 3**). Longer-term impacts of disasters are more difficult to determine empirically but may be significant, in part as disasters reduce the pace of capital accumulation, destroying existing productive and social capital and diverting scarce resources away from new investment. As such, disasters can represent a threat to both short-term economic stability and long-term sustainable development. Moreover, macroeconomic vulnerability to natural hazards often increases, rather than declines, during earlier stages of economic development (see **Guidance Note 3**).

However, high macroeconomic vulnerability is by no means inevitable and governments can take various steps to promote greater resilience, including by influencing the composition of economic activity and fostering strong underlying stability. Detailed studies of individual countries provide further evidence on the macroeconomic impacts of disasters, implications for levels and patterns of development and specific options for strengthening resilience.

For further discussion, see Benson, C. and Clay, E.J., *Understanding the Economic and Financial Impacts of Natural Disasters*. Disaster Risk Management Series No. 4. Washington, DC: World Bank, 2004. http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000012009_20040420135752

Current state of the art

There has been little effort to incorporate disaster risk concerns into the economic analysis of development projects or to use tools of economic analysis to examine possible ways of strengthening their hazard resilience, even in high-risk areas. There have also been few detailed economic analyses of risk reduction projects, particularly in a developing country context. In consequence, the collective evidence on the net benefits of risk reduction is limited and highly context specific. Related development organisation manuals on economic analysis similarly provide little guidance on analysis of disaster risk.

The paucity of evidence on the benefits of disaster risk reduction has proved a major stumbling block in attracting the interest and commitment of policy-makers to disaster risk reduction. Economic criteria are not the only ones by which projects are judged. Indeed, only multilateral lending agencies routinely undertake some form of economic analysis as part of their project appraisal process. And ultimately, even for these organisations, although minimum

⁴ Cabot Venton and Venton (2005).

⁵ IFRC. *World Disasters Report: Focus on reducing risk*. Geneva: International Federation of Red Cross and Red Crescent Societies, 2002.

⁶ World Bank. *Managing Catastrophic Risks Using Alternative Risk Financing and Insurance Pooling Mechanisms*. Discussion draft. Washington, DC: World Bank, Finance, Private Sector and Infrastructure Department, Caribbean Country Management Unit, Latin America and Caribbean Region, 2000.

internal rate of returns often have to be satisfied, high economic returns may be less important than, say, the contribution of a project to poverty reduction. However, in the face of tight budget constraints and many competing demands for public resources, there is widespread pressure to demonstrate that aid resources are well spent. Without ready access to data on the potential economic returns to investments in risk reduction, many are unwilling to even consider such investments. They also often fail to appreciate the potential importance of ensuring that other development projects in hazard-prone countries are adequately protected against natural hazards.

Advocated good practice

Two essential steps are required as part of the economic appraisal process to ensure that disaster risks are adequately assessed and managed:

- Disaster risk should be considered as part of the economic appraisal process as a matter of course in the design of all projects in hazard-prone areas.
- Related economic appraisal, incorporating analysis of disaster risk, should be applied early in the project cycle so that findings can be taken into account in the design of both disaster risk reduction projects and other development projects in hazard-prone areas, helping to strengthen resilience against natural hazards.

2. Basic steps in merging disaster risk concerns into economic analysis

Measures required to ensure that disaster risk and related options for reducing vulnerability are adequately and systematically examined and addressed at each step in the economic appraisal of a project are outlined below and summarised in Figure 1. This guidance note is intended to supplement existing guidelines on economic analysis, focusing specifically on where and how to build disaster-related concerns into account rather than providing full, comprehensive guidance on all aspects of economic appraisal. Analysis of disaster risk and related risk reduction measures raises a number of potentially complex issues, justifying this special focus.

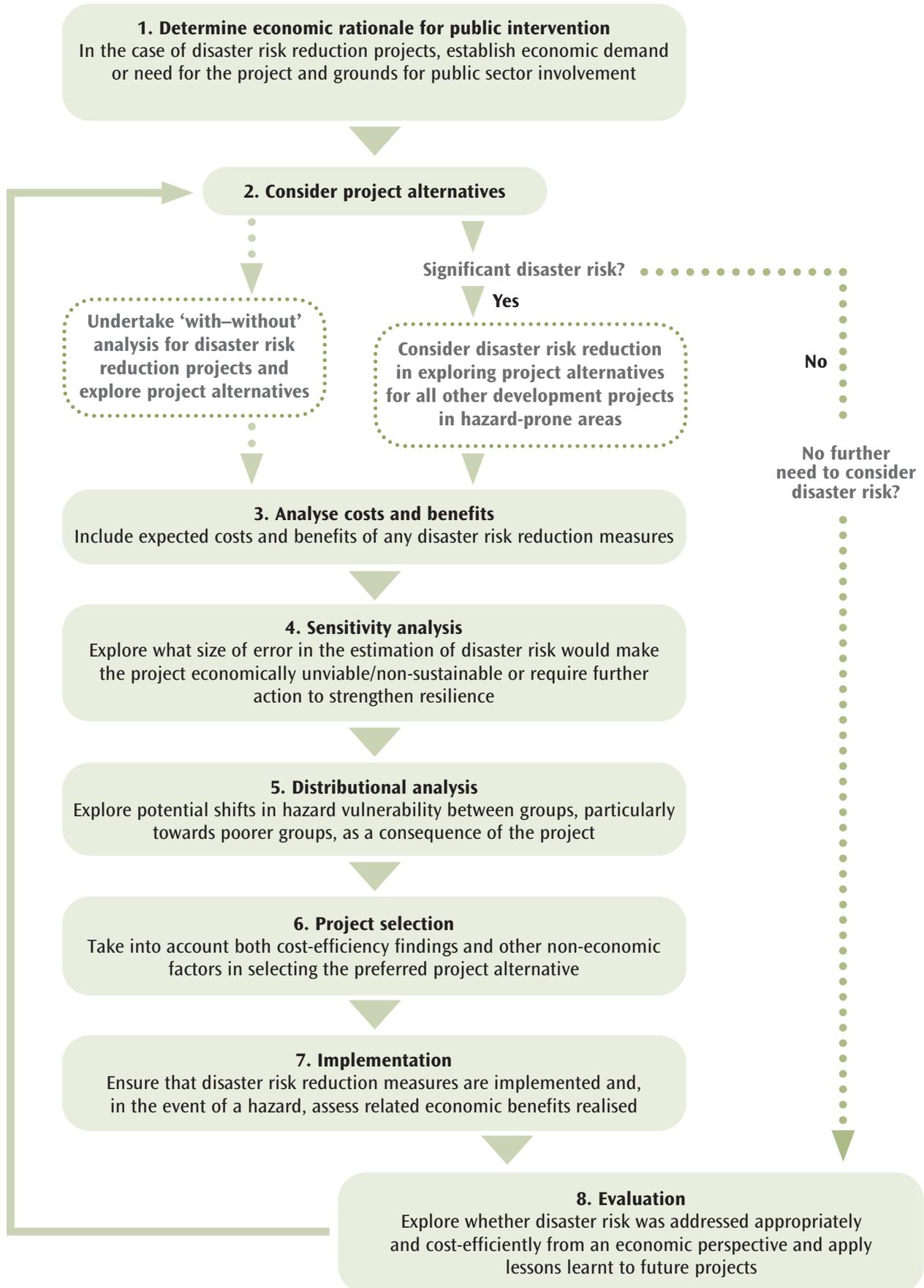
Step 1. Determine economic rationale for public intervention

In appraising potential disaster risk reduction projects, establish the economic demand or need for the project and the grounds for public sector involvement. Linkages to the development organisation's country strategy should also be established. Disaster risk concerns do not need to be considered at this preliminary stage in the economic appraisal of other development projects that do not have an explicit disaster risk reduction objective.

The economic case for a disaster risk reduction initiative is typically based on the need to reduce potential direct and indirect losses, rather than to generate a continual flow of positive benefits. As such, it can be difficult to establish a demand curve for such projects. Instead, it may be more appropriate to base demand analysis on estimates of the scale of the disaster reduction intervention that would be required to reduce potential losses to acceptable levels (as defined within the context of the project) and/or ensure desired safety standards. Alternatively, it may be possible to establish a notional demand curve based on a user survey of willingness to pay.

As regards the rationale for public sector involvement, some disaster risk reduction measures may be justified on the basis of the fact that they constitute public goods – that is, are non-rival in consumption (users do not reduce the supply available to others) and non-excludable – and so markets fail to provide them. Scientific forecasting and some forms of dissemination of disaster warnings, for instance, can be characterised as such. Others may be justified on grounds of equity. There are additional moral obligations on the part of government to prevent loss of human life.

Figure 1 Integration of disaster risk concerns into economic appraisal



Step 2. Consider project alternatives

In the case of proposed disaster risk reduction projects, analyse the ‘with–without’ project situation – that is, the impact of a hazard event with and without the project – and also consider alternative ways of addressing the project objective. In the case of other proposed development projects to be undertaken in hazard-prone areas, consider disaster-related issues in examining alternative project designs and scales of intervention, in terms of both the vulnerability of the project to natural hazards (e.g., the implications of decisions relating to alignment, surface type and drainage of roads for the level of vulnerability to flooding) and the impact of the project on disaster risk (e.g., a communications project that could also benefit the transmission of an early warning system or, adversely, a fisheries project that could also result in the destruction of mangroves) in examining project alternatives. (See **Guidance Notes 2 and 7** regarding sources of information on the types and probabilities of hazards faced.)

The economic analysis of alternatives and the subsequent analysis of costs and benefits (see Step 4) need to take account of the following factors:

- A reduction in disaster risk can sometimes be achieved via a choice of highly contrasting methods, ranging from large-scale technical projects to small-scale community-based initiatives and from engineering to social interventions. Analysis of alternatives should entail a careful, broad-minded examination of all possible approaches, rather than focusing solely on more minor adjustments in technical design, scale or levels of protection.
- Many of the benefits of any disaster risk reduction measures, whether undertaken in the context of a disaster risk reduction project or as part of another type of development project, are related to the direct and indirect losses that will not ensue should the related hazard event occur over the life of the project, rather than streams of positive benefits that will take place, as would be the case for other investments.
- In some cases, however, disaster risk reduction initiatives can generate some positive streams of benefits, for instance, where investments in irrigation to reduce the impact of drought result in a switch in cultivation to higher-yielding crops. Some projects even have explicit non-disaster, as well as disaster-related, objectives: for example, a dam may be planned both for flood control purposes and as part of a hydro-electricity scheme. Positive benefits should be taken into account in the economic analysis.
- Levels and forms of vulnerability may change considerably over the life of a project, particularly in developing countries undergoing rapid socio-economic change and/or high demographic growth. These changes, which can be both positive and negative, need to be considered in exploring potential flows of net benefits resulting from related disaster risk reduction measures.
- Predicted impacts of global warming on the frequency and intensity of climatological hazards over the life of the project should, likewise, be taken into account.
- The role of risk reduction measures in determining the outcome of above-design hazard events⁷ should be explored. In some such cases, they would still reduce levels of loss but in others, they could exacerbate them (for instance, where flood control measures have effectively encouraged the development of a flood plain).
- Development projects can transfer risk to another area, either intentionally (e.g., in the case of deliberate diversion of floodwaters) or unintentionally (e.g., in the case of the construction of infrastructure blocking drainage of water – see **Guidance Note 7**, Box 1). The analysis should take account of any such potential positive or negative externalities. The geographical boundaries of analysis, conventionally defined for purposes of cost–benefit analysis as a country, may need to be broadened in order to do this. The impact of the project on different groups, including non-beneficiaries, also needs to be carefully explored.
- Potential benefits of disaster risk reduction initiatives may not be fully realised, particularly where they are dependent on public compliance and capability to respond appropriately – for instance, to take appropriate action when a disaster warning is received – or proper upkeep and maintenance of related structures. Estimation of benefits should therefore be realistic.

Stakeholder analysis undertaken as part of the analysis of alternatives should similarly explore disaster risk and related options for strengthening the resilience of proposed outcomes. Beneficiary and non-beneficiary groups should be included in this process to determine relevant concerns, including the potential impact of different project alternatives on the vulnerability of the various groupings to natural hazards.

Step 3. Analyse costs and benefits

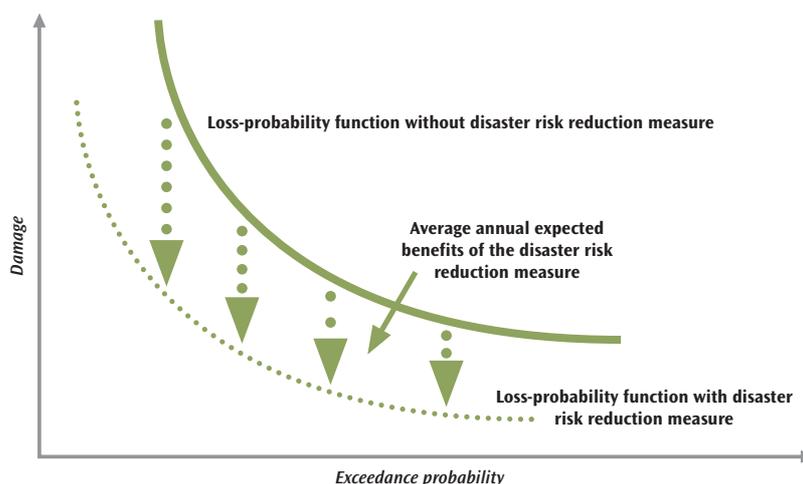
Take the cost of any proposed disaster risk reduction measures and the monetary value of the expected related flow of direct and indirect benefits into account in determining if a project is economically justified. Estimation of disaster risk reduction-related costs is normally straightforward. The estimation of benefits is more complicated as they

⁷ Hazard events of a greater magnitude than those against which the risk reduction measure is intended to provide protection (e.g., a 1 in 100-year flood, rather than the design 1 in 50-year flood).

are necessarily probabilistic, with the actual level of benefits realised dependent on the degree of severity of hazard events – if any – occurring over the life of the project. Moreover, little related information may be available on the likely frequency and intensity of potential hazards. Various methods therefore exist for incorporating risk and the related benefits of disaster risk reduction into economic analysis, the selection of which depends on the level of availability of hazard information.

Probability-based approaches. In cases where better hazard information is available or more funding is on hand to invest in estimating hazard probabilities, a more rigorous analysis of benefits can be undertaken. In such cases, an exceedance probability curve must first be obtained, indicating the probability of occurrence of different intensities of the hazard in question at a given location. A vulnerability analysis of the resilience of the assets or livelihoods that would be given some protection by the disaster risk reduction measures should then be undertaken, both with and without that measure. Finally, the vulnerability and exceedance probability curves should be combined to generate the loss-probability curves, indicating the probability of differing levels of loss with and without the disaster risk reduction measure. The area under each loss-probability curve represents average annual expected losses. Average annual expected benefits of a disaster risk reduction measure are represented by the area between the two loss-probability curves (Figure 2).⁸

Figure 2 Expected benefits of a disaster risk reduction measure



Exceedance probability curves may be available already, based on historical record and/or computer modelling (see **Guidance Note 2**). However, they often have to be estimated. Ideally, such estimates should be based on at least eight hypothetical hazard events, ranging from very low to very high probability. At an absolute minimum, three data points are required relating to the most likely, minimum possible and maximum possible events, so generating a triangular distribution. Levels of vulnerability to each event must then be assessed and a loss-probability curve derived. Local knowledge may be an important source of information in assessing vulnerability, particularly in relation to higher frequency hazards.

Alternatively, it may be preferable to derive the loss-probability curve from actual events, based on historical losses adjusted to reflect shifts in forms and levels of vulnerability over time and converted into current prices (see Box 3). Again, data on at least three events are required. These data could be complemented by a survey of the impact of past events on the intended beneficiary group (assuming a hazard event has occurred in recent times). In other cases, it may sometimes be possible to avoid estimation of the loss-probability curve entirely (see Box 4).⁹

Box 3 Historical damage assessment data – a cautionary note

Data on the impact of disasters are often weak, presenting an incomplete and, in parts, sometimes highly inaccurate record of events. As such, they constitute a potentially unreliable basis for estimating loss-probability functions.

⁸ See Parker et al. (1987) and Mechler (2005) for further guidance.

⁹ For further detailed guidance on the generation of loss-probability curves, including worked examples, see Mechler (2005).

The data typically focus on direct, physical losses, primarily based on official damage assessments. Even these data may be associated with a number of difficulties, for example:

- Many countries lack standard, comprehensive and systematic guidelines for use in estimating the costs of disasters. Even within a particular country, there may be discrepancies between different disasters in terms of the nature of data collated and methods for valuing loss.
- Coverage of assessments is typically partial, with involved government, donor and civil society groups only covering areas where they may be able to provide relief and rehabilitation assistance. Damage to the private sector may be largely ignored.
- Additional data on private losses are provided by the insurance industry but only cover insured losses which, in the case of developing countries, may represent a tiny proportion of total private losses.
- Damage assessments are commonly undertaken by officials and volunteers on the ground, often with little prior specialist training.
- Damage assessments are typically finalised very rapidly, often only a few months after a disaster has occurred and before its full impact is revealed.

The broad validity of loss-estimate data and the overall direction of any bias should therefore be explored before using historical data on losses to derive loss-probability functions.

A disaster can also have many flow or knock-on effects, commonly categorised as indirect and secondary effects. Indirect effects relate to disruption to the flow of goods and services, including, for instance, reduced output, loss of earnings and job losses. Secondary effects concern both the short- and the long-term broader socio-economic impacts of a disaster, such as on gross domestic product growth, fiscal and monetary performance, indebtedness and the scale and incidence of poverty. These indirect and secondary effects should also be carefully explored. However, in economic terms, direct physical losses are valued as the future flow of resources from the affected assets, implying that aggregate figures on total direct, indirect and secondary effects should be carefully scrutinised for any double counting.

Box 4 Case examples on estimating loss-probability functions

Worked cost–benefit analyses have employed a variety of methods to estimate loss-probability functions and related benefits of disaster risk reduction initiatives, in some cases based on detailed quantitative information and in others simplifying assumptions. For instance:

- A GTZ cost–benefit analysis of an integrated water management and flood protection scheme in Semarang, Indonesia was able, somewhat unusually, to take advantage of existing exceedance probability curves for riverine and coastal flooding in the project area and surveys of exposed assets. Future increases in exposure were assumed to be in line with projected population growth.
- A cost–benefit analysis of a flood protection project in Piura, Peru, undertaken as part of the same GTZ study, employed a backward-looking approach. The analysis was based on actual damage data from floods in 1982–1983 and 1997–1998 combined with information on the frequency and severity of El Niño events over the past 150 years, to which higher levels of rainfall in the project area are closely correlated. Damage data were disaggregated to determine levels of loss in the project area. Projections of future losses were adjusted to take account of changes in land use, increasing assets and enhanced resilience, the latter reflecting dyke improvements since the 1982–1983 flood and the installation of an early warning system since the 1997–1998 flood.
- An analysis of an NGO intervention to reduce the impact of flooding in Bihar, India, by raising hand pumps and supporting evacuation was based on the simplifying assumption that annual flood-related losses in the absence of the intervention would be the same every year over the life of project – that is, would occur with 100 per cent certainty. This approach was justified on the basis of the argument that although the level of flooding varied each year, it consistently reached a sufficient height to block hand pumps and require evacuation. Sensitivity analysis was used to explore the implications of longer (four-month) and shorter (two-month) periods of flooding, rather than the assumed three months.

Sources: Cabot Venton and Venton (2005); Mechler (2005).

Limited information approaches. In situations where information is limited and restricted resources available for the economic analysis, alternative less rigorous approaches may be pursued. However, these approaches should be applied with considerable caution and care.

In situations where there is high uncertainty about levels of risk but the magnitude of hazard events is potentially great, the pay-off or cut-off period approach may be applied. Under this approach, projects are assessed on the basis of whether they will generate sufficient net benefits over a specified, relatively short, period of time, as little as two to three years. Costs and benefits beyond the cut-off period are ignored. Alternatively, under the discount-rate adjustment approach, less weight is given to increasingly uncertain future benefits and costs by adding a risk premium to the discount rate. Game theory approaches offer a third option, following either ‘maximin-gain’ or ‘minimax-regret’ strategies. Under the former, the project alternative that gives the highest return in the worst-case scenario is selected. The latter involves selection of the project giving the smallest sum of possible losses. Under a fourth approach, sensitivity analysis, the value of key uncertain parameters is altered (see, also, below).¹⁰

Valuing benefits. Regardless of the approach selected for incorporating risk and the related benefits of disaster risk reduction into economic analysis, the issues listed above under Step 2 need to be taken into account in estimating benefits. In addition, the following factors should be borne in mind:

- **Indirect benefits.** The analysis should only take account of changes in indirect losses that can be clearly attributed to the project and that are not already counted as direct benefits (see Box 3). In some cases, input–output models capturing the inter-sectoral forward and backward linkages between different sectors in an economy may be helpful in determining indirect benefits. However, simple heuristics assuming fixed ratios of total direct to total indirect losses should be avoided. Although a few such ratios have been calculated, too few of them are available to be able to ensure that the selected ratio is in keeping with the particular nature of potential damage, prevailing socio-economic circumstances in the affected country and so forth.
- **Intangibles.** Risk reduction initiatives can also generate intangible benefits – that is, benefits relating to non-traded goods and services for which there is no commonly agreed method of monetary valuation. Intangible benefits include, for instance, damage to buildings of cultural or historical significance, disruption of schooling and psychological trauma. The literature on cost–benefit analysis of disaster risk reduction measures generally favours use of the contingent valuation method for valuing intangible benefits, cautioning against the use of other tools that have been developed for this purpose.¹¹ Under the contingent valuation method, respondents to a survey are asked how much they would be willing to pay for a clearly specified change, such as the additional protection to a historical building provided by a particular structural mitigation investment. Cost-effectiveness analysis provides an alternative method for analysing alternatives for projects that entail the flow of substantial non-monetary benefits or intangibles and where a decision has already been taken to proceed with a particular project. Under this approach, project inputs are valued in monetary units and outputs in physical units, with the least-cost method of achieving particular targets and objectives then selected (Box 5).

Box 5 Cost-effectiveness analysis: Seismic retrofitting in Romania

Cost-effectiveness analysis was applied to determine the selection of possible seismic retrofitting options for each sub-project under the seismic retrofitting component of a World Bank hazard risk mitigation and emergency preparedness project in Romania. The selection of sub-projects, in turn, was based on the functional importance of different public facilities within the emergency response system, their relevance in terms of life safety, their readiness for implementation and the cost of retrofitting, which had to total under 60 per cent of replacement cost for selection.

Source: World Bank. *Project Appraisal Document on a Proposed Loan in the Amount of US\$150 million and a grant from the Global Environment Facility in the Amount of US\$7 million for Government of Romania for a Hazard Risk Mitigation and Emergency Preparedness Project.* Report No: 282 17 RO. Washington, DC: World Bank, Environmentally and Socially Sustainable Development Unit, Europe and Central Asia Region, 2004.

¹⁰ See Kramer (1995), Parker et al. (1997) and OAS (1991) for further discussion on the relative merits and pitfalls of these various approaches.

¹¹ See Penning-Rowsell et al. (1992) and Handmer and Thompson (1996) for an in-depth discussion.

- **Injury and loss of life.** Valuation of injury and loss of human life, both of which are further examples of intangibles, is a particularly contentious issue, involving ethical and technical difficulties. The ‘Value of a Statistical Life’ approach, based on contingent valuation and willingness to pay, is generally considered the best tool in this regard. Under this approach, the value individuals place directly on reducing their own and others’ risk of death and injury is summed across all those that might be affected by a particular event.¹² In other situations it may be necessary to compare different types of potential projects in terms of lives saved (e.g., malaria control versus earthquake-proofing of schools). In such cases, a Disability Adjusted Life Years (DALY) type approach, taking into account the effect of interventions on life expectancy and quality of life, could be used to measure their relative cost-effectiveness and aid decision-making.¹³

Step 4. Sensitivity analysis

In cases where a probability-based approach has been taken, explore how large errors in the estimated disaster risk would have to be either to make the project economically unviable or non-sustainable or to require further action to strengthen resilience. Sensitivity analysis is necessary because derivation of loss-probability curves will always entail some degree of uncertainty.

Sensitivity analysis of estimates of disaster risk is particularly important for projects located in areas undergoing rapid socio-economic change (e.g., due to demographic growth or shifts in productive activities) and thus where vulnerability to natural hazards could alter significantly over the life of the project. It is also important where the frequency and severity of hazard events could be altered by climate change.

The potential indirect impact of a disaster on other uncertain variables in the project analysis, such as the price of critical inputs or outputs¹⁴ and the availability of government counterpart investment and recurrent cost funding, should also be explored as part of the sensitivity analysis for all proposed projects in hazard-prone areas, although due care should be taken to avoid problems of covariance in any formal statistical analysis. In addition, implications of other risks (such as inadequate maintenance of project facilities) for disaster risk should be considered.

For large projects and those with net present values (NPVs) close to zero, a more rigorous sensitivity analysis may be required, varying the values of all key variables simultaneously to generate a probability distribution function of a project’s expected economic NPV.

Step 5. Distributional analysis

In examining the extent to which intended beneficiaries will actually benefit from the project, explore potential shifts in vulnerability to natural hazards between groups – particularly towards poorer groups and non-beneficiaries – as a consequence of the project. For instance, flood protection schemes may attract new residents into flood plains, potentially forcing up land prices and pushing intended beneficiaries (i.e., existing, poorer households) away into other vulnerable areas (see **Guidance Note 3**). Distributional weights could be applied to take account of equity considerations, attaching higher weights to impacts benefiting the poor, although in practice there has been little, if any, application of this quantitative tool to the analysis of disaster risk reduction projects.

Step 6. Project selection

Take account both of cost-efficiency findings and also of rights to safety and protection, levels of risk aversion and other technical, social and environmental factors in selecting the preferred project alternative. The results of the economic analysis help inform decisions on project alternatives but are not the sole criterion on which they rest. From an economic perspective, project alternatives can be compared on various bases, such as their mean NPV; using a mean–variance analysis, which takes into account the degree of dispersion around the mean; or using a safety-first analysis, which seeks to maximise the expected NPV conditional on the risk of benefits falling below a critical level being as small as possible.

Step 7. Implementation

Ensure that any specified disaster risk reduction measures are implemented and, should a hazard event actually occur, assess related economic benefits (in effect, losses averted) resulting as a consequence of these measures.

¹² For further discussion, see Dixon, J.A., *The Economic Valuation of Health Impacts*. Washington, DC: World Bank, 1998. Available at: <http://siteresources.worldbank.org/INTEEI/214574-1153316226850/20486375/EconomicValuationofHealthImpacts1998.pdf>; and Mechler (2005).

¹³ For further information, see DFID, *DALYs and Essential Packages: Briefing Paper*. London: Department for International Development (UK), Health Systems Resource Centre, 2000. Available at: http://www.dfidhealthrc.org/shared/publications/Briefing_papers/DALYS.PDF

¹⁴ Implications of potential disaster-induced short-term rises in prices of key inputs should also be explored in determining the nominal cash flow as part of the financial analysis.

Step 8. Evaluation

With the benefit of hindsight, explore whether disaster risk was addressed appropriately and cost-efficiently from an economic perspective; how any disasters occurring over the course of the project affected its outcome and effectiveness; and whether the sustainability of the project's achievements are potentially threatened by future hazard events.

Box 6 FEMA's mitigation benefit–cost analysis (BCA) toolkit

FEMA has developed a series of software, written materials and training for use by FEMA grants applicants to structure and guide the cost–benefit analysis of disaster risk reduction measures. The suite of software can be applied to the analysis of earthquakes, wildland/urban interface fires, riverine and coastal floods, hurricanes and tornados. A related helpline has been established to provide technical support.

For further information, see FEMA (2006).

3. Critical factors for success

- *Full exploitation of economic appraisal tools.* Most fundamentally, economic analysis needs to be regarded as a key tool for designing projects and applied accordingly. If, instead, it is simply viewed as a means for calculating net present values and economic rates of return to satisfy project approval requirements, its potentially important contribution in analysing and addressing disaster risk as part of project design will be lost.
- *Understanding of the potential importance of assessing disaster risk.* Increased awareness of the potential importance of addressing disaster risk as part of the economic appraisal process is critical. To help achieve this, international development organisations should encourage the careful documentation and collation of evidence on the economic returns to investment in risk reduction, possibly via research but also, most critically, by assessing hazard risks and potential returns to mitigation as a matter of course in designing all projects in hazard-prone areas. Ideally, this information should be pooled into a single central global database, allowing more general, validated conclusions to be drawn on the benefits of mitigation.
- *Supportive policy environment.* Underlying policy commitment to disaster risk reduction is also required in order to strengthen the attention paid to related concerns in project design.
- *Pragmatic approach to analysis.* In the interests of cost and time, emphasis should be placed on relatively 'rough and ready' data collection and analysis, rather than more academic, full-blown cost–benefit investigation.

Box 7 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

¹⁵ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.¹⁵

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Vulnerability and Capacity Analysis

Guidance Note 9

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming and project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note introduces basic approaches to vulnerability and capacity assessment and analysis¹ (VCA), explains how it can be integrated into the project planning process and shows how natural hazards and disasters can be factored into it. It focuses on the use of VCA in development projects, but the approach can also be used in disaster reduction and post-disaster recovery. It is aimed at staff from diverse disciplines.

1. Introduction

VCA is a key component of disaster risk analysis. Its purpose is to:

- identify vulnerable groups;
- identify the factors that make them vulnerable and how they are affected;
- assess their needs and capacities (and empower them to assess these); and
- ensure that projects, programmes and policies address these needs, through targeted interventions or prevention and mitigation of potentially adverse impacts.

Economically and socially marginalised groups in society generally suffer worst from natural disasters (**see Guidance Note 3**). This question of people’s vulnerability and capacity in the context of natural hazards is very important for understanding the potential impact of disasters and making choices about how to intervene. More generally, socio-economic vulnerability is also now seen as a key to understanding poverty and designing poverty reduction programmes.

VCA considers a wide range of environmental, economic, social, cultural, institutional and political pressures that create vulnerability. Table 1, produced at a recent workshop on VCA and disaster risk reduction, illustrates the range of factors that may be relevant. However, this is just one way of viewing and categorising the subject, which can be conceived and framed in a variety of ways (for another example, see Box 1). Developing an appropriate framework for analysis is essential when starting a VCA (see Section 3).

Table 1 Hazard-related vulnerabilities and capacities of different sectors

Sector	Vulnerabilities	Capacities
Social	<ul style="list-style-type: none"> ■ Occupation of unsafe areas ■ High-density occupation of sites and buildings ■ Lack of mobility ■ Low perceptions of risk ■ Vulnerable occupations ■ Vulnerable groups and individuals ■ Corruption 	<ul style="list-style-type: none"> ■ Social capital ■ Coping mechanisms ■ Adaptive strategies ■ Memory of past disasters ■ Good governance ■ Ethical standards ■ Local leadership

¹ In this note, ‘assessment’ is taken to mean the process of collecting information, ‘analysis’ its interpretation.

<i>Sector</i>	<i>Vulnerabilities</i>	<i>Capacities</i>
	<ul style="list-style-type: none"> ■ Lack of education ■ Poverty ■ Lack of vulnerability and capacity analysis ■ Poor management and leadership ■ Lack of disaster planning and preparedness 	<ul style="list-style-type: none"> ■ Local non-governmental organisations ■ Accountability ■ Well-developed disaster plans and preparedness
<i>Physical</i>	<ul style="list-style-type: none"> ■ Buildings at risk ■ Unsafe infrastructure ■ Unsafe critical facilities ■ Rapid urbanisation 	<ul style="list-style-type: none"> ■ Physical capital ■ Resilient buildings and infrastructure that cope with and resist extreme hazard forces
<i>Economic</i>	<ul style="list-style-type: none"> ■ Mono-crop agriculture ■ Non-diversified economy ■ Subsistence economies ■ Indebtedness ■ Relief/welfare dependency 	<ul style="list-style-type: none"> ■ Economic capital ■ Secure livelihoods ■ Financial reserves ■ Diversified agriculture and economy
<i>Environmental</i>	<ul style="list-style-type: none"> ■ Deforestation ■ Pollution of ground, water and air ■ Destruction of natural storm barriers (e.g., mangroves) ■ Global climate change 	<ul style="list-style-type: none"> ■ Natural environmental capital ■ Creation of natural barriers to storm action (e.g., coral reefs) ■ Natural environmental recovery processes (e.g., forests recovering from fires) ■ Biodiversity ■ Responsible natural resource management

Source: Davis, Haghebaert and Peppiatt (2004).

Some factors in vulnerability are readily apparent (e.g., threats arising from environmental degradation or human settlement in hazardous locations such as flood plains and unstable hillsides). Less immediately visible are underlying factors such as poverty, population movement and displacement, legal–political issues (e.g., lack of land rights), discrimination, macroeconomic and other national and international policies, and the failure of governments and civil society organisations to protect citizens. The chain of causality, from root causes to local dangers, can be long and complex. Table 2 gives an illustration of this.

Table 2 Chain of pressures resulting in vulnerability to disasters

This table summarises the findings of monitoring surveys carried out by the Citizens’ Disaster Response Center in Mindanao and Visayas in the Philippines during a drought in 1997–1998. The causes of vulnerability are separated into categories from the most immediate to the underlying factors; this categorisation is a standard one, taken from Wisner et al. (2004).

<i>Hazard type: drought</i>	<i>Elements at risk (disaster)</i>	<i>Unsafe conditions</i>	<i>Dynamic pressures</i>	<i>Root causes</i>
<ul style="list-style-type: none"> ■ El Niño ■ Deforestation ■ Triggers secondary disasters: epidemics, pests, fire 	<ul style="list-style-type: none"> ■ Crops die before being harvested ■ Loss of livelihood ■ Loss of assets (sold to buy food) ■ Children die of malaria and measles 	<ul style="list-style-type: none"> ■ Farming does not produce sufficient food to feed family ■ Unstable livelihoods ■ One harvest of corn per year through ‘slash and burn’ ■ No savings ■ No irrigation facilities 	<ul style="list-style-type: none"> ■ ‘Slash and burn’ system under pressure ■ Logging and mining activities in watershed ■ No secured land rights for indigenous people 	<ul style="list-style-type: none"> ■ Laws not in favour of indigenous people ■ Unequal distribution of services and resources with a strong bias against indigenous people

Hazard type: drought	Elements at risk (disaster)	Unsafe conditions	Dynamic pressures	Root causes
	<ul style="list-style-type: none"> ■ People die after eating poisonous wild crops ■ Forestland lost due to fire ■ Planting season 	<ul style="list-style-type: none"> ■ Steep terrain prone to erosion and landslides ■ Lack of farm tools and animals to cultivate land ■ Many children malnourished ■ Lack of basic services ■ Indigenous people live in remote areas ■ Weak relationships with government structures ■ Low awareness of how to reduce risk of secondary hazards ■ Indigenous practices for coping with disasters lost by younger generation 	<ul style="list-style-type: none"> ■ Decline in soil fertility ■ Out-migration of male labour force (seasonal), leaving women, children and elderly in difficult conditions ■ Essential assets are sold, undermining future survival ■ Dependent on money lenders (very high interest rates) 	<ul style="list-style-type: none"> ■ National interests are more important than local rights of people ■ Debt crisis, structural adjustment programme, WTO (formerly GATT) force government to promote programmes that do not benefit marginalised groups like indigenous people

Source: Information provided by A. Heijmans, Disaster Studies Wageningen.

VCA also considers the capacities, resources and assets people use to resist, cope with and recover from disasters and other external shocks that they experience. Capacity is a key element in understanding and reducing vulnerability and VCA methodologies should be designed to take it into account.

2. When to use vulnerability and capacity analysis

VCA is used principally as:

- A diagnostic tool to understand problems and their underlying causes.
- A planning tool to prioritise and sequence actions and inputs.
- A risk assessment tool to help assess specific risks.
- A tool for empowering and mobilising vulnerable communities.

In development projects its main purpose is to provide analytical data to support project design and planning decisions, particularly in ensuring that risks to vulnerable people are reduced as a result of the project. It can be applied in a number of different contexts (e.g., poverty reduction, sectoral development, disaster management, climate change adaptation), and at different levels (from national or programme level to community and household). It can perform a range of functions: scoping or screening, programme or project design, research, baseline studies, and monitoring and evaluation. However, despite growing recognition of its value, it is still not systematically factored into development project planning processes, nor even sometimes into risk assessments.

Organisations working in disaster reduction mainly use VCA to identify problems (disaster reduction remains the most common application). In development activity, governments, multilateral organisations, international financial institutions (IFIs) and non-governmental organisations (NGOs) have used it mainly in the project appraisal or preparation phase (see **Guidance Note 5**). Here, VCA commonly forms part of risk analysis² or social appraisal, focusing on a particular geographical area or sector. Broad-brush scoping or national-level VCAs (see Section 3) may form part of pre-feasibility studies during the project identification phase.

Other development project planning tools, such as social analysis and social impact assessment, and especially sustainable livelihoods approaches, may address similar issues. They may also use similar data collection and assessment methods; their results can feed into a VCA and, in turn, they can be informed by VCA findings (see **Guidance Notes 10 and 11**).

² Linked to hazard assessment, which should identify the main hazards to be factored into the VCA (see **Guidance Note 2**).

Many VCA methods have been developed. Academics and practitioners from different disciplines use a variety of concepts and definitions of vulnerability, which leads to different methods of assessment and a focus on different aspects of vulnerability and risk.

3. Basic steps

This section gives general guidance on the basic steps in VCA, illustrating in particular the incorporation of natural hazards and associated disaster risk into the project assessment process.

Vulnerability is specific to time, place and particular hazard threats and groups of people. Each VCA should therefore be planned as a distinct exercise, according to its purpose in the project management cycle and the nature of the project concerned. This will also affect the skills mix required in the project team, and it is important to get the right team in place at the start of the process.

Figure 1 Basic steps in VCA



Step 1. Select a framework for analysis

The starting point is to establish a clear and shared understanding of what is to be analysed (this is linked to the purpose of the project and the role of the VCA in the project cycle). This requires some form of conceptual or analytical framework. Design or selection of a framework is the key to the assessment process.

Whatever form it takes, the analytical framework should:

- be holistic, ensuring that all relevant aspects are considered; sometimes a more narrowly focused VCA may be appropriate, but the initial perspective should be broad to ensure that important issues are not overlooked. Where hazards and disasters are part of the picture, they should be put in context (see **Guidance Note 2**);
- enable identification of the range of elements at risk (lives, health, incomes, livelihood, social ties, property, etc.) and assessment of their exposure to all kinds of external shocks or pressures, including hazards and disasters;
- identify the most vulnerable, recognising that different groups of people are vulnerable to these external shocks in different ways and to different extents;
- look not only at hazardous conditions and the immediate symptoms of vulnerability (i.e., situation analysis) but also at the underlying factors contributing to their vulnerability; and
- examine coping capacities and resilience to shocks and hazards: assessments often fail to pay enough attention to the ‘capacities’ dimension of VCA.

Analytical frameworks do not have to be complicated. Elaborate conceptualisation may not be appropriate to the practicalities of project planning and management. What is important is that the chosen framework is readily understood, user-friendly and adaptable. The capacities and vulnerabilities analysis (CVA) model (see Box 1) is an example: this framework and variants of it have been in widespread use for some years. Asset frameworks, such as that used in sustainable livelihoods analysis (see **Guidance Note 10**), are also commonly used. There are now many models to choose from or adapt (see Further reading), although they are often similar conceptually. If necessary, frameworks can be refined or made more detailed as planning progresses.

Box 1 Capacities and vulnerabilities analysis

Originally developed in the 1980s to make relief interventions more developmental, this model has been used widely in other disaster and development contexts, and many other VCA methods have built on it. The basis of the CVA framework is a simple matrix (see diagram) for viewing people’s vulnerabilities and capacities in three broad, interrelated areas:

	<i>Vulnerabilities</i>	<i>Capacities</i>
Physical/material What productive resources, skills and hazards exist? (Includes land, climate, environment, health, skills and labour, infrastructure, housing, finance and technologies)		
Social/organisational What are the relations and organisation among people? (Includes formal political structures and informal social systems)		
Motivational/attitudinal How does the community view its ability to create change? (Includes ideologies, beliefs, motivations, experiences of collaboration)		

Five other factors can be added to the basic matrix to make it reflect complex reality. These are disaggregation by gender; disaggregation by other differences (e.g., economic status); changes over time; interaction between the categories; and different scales or levels of application (e.g., village or national levels).

Source: Anderson and Woodrow (1998).

Step 2. Select the unit or level of analysis

This should be clearly identified at an early stage, to facilitate planning the VCA's scope and focus, identifying stakeholder participants and selecting data collection and analysis methods.

VCAs can be carried out on almost any scale, from household and community to national and even international level. Complementary VCAs at different levels could also be considered.³ They can focus on many different sectors or dimensions of development (e.g., food security, education, gender, transport, trade, disaster reduction).

Box 2 Country-level VCA

A World Bank national-level analysis of vulnerability in Guatemala in 2000–2001 used quantitative data from a recent extensive and cross-sectional Living Standards Measurement Survey, carried out an in-depth qualitative survey on poverty and exclusion in a sample of ten villages and complemented this with other administrative and statistical information including maps and reviews of social protection programmes. The data were then subjected to several formal analytical and statistical techniques.

The analysis covered the different kinds of shock (e.g., economic, social, natural) that were sources of vulnerability at macro- and micro-levels; their frequency and differential impact on household income, consumption, wealth and inequality; coping strategies and their effectiveness; and the value of external assistance.

The findings led to better understanding of the links between vulnerability and poverty, thereby strengthening the analytical and operational content of the government's poverty reduction strategy, as well as the Bank's programmes for poverty assessment and social protection in Guatemala.

Source: Tesliuc, E.D. and Lindert, K. *Risk and Vulnerability in Guatemala: A Quantitative and Qualitative Assessment*. Social Protection Discussion Paper No. 0404. Washington, DC: World Bank, 2004. Available at: <http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/0404.pdf>

Step 3. Identify stakeholders

For success, VCA depends to a large extent on the involvement of relevant stakeholders in providing and analysing data, whether at national or community level. As well as supplying more valid data through incorporation of a range of expert knowledge and perspectives, this ensures wider ownership of the findings, which can be further enhanced if participatory methods are used. Note that it may not be possible to identify all the stakeholders initially; others may be identified as the VCA process develops and should be incorporated into it.

It is particularly important to include vulnerable people in the process and, in hazard-prone areas, all those who are at risk from those hazards. It is also important to remember that the nature and impact of vulnerability varies across different groups.

Collaborative involvement of vulnerable people and external stakeholders (e.g., government officials) in the VCA process should be encouraged as this can stimulate a shared understanding of the issues and the appropriate solutions, as well as having the potential to influence policy and practice elsewhere.

Box 3 Collecting stakeholder perspectives

In 2000, the Palestine Red Crescent Society (PRCS) carried out a VCA as a first step towards a national disaster preparedness plan. The six-month assessment was explicitly participatory. It drew on interviews with officials and NGOs and 22 focus groups in towns, villages and refugee camps across the West Bank and Gaza, seeking to get a cross-section of Palestinian society. One novel element was the inclusion of children and young people, who expressed their vision of disasters and disaster mitigation through drawings.

³ At national level, VCA will probably be used principally as a diagnostic and risk assessment tool, but at local level its role as a participatory planning instrument may be equally important.

The work was carried out by PRCS staff, who received training in interview and group animation techniques. Two pilot studies were held to test the focus group method. Care was taken to ensure good gender balance in the focus groups and the involvement of other vulnerable groups such as the elderly. Two information-gathering workshops were held involving PRCS employees and a great deal of documentary data was collected.

Key institutional stakeholders were brought into the project's steering committee to ensure that the process would be taken forward. They included Palestinian Authority ministries and local NGOs.

Sources: PRCS. *Vulnerability and Capacity Assessment: A Participatory Action Research Study of the Vulnerabilities and Capacities of the Palestinian Society in Disaster Preparedness*. El Bireh: Palestine Red Crescent Society, 2000; IFRC. *World Disasters Report: Focus on reducing risk*. Geneva: International Federation of Red Cross and Red Crescent Societies, 2002.

Step 4. Select approach for data collection and analysis

The approach and methods must be appropriate to the scale and scope of analysis, as well as the VCA's purpose. There must be clarity and agreement about these aspects before data collection and analysis begin.

The method must be participatory and comprehensive enough to capture the different elements of vulnerability and capacity without becoming too complex and cumbersome an exercise. A rapid VCA can be done in a few days, even occasionally a few hours, although a more deliberative and participatory process is generally more desirable. More extensive VCAs may take weeks or months depending on the type of project and the methods used. In all cases, the allocation of funding, time and human resources should be adequate for the purpose of the VCA.

Some VCA methodologies are generic guidelines or provide toolkits from which to select assessment tools for particular exercises. Others have been developed for specific purposes, such as participatory assessment or food security assessment (see Further reading).

VCA will use a variety of sources and types of information, both quantitative and qualitative, to capture the complexity of vulnerability in the project area (see Table 3 for examples). A wide range of social, economic and demographic indicators can be combined with physical (e.g., topography, hazards, buildings, property) and land (e.g., land use) data to assess current vulnerability and predict trends.

Table 3 Tools for assessing socio-economic vulnerability

<i>Methods</i>	<i>Application to vulnerability</i>
Secondary data collection and review (official reports, economic surveys, census data, household surveys and other official statistics, research, early warning systems, reports by other agencies, etc.) ⁴	Contextual information on a variety of issues including population characteristics, external shocks and stresses (e.g., rainfall and temperature trends), health (morbidity and mortality), previous disasters' impact
Geospatial data (e.g., maps, satellite images, social mapping, transect walks)	Identify physical and environmental features (including hazards), land use, other resources and infrastructure, location of populations and vulnerable sub-groups
Environmental checklists	Questions to gain information about environmental conditions and concerns, revealing the relationship between vulnerable people and their environment (e.g., what role do environmental resources play in resilience? How do environmental hazards, degradation and changes affect communities?)
Sample surveys	Quantitative data on dimensions of vulnerability (e.g., education, employment, health, nutritional status, household economies)

⁴ This might include use of national-level risk and vulnerability indices (see **Guidance Note 4**).

Methods	Application to vulnerability
Interviews (individuals, households, community groups, key informants), focus groups	Information from different perspectives (among communities, other local stakeholders, external experts) on events and trends that cause stress, differential vulnerability and the effectiveness of adaptive behaviour
Individual and household case studies; oral history	Data on different experiences of vulnerability and abilities to withstand environmental hazards and other shocks
Timelines	Historical occurrence and profiles of longer-term events or trends (e.g., floods, droughts, epidemics, environmental trends and cycles)
Seasonal calendars	Describe seasonal events and trends, identifying vulnerability context, livelihood assets and strategies (e.g., rainfall, food levels at different times of year, crop planting and harvesting schedules, food prices, changes in health status)
Preference, matrix and wealth ranking	Reveal vulnerability of different groups' assets to shocks and stresses, and strategies against this
Problem tree	Identifies problems and their causes, and indicates possible solutions
Venn diagrams and other institutional appraisal/mapping methods	Social capital, relations between groups, institutional and policy environment
Scenarios and computer simulations	Explore possible future outcomes and model social–environmental interactions over time

Sources: CARE/TANGO International. *Household Livelihood Security Assessments: A Toolkit for Practitioners*. Atlanta: CARE USA Partnership and Household Livelihood Security Unit, 2002. Available at: http://www.kcenter.com/phls/HLSA%20Toolkit_Final.PDF; DFID. *Sustainable Livelihoods Guidance Sheets*. Section 4. London: Department for International Development (UK), 1999–2005. Available at: http://www.livelihoods.org/info/info_guidancesheets.html; IFRC. *Vulnerability and Capacity Assessment Toolbox*. Geneva: International Federation of Red Cross and Red Crescent Societies, 1996. Available at: <http://www.proventionconsortium.org/?pageid=43>; Twigg, J. *Disaster risk reduction: mitigation and preparedness in development and emergency planning*. London: Overseas Development Institute, 2004. Available at: <http://www.odihpn.org/publist.asp>; Ziervogel, G. 'Vulnerability Analysis'. Advanced Tools for Sustainability Assessment website. IVM – Vrije Universiteit Amsterdam, 2006. Available at: <http://ivm5.ivm.vu.nl/sat/?chap=20>

These tools can be applied in particular sequences to facilitate data gathering and analysis. For example, a VCA might start with collection of secondary data, then use tools that generate general information (geospatial data, maps, transects, historical timelines), followed by seasonal calendars and Venn diagrams, before moving on to focus group discussions and individual household interviews. Data gathered can be analysed by communities and project staff using problem trees.

Because vulnerability is multi-faceted, it is easy to lose sight of particular aspects. The assessment should explicitly identify internal (susceptibility to loss) and external (response to hazards) dimensions of vulnerability. Different sets of data collection tools may be needed for each dimension.

An important feature of vulnerability is that it changes over time. Assessment methods should identify trends, not just take a 'snapshot' of current conditions.

Most VCA frameworks place natural and other hazards explicitly within their broader coverage, and there is evidence in practice of VCAs leading to better hazard awareness and identification. Some practitioners working in particularly hazard-prone areas have found it necessary to further emphasise hazards issues in their VCA methods (see Box 4). This is a question that could be considered in the scoping phase of the VCA (see Step 5).

Box 4 Coverage of hazards in VCAs

In the Philippines, the Citizens' Disaster Response Center and Network of NGOs has used a version of the capacities and vulnerabilities analysis method (see Box 1) since the early 1990s as part of a community-based and development-oriented approach to disaster management. It has added a hazards, vulnerabilities and capacities assessment exercise, complementing the standard CVA, as an initial step in counter-disaster planning. This is undertaken relatively rapidly, but involves greater focus on hazards and their likely impact.

CARE has developed guidelines for programming in conditions of chronic vulnerability in East Africa. The approach is a modification of the organisation's standard household livelihood security assessment method, but places extra emphasis on identifying specific indicators for tracking the onset and impact of external shocks.

Sources: Heijmans, A. and Victoria, L.P. *Citizenry-Based & Development-Oriented Disaster Response: Experiences and Practices in Disaster Management of the Citizens' Disaster Response Network in the Philippines*. Quezon City: Center for Disaster Preparedness, 2001. Available at: http://www.proventionconsortium.org/themes/default/pdfs/CRA/CBDO-DR2001_meth.pdf; CARE/TANGO International. *Managing Risk, Improving Livelihoods: Program Guidelines for Conditions of Chronic Vulnerability*. Nairobi: CARE East and Central Africa Regional Management Unit and TANGO International, 2003. Available at: <http://www.kcenter.com/phls/2003CVGuidelines.PDF>

Capturing every aspect of vulnerability can appear to be a huge task. In order to be manageable, an assessment will seek to identify and focus on the most relevant aspects, but this should be a deliberative process within an overall perspective that remains holistic. The complexity of the task must not be used as an excuse for cutting corners.

Step 5. Collect data

Data collection and analysis are shown here as separate activities, for simplicity of presentation, but in practice the process is cyclical, with reviews of initial findings used to guide subsequent data collection, particularly in participatory assessments. For example, initial data collection activities might identify elements at risk, the principal hazards and other external threats, vulnerabilities directly associated with these threats and key capacities. Supplementary information gathering would be needed for analysis of the underlying socio-economic and environmental pressures causing the vulnerability.

Scoping. The scoping phase generates a broad picture of vulnerability in the project area or affecting it, highlights key issues and priorities and identifies information gaps. This phase relies on secondary data, including maps. Some secondary data collection may take place at a very early stage in project preparation to inform more detailed VCA design.

Detailed data collection. This stage sees more emphasis on collection of additional primary data to complement and challenge the secondary data findings. Full use should be made of existing secondary data but these should not be allowed to dominate the assessment.

Community-level and participatory VCAs are likely to give more weight to primary data findings and use secondary sources to cross-check information generated in the field. This approach often supplies detailed information and insights regarding local conditions. It also allows different groups of vulnerable people to set out their needs and priorities and to challenge externally imposed views and agendas. Participation is, therefore, seen as an essential element in any VCA.

Findings from local-level assessment exercises can feed into VCA and decision-making at a higher level or on a larger scale,⁵ although it may be difficult to compare the results from several local-level assessments where these have not used standardised methods.

⁵ For a methodology for doing this, see ActionAid, *Participatory Vulnerability Analysis: a step-by-step guide for field staff*. London: ActionAid, undated. Available at: <http://www.actionaid.org/wps/content/documents/PVA%20final.pdf>

Box 5 Outputs and use of vulnerability and capacity analysis

VCA can generate many different kinds of information, presented and used in a variety of ways, for both improved disaster management and socio-economic development.

In Albania, a VCA carried out by the Albanian Red Cross in 2004, with support from the United Nations Development Programme and the United Kingdom's Department for International Development (DFID), focused on high-risk locations and community experiences and perceptions. A range of data-collection methods was used to provide information on hazard events and their impact, response activities by local and national government, NGOs and international agencies, community understanding of vulnerability and its causes, local views of the effectiveness of official emergency services and people's willingness to volunteer for emergency work. The study made numerous recommendations for strengthening central and local emergency management capacity, which were implemented through a new National Civil Emergency Plan.

In the Caribbean island of Montserrat, the government commissioned an integrated vulnerability analysis in 2002 to present the history of natural and technological hazards, determine the vulnerability of existing and proposed development areas to natural hazards, consider physical and social infrastructural needs and make disaster mitigation recommendations for development planning and disaster management. The outputs generated were primarily in the form of maps, which, though insufficiently detailed for some disaster management purposes, were used alongside government economic and trade statistics, social surveys, a participatory poverty assessment and other data to inform the island's new Sustainable Development Plan.

Sources: UNDP Albania/Albanian Red Cross. *Local Vulnerability and Capacity Assessment in Albania: study report*. Tirana: United Nations Development Programme Albania and Albanian Red Cross, 2004; Ministry of Local Government and Decentralisation. *National Civil Emergency Plan of Albania*. Tirana: Ministry of Local Government and Decentralisation, 2004. Both available at: <http://www.undp.org/bcpr/disred/english/regions/europe/albania.htm>; Smith, D. *Montserrat Integrated Vulnerability Analysis*. Vulnerability Applications and Techniques website, 2002. Available at: http://www.csc.noaa.gov/vata/VATIII_DSsmith.pdf; CDERA. *Status of Hazard Maps, Vulnerability Assessments and Digital Maps: Montserrat*. Bridgetown: Caribbean Disaster Emergency Response Agency, 2003. Available at: http://www.cdera.org/projects/cadm/docs/montserrat_hmvadm.pdf; Government of Montserrat. *Montserrat Sustainable Development Plan 2003–2007*. Government of Montserrat, 2003. Available at: http://www.devunit.gov.ms/documents/mni_sdp_03_07.pdf

Step 6. Analyse data

This step is often the most difficult because of the volume and diversity of data collected. As a result, in some cases the findings of a VCA are more descriptive than analytical, especially where the data are primarily qualitative. This can make it difficult to set priorities for intervention.

There can be no single measure of vulnerability, owing to its multi-faceted nature and multiple causes. Weighting of diverse indicators is difficult. Some aspects of vulnerability and loss (e.g., lives, infrastructure, housing, crops, incomes) are often easier to measure than intangible and unquantifiable aspects (e.g., social cohesion, community structures, cultural losses) although the latter may be equally important. Careful triangulation of the different indicators is needed to build up an overall picture. Use of local knowledge and perspectives can be of great help here in identifying priorities.

The different dimensions of vulnerability have to be linked to present a full picture and to reveal cause–effect linkages. Data on the location, nature and severity of hazards should be reviewed against information on the exposure and resilience of different elements at risk. Estimating resilience to future hazard events is a predictive exercise that is likely to involve some assumptions, which should be stated clearly in the assessment report.

Step 7. Decision-making and action

VCA is a diagnostic tool, but by facilitating understanding of present and potential future situations it helps to direct interventions. Actions that result from a VCA should take the form of improvements to project design and implementation that increase community resilience (including development of new activities to support vulnerable groups), changes in the thinking and practice of the operational agency itself, or policy changes at a higher level.

Specific actions resulting from VCAs might include:

- Selection of alternative project sites (or, in the case of agricultural projects, alternative crops).
- Shift of emphasis to different economic and livelihood activities, or a different mixture of such activities.

- Introduction of economic support mechanisms (e.g., micro-credit, cash for work) and social support systems to increase the resilience of vulnerable communities.
- Repair, strengthening or redesign of vulnerable infrastructure and facilities.
- Relocation of vulnerable communities and facilities.
- New land use, planning or building regulations.
- Preparation of disaster mitigation and preparedness plans.
- Strengthening institutions and communities to enable them to implement recommended actions and provide a basis for initiating future actions.
- Formal contributions to policy debates, especially regarding the broader, underlying pressures contributing to vulnerability in the project area.

In project planning, VCA findings usually feed into broader risk analysis. In practice, the distinction between risk and vulnerability is sometimes blurred and some guidelines present vulnerability and risk analysis as a combined exercise.

At each decision-making stage in the project planning process, VCA findings should be referred to and the impact of those decisions on vulnerability considered. Analyses should be transparent and available to all those who produce and use the information.

Ideally, VCA should be an ongoing process during the project cycle, because vulnerability is itself dynamic. Follow-up VCAs can assess changes resulting from the project and external factors that might require subsequent modifications to project design and delivery. In practice, this rarely happens. VCA can also be a tool for monitoring and evaluation, by identifying changes in baseline conditions (see **Guidance Note 13**).

It is also useful to evaluate the VCA process itself and use those lessons in subsequent assessments.

4. Critical factors for success

- Maintaining a holistic view is crucial to create a comprehensive and coherent analysis.
- Vulnerabilities should always be assessed alongside capacities.
- VCA requires a mix of methods and tools, fitted to the project's scope and purpose and adapted to local conditions.
- The approach taken must be manageable, bearing vulnerability's complex nature in mind.
- Analysis should not be over-elaborate but geared to decisions about interventions based on identification of those components of vulnerability that are most relevant to the project and that the project is capable of addressing.
- Project teams should possess skills for collecting and analysing different types of data (including facilitation skills for participatory assessment).
- Participation of vulnerable people is an essential part of the process.
- Because vulnerability is not simple, and the data will be diverse, organisations carrying out VCAs may have to put some effort into reaching a consensus on priorities regarding how to proceed.
- Carrying out a VCA can raise expectations that the development organisation concerned will intervene to solve all the problems identified. This is rarely possible. It is therefore important to discuss the project's purpose and likely outcomes with other stakeholders at the outset.

Box 6 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.⁶

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

Directories of methods and case studies

ProVention Consortium, Community Risk Assessment (CRA) Toolkit: <http://www.proventionconsortium.org/?pageid=39>

Vulnerability Assessment Techniques and Applications (VATA) website: <http://www.csc.noaa.gov/vata/>

These mostly cover local- or community-level analysis. For methodological guidance on national-level assessments, see the World Bank's Social Risk Management web pages: <http://www.worldbank.org/srm>

Methodological discussions

Anderson, M.B. and Woodrow, P.J. *Rising from the Ashes: Development Strategies in Times of Disaster*. London: IT Publications, 1998. 2nd ed.

Cannon, T., Twigg, J. and Rowell, J. *Social Vulnerability, Sustainable Livelihoods and Disasters*. London: University of Greenwich, Natural Resources Institute, 2003. Available at: http://www.benfieldhrc.org/disaster_studies/project_pages.htm

Davis, I., Haghebaert, B. and Peppiatt, D. *Social Vulnerability & Capacity Analysis*. Workshop. Geneva, 25–26 May 2004. Geneva: ProVention Consortium, 2004. Available at: http://www.proventionconsortium.org/themes/default/pdfs/VCA_ws04.pdf

Concepts and issues

Alwang, J., Siegal, P.B. and Jørgensen, S.L. *Vulnerability: a view from different disciplines*. Social Protection Discussion Paper No. 0115. Washington, DC: World Bank, 2001. Available at: <http://siteresources.worldbank.org/SOCIALPROTECTION/Resources/SP-Discussion-papers/Social-Risk-Management-DP/0115.pdf>

Bankhoff, G., Frerks, G. and Hilhorst, D. *Mapping Vulnerability: Disasters, Development and People*. London: Earthscan, 2004.

Handmer, J. 2003, 'We are all vulnerable', *Australian Journal of Emergency Management*. 18(3) 55–60, 2004. Available at: <http://www.ema.gov.au/agd/EMA/emaInternet.nsf/Page/AJEM#previous>

Wisner, B. et al. *At Risk: Natural hazards, people's vulnerability and disasters*. London: Routledge, 2004. 2nd ed. First three (theoretical) chapters are available at: <http://www.unisdr.org/eng/library/lib-select-literature.htm>

⁶ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Sustainable Livelihoods Approaches

Guidance Note 10

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note explains how sustainable livelihoods (SL) thinking and methods can support the incorporation of natural hazards and associated disaster risk into development project planning. It briefly introduces SL thinking and explains its application to projects and programmes, with particular emphasis on its relevance to hazards and disasters. It reviews methods used in SL approaches to assess hazards, vulnerability and risk, and discusses other factors in applying SL to project cycle management.

1. Introduction

In recent times, thinking about poverty and sustainable development has begun to converge around the linked themes of vulnerability, social protection and livelihoods. This has been accompanied by the development of a variety of approaches to analyse situations and assess the likely impact of project interventions. These include vulnerability analysis (see **Guidance Note 9**), social analysis/social impact assessment (see **Guidance Note 11**) and sustainable livelihoods approaches (sometimes referred to as livelihood security or livelihood systems approaches).

Box 1 Defining ‘sustainable livelihoods’

Whatever their precise terminology, most agencies’ definitions state that:

- A livelihood comprises the capabilities, assets and activities required for a means of living.
- A livelihood is sustainable when it can cope with and recover from external stresses and shocks, and maintain or enhance its capabilities and assets now and in the future.

SL is still evolving as an idea and a methodology, but many international development agencies have adopted it in project appraisal and review,¹ and it is steadily becoming part of the mainstream of development planning.

2. Sustainable livelihoods approaches

A sustainable livelihoods approach is essentially a way of organising data and analysis, or a ‘lens’ through which to view development interventions. Taking a holistic view of a project (need, focus and objectives), it provides a coherent framework and structure for analysis, identifies gaps and ensures that links are made between different issues and activities. The aim is to help stakeholders engage in debate about the many factors that affect livelihoods, their relative importance, the ways in which they interact and the most effective means of promoting more sustainable livelihoods.

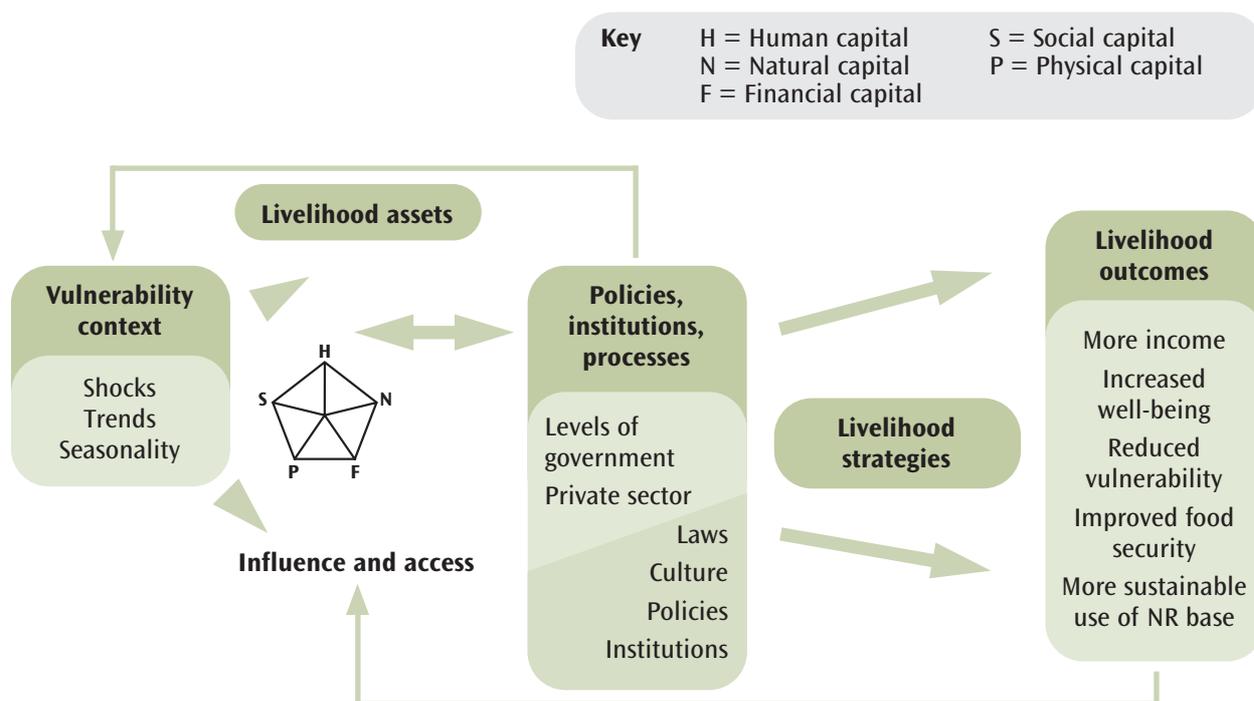
¹ Including the United Nations Development Programme (UNDP), the United Kingdom’s Department for International Development (DFID), CARE and Oxfam.

There is no single SL approach, and flexibility in method is a distinctive feature of SL. But in most models the main elements are similar and analysis will address all of these to some degree:

- **Context.** The external environment in which poor people live their lives and which is responsible for many of their hardships.
- **Assets and capabilities** (or ‘capital’). The resources poor people possess or have access to and use to gain a livelihood.
- **Policies, institutions and processes** (sometimes called transforming structures and processes). The institutions, organisations, policies and legislation that determine access to assets and choice of livelihood strategies.
- **Livelihood strategies.** The ways in which poor people deploy their assets and capabilities to improve their livelihoods (i.e., consumption, production, processing, exchange and income-generating activities).
- **Outcomes.** Successful livelihood strategies should lead to more income and more economically sustainable livelihoods, increased well-being, reduced vulnerability and more sustainable use of the natural resource base.

Figure 1 shows one widely used sustainable livelihoods framework that contains these elements.

Figure 1 DFID’s sustainable livelihoods framework



Source: DFID (1999–2005), *Sustainable Livelihoods Guidance Sheet 2.1*.

3. Applying sustainable livelihoods approaches to projects and programmes

SL approaches can be used at both policy and project level to initiate new poverty reduction activities or modify existing activities to improve livelihood outcomes.

At project level, SL thinking can be applied at the identification and appraisal stages of the project cycle (see Section 5) to identify development priorities and plan new activities. It can also be used to review project activities – which may not have been designed originally with SL in mind – and to improve monitoring and evaluation.

Application of SL in project design helps to match project activities to poor people's priorities. Livelihoods analysis leads to three main types of project activity (which are not exclusive):

- *Livelihoods promotion.* Activities to improve household resilience (e.g., through savings and credit programmes, crop diversification and marketing, improved health care).
- *Livelihoods protection.* Activities to prevent decline in household livelihood security, particularly in periods of stress (e.g., early warning systems, cash/food for work, providing seeds and tools, hazard mitigation).
- *Livelihoods provisioning.* Direct provision of essential needs (e.g., food, water, shelter), usually in emergencies.

It can also lead to other activities aimed at social, cultural and institutional change that are associated with improved livelihoods and poverty reduction. Experience of projects that adopt SL thinking has shown that this can change planners' attitudes (see, for example, Box 2).

Box 2 From water resources to water security

During the mid- to late 1990s the British Geological Survey (BGS) began to incorporate a livelihoods perspective into its work on drought in sub-Saharan Africa.

This work had originally been resource-focused, highlighting groundwater management policies and interventions. By following an SL approach and using project teams with a broader skills base (hydrogeology, water policy and economics, institutions and social development), BGS began to see the water security implications of drought: the nature of water scarcity and barriers to access; interventions needed to protect livelihoods before lives are threatened; and the information required for effective pre-disaster mitigation. For example, community surveys showed how access to water was influenced by access to a range of household assets (labour and animals for collecting water, money to buy it, social capital for securing water rights or access to irrigation schemes and knowledge of alternative sources) as well as by barriers to physical access to the water itself.

This led BGS to think beyond conventional sectoral approaches and the narrow focus of many early warning systems and policy responses. Within the organisation's international development work generally, there was a move towards multidisciplinary project teams and partnerships with external organisations that have different insights and skills – and hence a problem-led, rather than discipline-led, approach to projects.

Source: DFID (1999–2005), *Sustainable Livelihoods Guidance Sheet 7.1*.

4. Relevance to hazards and vulnerability

By giving prominence to vulnerability and external shocks, SL approaches provide good opportunities for including hazard and disaster awareness in project planning (see **Guidance Note 9** for more detailed discussion of vulnerability and its relationship to hazards). SL thinking considers vulnerabilities of all kinds as central to the ways in which livelihoods are shaped. Two main aspects of vulnerability are considered within the SL approach:

- The extent to which different groups are exposed to particular trends, shocks and seasonality (the 'external dimension' of vulnerability).
- How their livelihoods are affected by these influences (the 'internal dimension').

Vulnerability context

The external dimension of vulnerability is usually known as the 'vulnerability context': a collection of external pressures that are a key factor in many of the hardships faced by poor people. The vulnerability context should be the starting point for analysis and is of particular importance for incorporating natural hazards threats into project thinking.

DFID's framework (see Figure 1) is typical in presenting three main categories of external vulnerability:

- *Trends* are long term and usually large scale. They may include trends in population, resource acquisition and use (including conflict over resources), economics (national and international), governance and politics, technology and the environment (e.g., climate change).

- *Shocks* include human health shocks (e.g., epidemics), natural shocks (e.g., natural hazard-induced disasters), economic shocks (e.g., rapid changes in exchange rates), conflict and crop/livestock health shocks. They can destroy assets directly (e.g., in the case of floods or storms). They can also force people to dispose of assets as part of coping strategies. Resilience to external shocks and stresses is an important factor in livelihood sustainability.
- *Seasonality* is expressed through seasonal shifts in prices, production, food availability, employment opportunities and health. These are some of the greatest and most enduring sources of hardship for poor people.

Table 1 shows how one SL assessment categorised external forces according to their nature and scale.

Table 1 Sources of vulnerability in rural Bangladesh

	<i>Micro-level</i>	<i>Meso-level</i>	<i>Macro-level</i>
<i>Natural/ environmental</i>	Salinity Aridity Arsenic contamination Pest attack	Waterlogging River erosion Cyclone Epidemics Land degradation	Climate change Sea-level rise Flood Drought
<i>Social</i>	Illness Injury Disability Old age Death of family member Crime Domestic violence		
<i>Economic</i>		Unemployment Resettlement Harvest failure	
<i>Political</i>	Political violence	<i>Mastanism</i> ²	Governance crisis

Source: Islam, S.A. 'The causes of vulnerability in rural livelihoods'. In Toufique, K.A. and Turton, C. (eds). *Hands not Land: How Livelihoods are Changing in Rural Bangladesh*. Dhaka: Bangladesh Institute of Development Studies, undated. Available at: <http://www.livelihoods.org/lessons/docs/handsland.pdf>

Livelihoods' vulnerability to shocks and stresses

SL analysis can be used to consider three main aspects of livelihood vulnerability to shocks and stresses:

- The impact of hazards on all the different kinds of livelihood asset/capital (see Figure1). Hazards affect natural capital (e.g., floods that ruin agricultural land), physical capital (e.g., loss of housing, tools), financial capital (e.g., loss of savings), human capital (e.g., loss of life, injury, unemployment) and social capital (e.g., damage to social networks).
- The livelihood strategies adopted by households and communities to reduce their vulnerability to hazards and recover from hazard events. These can be diverse, ranging from physical measures (e.g., building flood embankments, strengthening houses) to social/organisational actions (e.g., reinforcing social support networks, establishing local disaster preparedness committees) and livelihood diversification.
- Institutions, policies and processes may help protect people against the impact of shocks (not only conventional disaster mitigation measures, such as public education about risk avoidance, evacuation plans and relief provision, but all kinds of development interventions that build up livelihood assets, for example, micro-credit, insurance, health, agricultural extension and organisational development projects).

² Behaviour associated with illegitimate use of power and/or deployment of violence by political activists.

5. Use of sustainable livelihoods methods for assessing hazards and disaster risk

General methodology

There are no set rules for applying SL thinking to projects or for carrying out a livelihoods assessment. The main aim should be to understand the livelihoods of different stakeholder groups affected by the project and the influences on them. From this, it is then possible to identify the best entry points or options for improving livelihoods by building and protecting livelihood assets or influencing the institutions, policies and processes. Although SL assessment may identify several such entry points, the most appropriate approach might be a single-sector intervention as long as it takes cross-sectoral linkages into account and considers all the potential project impacts on vulnerable people's livelihoods.

SL frameworks can be used in combination with other appraisal tools as a checklist or to structure ideas. Specific livelihoods analyses can be carried out; alternatively, other analysis can be modified to take account of SL issues, or the findings from other technical studies can be reviewed from an SL perspective – many SL analyses draw on the results of other appraisals. In some projects, the design process does not explicitly use a formal SL framework, but incorporates certain concepts and methods from it.

In general planners should focus more on analysis than information gathering and use existing information wherever possible. Additional information and analysis may sometimes be required, but livelihoods analysis does not have to examine every aspect in depth. In looking at the vulnerability context, for example, it should identify those trends, shocks and aspects of seasonality that are particularly important to livelihoods in the project area. For small, focused projects, it may be best to use the SL framework as a checklist. More detailed analysis will probably be required for larger and more complex projects, although broad-brush analysis may sometimes be more appropriate for large-scale geographical or sectoral programmes.

It is often impossible to assemble project teams with all the specialist expertise needed to assess every aspect of SL. It is, therefore, important for all project team members to understand SL concepts and the approaches used and to take a broad view of their task, so that important issues and linkages between the different parts of the analytical framework are not overlooked.

Phases of SL analysis

The approach should be phased,³ starting with an overview of the most important risk factors (often largely descriptive) and identification of possible relationships and linkages between them. It should then lead on to more detailed analysis of key problems, the nature of expected changes, coping strategies and potential solutions. These stages of data collection and analysis can be matched to the standard sequencing of activities in project identification and appraisal (see Table 2, which outlines a possible sequence of a full-scale livelihood security assessment: the exact sequence will vary depending on the project's objectives and the information sought).

³ Some guidelines do not prescribe a sequence of activities for carrying out SL analysis, but in practice this has to be structured in one form or another.

Table 2 Phases of SL analysis in project planning

Phase(s) of project cycle⁴	Phase of SL analysis	Purpose	Main activities
Programming	Objective setting	Establish objectives and framework to guide SL analysis	Design assessment framework and work plan
Identification and appraisal (preparation)	Review of existing information	Set the parameters for primary information collection	Assess accuracy and comprehensiveness of existing information Identify major livelihood issues to be assessed through field data collection Validate conclusions through stakeholder discussions Design approaches for gathering new information
Appraisal (preparation)	New or additional field assessment	Improve understanding of key issues and fill information gaps	Site selection (chosen to capture variation in livelihood systems, constraints and sources of vulnerability) Preparatory work with communities involved in field studies Field team training Field data collection, entry, organisation, analysis (iterative process)
Appraisal (preparation)	Problem and opportunity analysis	Refinement of information, identification of problems and opportunities, and selection of interventions	Multi-stakeholder analysis and design workshops
Appraisal (preparation)	Project design		

Adapted from Frankenberger, T. Drinkwater, M. and Maxwell, D. 'Operationalizing household livelihood security'. In *Proceedings from the Forum on Operationalizing Sustainable Livelihoods Approaches, Pontignano (Siena) 7– 11 March 2000*. Rome: United Nations Food and Agriculture Organization, 2001. Available at: http://www.fao.org/documents/show_cdr.asp?url_file=/docrep/003/x9371e/x9371e15.htm; *ibid.*, Appendix 3; CARE. *Household Livelihood Security Training & Facilitation Manual*. Atlanta: CARE USA, Partnership and Household Livelihood Security Unit, 2000. Available at: <http://www.kcenter.com/phls/hls.htm>

Data collection and analysis

A variety of techniques that are commonly used in SL data collection and analysis can be applied to explore the vulnerability context, its impact on livelihood assets and strategies, and ways by which these can be reinforced. Table 3 lists some of those most directly relevant to hazard-related vulnerability (though they may also address other aspects of sustainable livelihoods).

⁴ See **Guidance Note 5** for a more detailed account of the project planning process.

Table 3 Tools for assessing hazard-induced vulnerability in SL analysis

<i>Methods</i>	<i>Application to vulnerability</i>
Secondary data collection (reports, research, statistics, etc.)	Contextual information on a variety of issues including external shocks and stresses likely to affect livelihoods (e.g., rainfall and temperature trends, location and features of natural hazards), health (morbidity and mortality), prices, resource stocks – to complement but not replace primary data
Environmental checklists	Questions to gain information about environmental conditions and concerns, revealing the relationship between the poor and their environment (e.g., what role do environmental resources play in livelihoods; how do environmental hazards, degradation and changes affect livelihoods, and vice versa?)
Sample surveys	Quantitative data on household economies (income, costs, etc.), livelihood assets and strategies
Interviews (individuals, households, community groups, key informants), focus groups	Information from different perspectives (communities, other local stakeholders, external experts) on events and trends that cause livelihood stress, differential vulnerability and the effectiveness of adaptive behaviour
Individual and household case studies	Data on different livelihood experiences and resilience to environmental hazards and other shocks
Timelines	Historical occurrence and profiles of longer-term events or trends (e.g., floods, droughts, epidemics, local environmental trends and cycles)
Seasonal calendars	Describe seasonal events and trends, identifying vulnerability context, livelihood assets and strategies (e.g., rainfall, food levels at different times of the year, crop planting and harvesting schedules, food prices, changes in health status)
Preference, matrix and wealth ranking	Reveal vulnerability of different groups' livelihood assets to shocks and stresses and strategies against this
Mapping	Identify physical and environmental features (including hazards), land use, natural and social resources (assets/capital) ⁵
Venn diagrams and other institutional appraisal/mapping methods	Social capital, relations between groups, institutional and policy environment

Sources: DFID (1999–2005), *Sustainable Livelihoods Guidance Sheet 4*; CARE/TANGO International (2002).

Assessments should use several methods to capture the different elements of livelihood vulnerability/resilience and validate data through triangulation and cross-checking. Much of the data collected through fieldwork may be qualitative (especially if participatory appraisal techniques are used), but some secondary data are likely to be quantitative and field assessments can include quantitative methods such as household or health surveys. Much contextual information on environmental features (including hazards) and livelihood resilience may be gathered through initial assessment based on secondary data, interviews with key informants and perhaps community meetings (**see also Guidance Note 2**). Reviews of existing information should be as comprehensive as possible and their findings are usually validated by stakeholders before collecting new field data.

Formal risk assessment is not usually considered necessary in routine livelihoods analysis, but may be required in some situations.

⁵ This may use maps, formal surveys and other data sets. In community-based work, participatory techniques such as transect walks and social mapping may be used.

Indicators

Vulnerability context. Many indicators can be used to identify the significance of externally induced vulnerability and changes over time. The example presented in Table 4 is from a livelihoods assessment carried out for an irrigation project in South India, where indicators developed by the team were explored and discussed with the affected communities.

Table 4 Indicators of shocks, trends and seasonal variations

<p><i>Shocks</i></p> <ul style="list-style-type: none">■ Human health (epidemics, hunger periods, etc.)■ Natural shocks (droughts, floods, etc.)■ Livestock disease and crop failures■ Economic shocks (sudden variations in prices, unemployment periods, etc.)■ Conflicts (between landowners and landless, between irrigation authorities and farmers and others)■ Other important technical and social events (e.g., introduction of mechanisation, construction of wells/boreholes, water supply, introduction of TV and telephone in the villages)
<p><i>Trends and changes over time</i></p> <ul style="list-style-type: none">■ Changes in main income sources, emergence of new income-generating activities■ Agricultural production (types of crops) and related changes in tasks carried out, impact on diet, fertiliser and pesticide use, impact of mechanisation and irrigation■ Marketing of different foodstuffs, access to markets, prices of foodstuffs and consumer goods■ Access to and use of natural resources including water, fisheries, wood and fodder, changes in bio-diversity and impacts on daily life■ Population changes, including migration, family planning, village size, percentage of landowners/landless■ Ways in which life has improved or worsened, including consumption trends, health, education, standard of living, family values, infrastructure (transport, hospital), savings behaviour
<p><i>Seasonal variations</i></p> <ul style="list-style-type: none">■ Prices of fish, rice, other crops and vegetables (variations in prices indicate availability and production of these foods)■ Meal frequency, with distinctions between younger adults, elders and children■ Water availability, in both canal and wells, and rainfall■ Work load and opportunities for employment■ Health (incidence of disease)■ Consumption of fish, chicken and mutton■ Household expenses (religious festivals, school, etc.)■ Availability of fodder and fuel wood■ Access to markets and other infrastructures

Source: Brugere, C. and Lingard, J. *Evaluation of a Livelihoods Approach in Assessing the Introduction of Poverty-Focused Aquaculture into a Large-Scale Irrigation System in Tamil Nadu, India*. Newcastle-upon-Tyne, UK: University of Newcastle, School of Agriculture, Food and Rural Development, 2001. Available at: http://www.livelihoods.org/post/Docs/SLA_Aqua.pdf

Livelihoods' vulnerability to shocks and stresses. A wide range of indicators can be used to assess livelihood vulnerability or security comprehensively. In most cases, a narrower focus is likely to be more practical, depending on capacity, resources and sample size. This could focus on specific external shocks and stresses (Box 3 gives an example).

Box 3 Assessing vulnerability to winter weather

A study in 2003 sought to identify the impact of winter weather on the livelihoods of poor households in the Afghan capital, Kabul, and to identify appropriate development interventions. The study surveyed 100 selected households, members of which were interviewed three times over a three-and-a-half month period. It focused on the particular threats from winter, households' susceptibility to them, coping strategies, and the impact of international non-governmental organisations' cash-for-work programmes.

Evidence was collected relating to the following indicators:

Threats from winter

- Quality of housing and basic facilities
- Ability to purchase fuel
- Ownership of items such as blankets and warm clothes
- Security of tenure
- Access to employment during the winter months and factors affecting ability and access to work
- Ownership of productive assets (e.g., land, livestock, tools) and other material assets (e.g., radios, jewellery)
- Health status

Coping strategies (with regard to:)

- Winter weather (e.g., obtaining fuel and food, changing diet or consumption patterns)
- Income (e.g., seeking alternative work, borrowing, selling assets, begging, sharing income and expenditure across extended families, moving, drawing on social obligations)

Changes in these indicators over time as the result of the cash-for-work interventions were also measured.

Based on its findings, the study was able to recommend several practical modifications and improvements to development assistance programmes.

Source: Grace, J. *One Hundred Households In Kabul: A study of winter coping strategies, and the impact of cash-for-work programmes on the lives of the "vulnerable"*. Kabul: Afghanistan Research and Evaluation Unit, 2003. Available at: <http://www.areu.org.af>

6. Critical factors for success

In general, SL analysis should be based on holistic thinking and a multidisciplinary approach, seeking to identify all relevant constraints, assets and opportunities and relate them to one another.

With regard to incorporating natural hazards in SL assessments, key factors include:

- Recognition of the centrality of vulnerability (both external and internal) to livelihoods.
- Appreciation that livelihoods and the vulnerability context are dynamic and may change quickly.
- Explicit consideration of the significance of hazards and their impact in exploration of vulnerability (this does not mean that there should be special emphasis on hazards, only that their relative importance within the vulnerability context should be properly assessed and kept in mind).
- Recognition of the importance of poor people's views and experiences in understanding the vulnerability context and its impact.

Box 4 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.⁶

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

⁶ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Further reading

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Ashley, C. and Carney, D. *Sustainable Livelihoods: Lessons from early experience*. London: Department for International Development (UK), 1999. Available at: <http://www.livelihoods.org/info/docs/nrcadc.pdf>

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DFID. *Sustainable Livelihoods Guidance Sheets*. London, Department for International Development (UK), 1999–2005. Available at: http://www.livelihoods.org/info/info_guidancesheets.html

Livelihoods Connect website (<http://www.livelihoods.org>) (a major collection of online documents: concepts, methods, applications, training).

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Social Impact Assessment

Guidance Note 11

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note looks at the use of social impact assessment (SIA) as a tool for assessing disaster risks when planning development projects. It outlines the principal approaches and methods used in SIA and identifies entry points for introducing natural hazard and related disaster risks. The note is intended for use by project planners and managers in multilateral and bilateral development agencies, national and local government departments and non-governmental and private sector organisations. Users will include those managing or doing an SIA, so that they can incorporate disaster risk into their social assessment; but the note can also be used by those assessing disaster risk to understand how the techniques of SIA can assist their assessment and mitigation of risk.

1. Introduction

Natural disaster risk is a potential factor in many development projects. Environmental hazards can affect a project area, with socio-economic consequences for the project's target populations. Development projects can increase or reduce the risk of natural disaster, through their impact on social resilience and the natural environment.

By understanding and anticipating future hazard events, communities, public authorities and development organisations can minimise the risk disasters pose to socio-economic development. Understanding the interactions between projects and environmental hazards is crucial in ensuring the sustainability of development gains.

Social impact assessment can play an important role in this understanding. SIA is the process of analysing, monitoring and managing the social consequences of policies, programmes and projects. These consequences may be positive or negative, intended or unintended, direct or indirect; they may be short-term impacts or long-term changes. As well as helping to explain how a proposed action will change the lives of people in communities, SIA indicates how alternative actions might mitigate harmful changes or implement beneficial ones.

Box 1 What are social impacts?

Social impacts can be characterised and defined in many ways. The following definition is widely understood and used:

“By social impacts we mean the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society. The term also includes cultural impacts involving changes to the norms, values, and beliefs that guide and rationalize their cognition of themselves and their society.”

Source: Interorganizational Committee on Principles and Guidelines for Social Impact Assessment (2003).

SIA originated as a socio-economic component of environmental impact assessment (EIA), although it has since expanded and developed considerably, in developed and developing countries. SIAs can be carried out at different stages in project and policy development, from initial planning to implementation and post-implementation evaluation. In project-level assessment, typical applications include considering the likely impacts of new industrial activities, construction, land use or resource management practices. SIA often forms part of a broader social analysis or assessment (see Box 2), but has a distinct and more specific purpose.

Box 2 Social analysis and social risk

Social analysis

Social assessment and analysis are widely used in economic development and poverty alleviation initiatives to assess if a project or programme is likely to meet its social objectives and to recommend measures that will ensure these objectives are met. This is done by examining social opportunities, constraints and likely impacts; assessing the role of beneficiaries in project design and implementation; and helping the implementer or donor to identify and monitor expected social development outcomes and social risks.

Applications can be at different levels, using different instruments. They might include:

- Macro-social analysis of the socio-cultural, institutional, historical and political context, carried out as inputs into country-level strategies and programming or to support policy formulation and sector strategies.
- Sociological appraisal of the opportunities, constraints and likely impacts, carried out as a part of project appraisal.
- Social assessment, where the views of stakeholders are obtained in order to improve project design and establish participatory processes for implementation and monitoring.

All of these would normally be undertaken at an early stage in project or programme development, although further appraisals or assessments can be carried out at any time if required. The assessment methods used are diverse, ranging from large-scale formal studies to participatory research. Selection of tools and methods depends on context and resources, but normally involves collection of quantitative and qualitative data.

Social risk

Recent recognition of vulnerability as a key factor in poverty has led a number of agencies, including the World Bank and the Asian Development Bank (ADB), to look more closely at social risk and protection as part of the social analysis process. Social risk analysis looks at what might go wrong for the project, the implementing agency/lender and vulnerable groups. The social risks that might be analysed can be categorised in different ways (see, for example, the World Bank and ADB categorisations below) but should include hazards and disasters.

Categorisations of social risk

World Bank	Asian Development Bank
<i>Vulnerability:</i> increased exposure or susceptibility, especially of the vulnerable and poor, to endemic risks or external shocks (the analysis should explore how to manage such risks)	<i>Life cycle:</i> risks to the individual, such as illness, injury, disability, old age
<i>Country risks:</i> conflict and violence, political instability, ethnic and religious tension. These are beyond the control of project managers but must be considered during a project appraisal	<i>Social risks:</i> crime, violence, civil strife, war, lack of rights
<i>Political economy risks:</i> those that might affect the project's intended beneficiaries as an indirect result of the project (e.g., capture of benefits, opposition to or distortion of the project by influential stakeholders and elites)	<i>Economic risks:</i> unemployment and other labour market risks, economic transition and restructuring, harvest failure
<i>Institutional risks:</i> including poor governance, limited technical and administrative capacity, and design complexity	<i>Environmental risks:</i> including natural catastrophes and disasters
<i>Exogenous risks:</i> e.g., terms of trade, regional conflict, effects of climate	<i>Development-induced risks:</i> involuntary displacement, loss of common property, loss of support networks, homelessness, marginalisation

Whatever the framework used, social risk analysis will need to examine hazard-related vulnerability, to which a variety of tools and methods can be applied (see **Guidance Note 9**). In practice, it tends to be a broad-brush and relatively rapid assessment best suited to programme- or country-level initiatives where relevant data sets are more likely to be available.

In all cases, the analysis must lead to a corresponding risk management strategy in the project plan. The World Bank, for example, recommends a conventional probability-impact matrix to identify risks that justify modifications to the plan, followed by further planning using tools such as scenario analysis to raise the risk threshold of the target population.

Sources: ADB (2001); Lohani, B. et al. *Environmental Impact Assessment for Developing Countries in Asia. Volume 1 – Overview*. Manila: Asian Development Bank, 1997. Available at: http://www.adb.org/Documents/Books/Environment_Impact; World Bank (2003); World Bank. *A User's Guide to Poverty and Social Impact Analysis*. Washington, DC: World Bank, Poverty Reduction Group and Social Development Department, 2003. Available at: <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTPOVERTY/EXTPSIA/0,,contentMDK:20454976~menuPK:1107972~pagePK:148956~piPK:216618~theSitePK:490130,00.html>

To predict the probable impact of a particular development or policy change on a given community, SIA draws on the past behaviour of other individuals and communities affected by similar developments. It is therefore rooted in comparative analysis.

SIA is not a single method but a collection of tools and approaches. A wide range of social science methods can be used in carrying out SIA and a variety of data-gathering techniques is employed, depending on purpose and context. Most of the evidence is primary data from the affected area (e.g., survey research, informant interviews, oral histories, participatory group exercises). Other, secondary, sources that can be used include census data, geographical data (including maps), national and local government statistics, documentation from non-governmental organisations (NGOs) and community-based organisations, local histories, newspaper reports and, where available, previous social science research. A good SIA should provide qualitative and quantitative indicators of social impacts that can be understood by decision-makers and citizens alike.

2. SIA as a tool for assessing hazard and disaster risk

As a conceptual model, SIA is equipped to take hazard and related disaster risk into account, whether these are external factors affecting a project or conditions created or magnified by the project itself.

In general, SIA can be understood as a framework for evaluation of all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and environmental surroundings.

By providing an understanding of the community and its social processes, SIA makes it possible to:

- identify the direct and indirect social consequences of risks (i.e., the social impacts which could arise from a hazard event); and
- develop appropriate and effective mitigation mechanisms to hazards which harness community resources and recognise community reactions to events.

SIA theory accepts that social, economic and biophysical impacts are interconnected and that change in any one of these domains will lead to changes in the others. Seen in this way, SIA has clear linkages to EIA (see **Guidance Note 7**) and other forms of ex-ante impact assessment, as well as with vulnerability and sustainable livelihoods analysis (see **Guidance Notes 9 and 10**). Guidance on SIA makes it clear that good practice in project design and implementation is risk-averse.

However, while hazards and risk are important features of the SIA process, SIA is not specifically a risk assessment but a means of understanding and measuring human responses to situations that may be risky or threatening. Therefore, SIA is not commonly used *by itself* as a method of analysing hazard risks generated by a project or external to it. It is more common for a formal risk analysis or a health impact assessment (see Box 3) to be undertaken, either to complement the SIA or within a broader EIA of which the SIA is part.

Box 3 Health impact assessment

Health impact assessment (HIA) is a multidisciplinary process, viewing a range of evidence within a structured framework through a variety of procedures and methods. Ideally, it should be integrated with EIA and SIA early in the planning cycle. It can be applied to both occupational health risk (within the project) and community health impact (in the project area or other areas that might be affected by it).

Health is understood in broad terms, encompassing social, economic, cultural and psychological well-being and the ability to adapt to the stresses of daily life. HIA therefore considers the underlying determinants of health (e.g., employment and working conditions, physical environments, health services, education and coping skills), using checklists of these as indicators of changes in health risks. Guidance recommends investigating a wide range of health factors related to project interventions: hazardous agents, environmental factors, exposure and effects on physical health, health-care services and social well-being. Health inequality is a central issue and identification of the most vulnerable groups is very important.

Individual HIAs vary greatly in their scope and approach, from formal quantitative surveys using health data to small-scale participatory exercises. Compared to some other project appraisal methodologies, HIA is relatively recent and its potential as a tool for assessing disaster risk or vulnerability has not been fully explored.

Sources: N&YPO. *An Overview of Health Impact Assessment*. Northern & Yorkshire Public Health Observatory, 2001; Health Canada. *Canadian Handbook on Health Impact Assessment*. Ottawa, Canada: Ministry of Health, 1999. Available at: www.hiagateway.org.uk/media/hiadocs/15_canadian_handbook_partone.pdf; Steinemann, A. 'Rethinking human health impact assessment', *Environmental Impact Assessment Review*, 2000, 20: 627–645; Taylor, L., Gowman, N. and Quigley, R. *Influencing the decision-making process through health impact assessment*. London: Health Development Agency, 2003. Available at: http://www.hiagateway.org.uk/media/hiadocs/Decision_Making_HIA.pdf; Taylor, L., Gowman, N. and Quigley, R. *Addressing inequalities through health impact assessment*. London: Health Development Agency, 2003. Available at: http://www.hiagateway.org.uk/media/hiadocs/Addressing_Inequalities_HIA.pdf

Ideally, SIA, EIA and HIA are combined through an interdisciplinary approach (see Box 4). Where they are not, information on social and environmental impacts should be brought together into a coherent impact statement, which ensures that disaster risk is taken into account from both social and environmental perspectives (see Box 5).

Box 4 Integrated environmental and social impact assessment

The African Development Bank's Integrated Environmental and Social Impact Assessment (IESIA) guidelines are designed to highlight major issues and potential impacts that should be taken into account during the preparation and assessment phases of the Bank's projects. The guidelines cover nine development sub-sectors: irrigation, fisheries, forestry, livestock and rangeland management, crop production, water supply, roads and railways, hydropower, and dams and reservoirs. Six cross-cutting themes are considered: poverty, environment, population, gender, participation and health outcomes.

The integrated thematic framework enables planners to identify and respond to a range of hazards. For example, in the case of forestry projects, potential hazard impacts identified by the guidelines include:

- **Environmental:** degradation of air quality (by dust and vehicle emissions during construction and in transporting timber; by fire during site preparation), contamination of water supplies (by hazardous materials and spills), watercourse and water-flow obstruction (and associated flood risk), soil erosion and contamination, landslides (resulting from soil instability caused by road cuts on slopes).
- **Population (natural resources and land management):** increased risk of fire in arid areas, risk of forest fires due to presence of workers and machinery.
- **Health outcomes:** communicable diseases, pesticide poisoning, decrease in wild food sources leading to food insecurity and malnutrition, injuries during construction, psychosocial disorders associated with rapid resettlement and social change.

The guidelines also take external factors and project-related hazards into account. In the case of forestry, these include the following external hazards: fire, insect epidemics and tree diseases, and wider social instability. Hazards associated with the project itself might include: pesticides misuse, fire, work accidents and increased exposure to animal disease reservoirs.

Source: AfDB. *Integrated Environmental and Social Impact Assessment Guidelines*. Tunis: African Development Bank, 2003. Available at: http://www.afdb.org/pls/portal.docs/PAGE/ADB_ADMIN_PG/DOCUMENTS/ENVIRONMENTALANDSOCIALASSESSMENTS/IESIA.PDF

Box 5 Linking EIA, hazards and SIA

The Nam Theun 2 hydroelectric project in Laos, due to be completed in 2009, will create a reservoir with a surface area of 450 square kilometres and generate more than 1,000 megawatts of electricity. The Asian Development Bank has been one of the international development agencies supporting project design. In 2004 a series of reports on the project's environmental and social impacts were prepared to meet ADB's EIA requirements.

The EIA components of the study looked at the project's impacts on the physical environment (changes in hydrology including flood risk, water quality, erosion and sedimentation, climate and groundwater), biological environment (aquatic and terrestrial habitats, species diversity, protected areas and endangered species) and impacts associated with resettlement sites (natural habitats, soil erosion and degradation, over-exploitation of wildlife and aquatic resources, water quality, waste management, risk of landslides, flooding and waterlogging, and increased population from new economic opportunities).

The starting point for the SIA elements of the study was an investigation of the social characteristics of the project area: the size and location of populations, ethnicity, livelihoods and income, infrastructure, education and public health, and cultural sites. However, the focus of the SIA was on the consequences of resettlement, since the most significant social impacts arose from this.

The SIA addressed a wide range of social impacts, some of which were related, directly or indirectly, to the environmental issues identified in the EIA studies. It covered relocation, loss of lands and livelihoods, social stress arising from displacement and resettlement, access to natural resources and competition for these (including potential for conflict), price increases, marginalisation of ethnic groups, capacity of local authorities, changes in water quality and flow that might lead to an increase or decrease in water-borne diseases, health impacts (including sexually transmitted and other communicable diseases, drug use and alcoholism, poor sanitation, human trafficking), access to schools, markets and health facilities, irrigation potential and nutrition. In one location, flooding and riverbank erosion were identified as potential problems with socio-economic consequences. The risk to people from movement of wild elephants through areas marked for resettlement was also noted by one of the studies.

The SIA also considered possible livelihood disruption and health and safety impacts from the construction process. In the case of health and safety, these included traffic accidents, contamination of drinking water, sexually transmitted and communicable diseases, food availability in markets and trafficking.

Specific mitigation strategies were developed in each of these areas, for both the construction and operational phases of the project. Information on the project's cumulative environmental and social impacts, together with economic projections, was combined with information on other predicted developments to generate impact scenarios over 5- and 20-year planning periods.

Source: ADB. *Summary Environmental and Social Impact Assessment: Nam Theun 2 Hydroelectric Project in the Lao People's Democratic Republic*. Manila: Asian Development Bank, 2004. Available at: <http://www.adb.org/Documents/Environment/LAO/lao-nam-theun2.pdf>

Manuals and guidelines emphasise the importance of examining social equity or distribution of impacts across different groups. Assessments are expected to devote particular attention to impacts on vulnerable social groups. Here it would be also useful to recognise the linkages between socio-economic vulnerability and environmental hazards (see **Guidance Note 9**).

SIA is typically applied to the consequences of planned interventions. The techniques might also be used to consider the social impacts of other types of event such as disasters, climate change, demographic change and epidemics.

3. Integrating hazard and disaster risk into the SIA process

A conventional SIA process comprises the following ten steps,¹ which are set out below with comments about how hazards and related disaster risks can be incorporated into the process.

Step 1. Develop public involvement programme

The first step is to develop an effective plan to involve the public. This requires identifying and working with all potentially affected groups. It should explicitly include those who might be exposed to greater (or lesser) hazard risk as a result of the project. Stakeholder engagement is vital to SIA and should take place throughout the assessment. This should involve genuine participation in the process, not merely consultation.

Step 2. Describe proposed action and alternatives

The proposed action or policy change (and alternative approaches, if appropriate) is described in enough detail to begin to identify the data requirements for an SIA and design the framework for assessment. Potentially key types of social impact, including those related to disasters, should be identified and plans made to obtain relevant data (see Section 4 for further discussion). This step is equivalent to the screening stage in an EIA (see **Guidance Note 7**).

Step 3. Describe relevant human environment and zones of influence

Relevant data on the geographical and human environments related to the project are collected and reviewed through a baseline study or community profile. This study could cover relationships between people and their biophysical environment (e.g., ecological setting, aspects of the environment seen as resources or problems, patterns of resource use) and culture, attitudes and social–psychological conditions (e.g., risk perception, psychological coping). Hazards and vulnerability should be factored into the baseline analysis.

Step 4. Identify probable impacts (scoping)

This stage seeks to identify the full range of possible social impacts (including those perceived by affected groups). Early, comprehensive and systematic screening can identify potential hazards and associated risks that might affect the project and communities at any stage in the project cycle, as well as the impact the project itself might have on disaster risk. It is important that the views of all affected people, including those vulnerable to hazards, are taken into account.

Step 5. Investigate probable impacts

Investigation of the social impacts identified during scoping is the most important component of the SIA. A range of methods, including modelling and scenarios, can be deployed to investigate probable future impacts. Hazardous events (as external factors or consequences of the project) and their risk or uncertainty should be included in trend and scenario analysis. As part of the latter, scenarios should be developed of the social consequences of exposure to the hazards identified (e.g., using fault- or event-tree procedures).² Records of previous experiences (including disaster events) provide valuable data for this process.

Step 6. Determine probable response

The responses of all affected groups to the impacts are assessed, in terms of attitude and actions. This should include responses to changes in social vulnerability as a consequence of the project and to a disaster event with an impact on the project. Differential vulnerability between social groups should be recognised.

Step 7. Estimate secondary and cumulative impacts

Secondary (indirect) and cumulative project impacts are assessed, although it is almost impossible to identify all dimensions of social impacts because of the way in which one change leads to others. Future patterns of vulnerability, both as long-term results of the project and due to other factors (e.g., climate change), should be considered in this stage.

Step 8. Recommend changes or alternatives

The consequences of changes to the plan or alternative interventions are assessed as in step 5 (though usually on a more modest scale) and the same key issues should be considered.

¹ Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (2003). The ten steps are logically sequential but may often overlap in practice.

² Fault-tree procedures begin with an event and use reverse analysis to determine the events and factors that might lead to it. Event-tree procedures work forwards from an event, problem or failure to determine if a major event could result.

Step 9. Mitigation, remediation and enhancement plan

A plan is developed for mitigating adverse impacts, by not taking or modifying an action, minimising its impacts through design and operational changes, or compensating for its impact by providing alternative facilities, resources or opportunities. This might include risk mitigation strategies. Impact avoidance should be the first priority, impact reduction or minimisation undertaken if avoidance is not possible, and offsetting or compensation for adverse impact used only when no other options are available.

Step 10. Develop and implement monitoring programme

A monitoring programme is developed to track project or programme development and compare actual impacts with projected ones.

4. Assessing hazard-related impacts and risks

Social impact variables

Environmental hazards and related risks can be considered explicitly within the framework of ‘social impact variables’ to be assessed during the SIA. Table 1 is based on a commonly used conceptual framework which divides social impacts into *general* categories (there are many specific variables within these categories). Alongside this are indications of where some key hazard and risk issues can be located within the categorisation.

Note that all categorisations of social impact variables can be questioned in terms of their conceptualisation and completeness. Several alternative frameworks are available.³ Assessors should never take a framework off the shelf to be used as a checklist, but should draw on what is available to develop their own indicator frameworks for each occasion. They need to be open-minded in doing this, because social impacts and their significance are situation-specific. Local stakeholder involvement in this task is essential.

Table 1 Linking hazards and disaster risk to key social impact variables

<i>Category of social impact</i>	<i>Relevant hazard/disaster issues</i>
<i>Population change:</i> changes in number, density, distribution and composition	How such changes affect different groups’ exposure and vulnerability to hazards
<i>Community and institutional structures:</i> including size, structure and level of organisation of local government and changes in attitudes, values, local government and employment	Capacities of such structures to manage hazard and disaster risks in the project area or associated with the project development; impact of hazards on employment opportunities and equity, and hence on livelihood resilience
<i>Political and social resources:</i> distribution of power and alterations in power, interested and affected parties, leadership capacity	Impact of such factors on capacity of community and institutional structures (above) and in magnifying or reducing vulnerability of marginalised groups
<i>Community and family changes:</i> factors that influence daily life including attitudes, values, perceptions, social relationships and networks ⁴	Social capital and other capacities to manage risk; perceptions of risk, health and safety
<i>Community resources:</i> patterns of land use, community services, tax base	Natural resource and land use; availability and quality of relevant services and facilities (e.g., health, police, fire, sanitation)
<i>Social justice:</i> equity, human rights, participation	Social justice issues as factors in vulnerability

Sources: Interorganizational Committee on Guidelines and Principles for Social Impact Assessment (2003); Burdge, R.J. ‘The practice of social impact assessment – background’, *Impact Assessment and Project Appraisal*, 2003, 21(2): 84–8.

³ See, for example, Vanclay, F., ‘Conceptualising social impacts’, *Environmental Impact Assessment Review*, 2002, 22: 183–211.

⁴ This category is also said to include disruption to daily living and movement during project implementation. Here, relevant hazard-related issues include pollution, increased risk of traffic accidents, obstruction of transport routes (and hence of evacuation routes), and damage to water supplies or irrigation systems.

The key issues are likely to change during the lifetime of the project and the SIA should identify this. For example, local perceptions of risk and safety may be prominent issues during the planning phase, hazard exposure resulting from relocation of communities (or arrival of new groups such as migrant workers) during the construction or implementation phase, and changes in vulnerability resulting from loss of social capital or shifts in local power structures once the project has been completed and its impact is being felt.

Direct and indirect impacts

Consideration should be given to indirect, long-term or cumulative impacts involving interactions between communities and the environment. For example, movement or growth of local populations may lead in the short term to reduced livelihood opportunities and as a result of this, over a longer period of time, to excessive pressure on natural resources or unsustainable environmental management practices, which in their turn may result in environmental degradation and associated hazard risk. (Increases in population size and density are by themselves likely to increase the risk from existing hazards unless existing protective measures and emergency services are reinforced.) A secondary impact of mitigation measures may be changes in the relationships between social groups. For example, construction of a dam or reservoir to control downstream flooding might lead to tensions between different water users such as farmers, recreational users such as fishermen or water-sports enthusiasts and those who make their living transporting goods and people by water.

However, widening the scope of the assessment in such ways does have practical implications in terms of capacity, resources and data access. The more immediate and direct impacts are likely to be easier to identify and assess. Moreover, the SIA should focus on the most important social impacts. SIA teams should also be clear from the start about the areas and communities under investigation.

Box 6 Assessing natural hazards' impact on communities and projects

A large-scale oil and gas drilling and production project on the Arabian Peninsula required extensive assessment of environmental/ecological aspects and their consequences for communities. This assessment was done through integrated EIA, SIA and HIA (community health) studies.

Key issues relating to project impact included: loss and degradation of traditional grazing grounds (most of the local population were nomadic pastoralists), impact on groundwater resources (the project was highly water intensive and could adversely affect other users; it would also dispose of considerable quantities of produced water with implications for hydrogeology and groundwater quality), consumption of raw materials and construction of infrastructure.

Many of the anticipated social impacts of these conditions were similar to those experienced by other kinds of industrial development. For example, the potential for construction work to cause disruption to infrastructure and natural resources, damage to household and community assets such as land, houses, livestock shelters and roads, and issues of community safety arising from the large number of contractors, the scale of road movements and community inexperience of such large-scale developments.

The assessment also considered potential impacts (or lack thereof) in relation to natural environmental factors that affected the project area at the time – in particular a long-running drought in the area. Among the assessment tools used were stakeholder consultation (formal and informal interviews, focus groups and community meetings) and land use modelling through time (related to rainfall and its relation to ephemeral grass densities). It was found that the drought was likely to cause significant differences in social baseline conditions over time because the project site and its surroundings were in a prime grazing area to which many herders would move only after significant rainfall and consequent growth of energy-rich ephemeral grasses. Migratory communities could be directly and indirectly affected by the development as it progressed, but the numbers affected at any one time would be influenced by unpredictable rainfall patterns: this would make contingency resettlement plans necessary.

Methodological lessons learned from this experience were: the value of looking at baseline changes through time (especially cyclical variations) and the critical nature of the stakeholder engagement process in explaining local livelihood strategies.

Source: information supplied by Charles Martin Borkowski, environmental and social management consultant.

Risk perception

SIA explicitly acknowledges the importance of the social construction of reality and hence the value of investigating people's perception of risks as part of an assessment. Here risk is not seen as an objective fact but as a subjective experience felt by everyone and felt differently by different people. People's attitudes towards risk and behavioural responses to it are important indicators of their likely reaction to a project and in some situations will make it necessary to modify project design (see Box 7).

Box 7 Capturing flood risk perceptions through SIA

SIA formed part of an environmental assessment carried out in 1998 to select options for overcoming siltation of waterways and consequent waterlogging in the Khulna-Jessore region of south-west Bangladesh. The aims of the assessment were to evaluate the environmental and social consequences of four water management options and recommend one that would ensure an environmentally sustainable and socially viable solution to the drainage problem.

The SIA involved rapid rural appraisal and related participatory methods in 60 locations, and made extensive use of local perceptions of likely socio-economic changes – positive and negative – resulting from the different project options. These included the potential damage to property and crops from flooding, and health impacts (especially water-borne diseases). The assessment recommended an option that would solve water congestion problems and provide potential for improvements in social and economic well-being. The government of Bangladesh and the Asian Development Bank, which was funding the project, accepted this recommendation.

Source: Momtaz, S. 'The practice of social impact assessment in a developing country: the case of environmental and social impact assessment of Khulna-Jessore Drainage Rehabilitation Project in Bangladesh', *Impact Assessment and Project Appraisal*, 2003, 21(2): 125–32.

5. Critical factors for success

The following factors may be important in making sure that social impacts associated with natural hazards are addressed through the SIA process:

- SIA should be linked to the rest of the appraisal process, especially to EIA and associated risk assessments, and the results of these different assessments related to each other in a comprehensive and coherent analysis of project impacts.
- Whilst a holistic view is essential, hazard and related risk issues should be kept in proportion, both with regard to their intrinsic significance and in relation to other social impacts (see Box 8).
- Impact assessment must feed back into project design, leading where necessary to development of avoidance or mitigation strategies.
- Communities' perceptions are important indicators of hazards and associated risks, and of their likely responses to project interventions.
- Affected communities should be fully involved in the assessment, not just as providers of information (i.e., public consultation), where their extensive knowledge of local hazards and risk management strategies will be valuable, but in negotiations with other stakeholders about avoidance or mitigation options.
- Positive benefits of projects in terms of reducing risk should be acknowledged.
- Findings should be communicated to decision-makers and acted upon by them – SIA is a tool to help make decisions.

Box 8 Assessing the significance of natural hazards in SIA

An SIA carried out in 2002 as part of a major gas pipeline project in China sought the views of more than 10,000 people in communities in areas to be affected by the project. In the survey, the communities identified drought and sandstorms as the most severe environmental problems facing them. These were unlikely to have a significant impact on the project or to be affected by it. Therefore the SIA did not propose any natural hazard mitigation options other than protecting some sections of the pipeline on uncultivated land from wind and water erosion. But in response to community concerns regarding threats to local infrastructure during construction, the SIA advocated putting systems in place to repair any damage to irrigation systems, paddy dykes and local roads.

Source: UNDP. *Social Impact Assessment Survey of the China West–East Gas Pipeline Project*. Beijing: United Nations Development Programme China Country Office, 2002. Available at: <http://www.undp.org.cn/downloads/otherlocal/sia-pipeline-en.pdf>

Box 9 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.⁵

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

⁵ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Further reading

Social impact assessment

Basic approach and principles

Interorganizational Committee on Guidelines and Principles for Social Impact Assessment. 'Principles and guidelines for social impact assessment in the USA', *Impact Assessment and Project Appraisal*, 2003, 21(3): 231–250.

UNEP. *Environmental Impact Assessment Training Resource Manual*. Topic 13 'Social Impact Assessment'. Geneva: United Nations Environment Programme, 2002. 2nd edition. Available at: http://www.unep.ch/etu/publications/EIAMan_2edition_toc.htm

Vanclay, F. 'Social Impact Assessment: International Principles', *Impact Assessment and Project Appraisal*, 2003, 21(1): 5–11.

International Association for Impact Assessment website: <http://www.iaia.org>

Detailed methodological guidance and discussion

Becker, H.A. *Social impact assessment: method and experience in Europe, North America and the developing world*. London: UCL Press, 1997.

Becker, H.A. and Vanclay, F. (eds). *The International Handbook of Social Impact Assessment*. Cheltenham, UK: Edward Elgar, 2003.

Burdge, R.J. et al. *The Concepts, Process and Methods of Social Impact Assessment*. Middleton, USA: Social Ecology Press, 2004.

Burdge, R.J. *A Community Guide to Social Impact Assessment*. Middleton, USA: Social Ecology Press, 2004. 3rd edition.

Social analysis

ADB. *Handbook on Poverty and Social Analysis*. Manila: Asian Development Bank, 2001. Available at: http://www.adb.org/Documents/Handbooks/Poverty_Social

World Bank. *Social Analysis Sourcebook: Incorporating Social Dimensions into Bank-Supported Projects*. Washington, DC: World Bank, Social Development Department, 2003. Available at: <http://www.worldbank.org/socialanalysisourcebook>

Health impact assessment

Health Impact Assessment Gateway: <http://www.hiagateway.org.uk/>

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Construction Design, Building Standards and Site Selection

Guidance Note 12

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note focuses on construction design, building standards and site selection, and their role in the mitigation of risk due to natural hazards. The note provides general guidance for design professionals and funding organisations involved in development projects concerning the construction of new infrastructure, strengthening intervention on existing infrastructure and post-disaster reconstruction. It provides guidance for analysing the potential threat posed by poor construction and inappropriate land use in hazard-prone areas. Only formal constructions (mainly buildings) are considered and some guidance is given on designing structural intervention (construction or strengthening) plans to help mitigate risk from natural hazards to vulnerable people, their livelihoods and the local economy. No specific technical solutions for the latter are proposed as each location and hazard requires a solution tailored to local needs and resources. However, references for further reading on technical issues are provided. Hazard risk mitigation infrastructure is not covered by this guidance note.

1. Introduction

A significant part of development assistance is spent on the construction of infrastructure in developing countries. However, these investments and associated development gains can be lost in seconds in the event of a natural hazard event (see Box 1). The majority of human and direct economic losses from a natural hazard event occur as a direct result of damage to the built environment and/or ineffective early warning and evacuation systems. The negative impact of natural hazards on communities can be limited by taking such hazards into consideration when selecting sites, designing new infrastructure and strengthening existing infrastructure.

The exclusion of hazard mitigation measures in development projects is unacceptable in view of the increasing disaster risk in developing countries caused by environmental degradation (see **Guidance Note 7**) and growing urbanisation, with the accompanying rapid increase of poorly built housing, uncontrolled use of land, overstretched services and high population densities. Consequently, development organisations should be accountable for the hazard-proofing measures they include in their construction projects, and for the losses resulting from their non-inclusion. This applies to projects where a hands-on approach is adopted or where the work is carried out by others.

Box 1

Consequences of ignoring hazards in construction

The following examples show how the lack of hazard measures or reliance on local best practice only can lead to large human and economic losses and set back development goals in the event of a natural disaster:

- In the years preceding the May 2000 floods, the World Bank financed the construction of 487 schools in Mozambique according to local building practice. However, during the floods 500 primary schools and seven secondary schools were damaged or destroyed,¹ severely setting back development goals.

¹ World Bank. *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. Washington, DC: World Bank, Independent Evaluation Group, 2006. Available at: <http://www.worldbank.org/ieg/naturaldisasters/>

- The Caribbean Development Bank, the United States Agency for International Development (USAID) and the government of Dominica funded the construction of a deep-seawater port in Woodbridge Bay, Dominica. The Delft Hydraulics Laboratory (Netherlands) carried out a specialised study of the hazards at the port and submitted a report. The contractors who designed the port ignored the maximum wave height indicated in the report and built the port to withstand waves of less than half that height. In 1979, one year after the completion of the project, port structures and facilities were severely damaged by Hurricane David. Repair costs amounted to US\$ 3.9 million (estimated for 1982), 41 per cent of the port's construction costs. The Caribbean Disaster Mitigation Project (CDMP) determined that strengthening the port structures at the design stage would have cost only 10 per cent of the construction costs.²
- The 2001 Bhuj earthquake in India led to widespread damage, including the collapse of 461,593 rural houses of rubble masonry construction. Good seismic codes of practice exist in India, but their non-enforcement, combined with poor inspection procedures, led to the failure and heavy damage of 179 high-rise reinforced concrete buildings in Ahmedabad, 230 kilometres away from the epicentre. Damage to port operations and industry resulted in approximately US\$ 5 billion of direct and indirect losses.³
- Hurricane Mitch, which hit Honduras in 1998, resulted in a loss equivalent to 41 per cent of the country's gross domestic product (GDP).⁴ Hurricane Luis in 1995 caused losses to Antigua and Barbuda equivalent to 65 per cent of their GDP.⁵
- In January and February 2001, two major earthquakes devastated El Salvador. More than 165,000 homes were destroyed and 110,000 damaged. In the most affected areas, up to 85 per cent of the houses were destroyed. The degree of destruction can be attributed to two main factors: the building material used and the quality of construction and maintenance.⁶

2. Current state of the art

In past development initiatives involving the construction of infrastructure, the option of designing and building to reduce the vulnerability of infrastructure to natural hazards has often been ignored due to the perceived higher costs and lack of appropriate expertise. Furthermore, the selection of the location for services or critical facilities has often been made on the basis of land cost and availability, rather than from consideration of safety from potential natural hazards. Typically, development organisations rely on 'best local practices' in hiring contractors to undertake construction work. Problems arise when best local practice does not incorporate the use of any building codes for hazard resistance or uses building codes that inadequately account for local hazards. The latter type of code typically exists in countries where infrequent natural hazards occur or where there is an incomplete historical record of past natural disasters. This results in hazard or zoning maps that do not adequately represent the frequency of occurrence or potential magnitude of natural hazards (see **Guidance Note 2**). Even when appropriate building codes exist, their correct application requires skilled engineers, architects and builders and effective enforcement and inspection procedures. Poor governance and corruption, leading to, for example, abuse of land use controls and building permits and codes, and illegal expansion of buildings, often exacerbate damage caused by disasters. In addition, most developing countries lack certification and licensing processes for professionals and enforcement procedures are non-existent. Enforcement procedures have, however, also been found to be ineffective in some developed countries, as was highlighted by Hurricane Andrew (1992) in Florida, USA, and the Izmit earthquake (1999) in Turkey.

The adoption of best local practice and of opportunity-based land use can, therefore, lead to a promotion of existing weaknesses in buildings and infrastructure. Funding and development organisations alike need to ensure that experienced hazard specialists and engineers coordinate or implement construction projects (by either employing them directly or ensuring that the contracted work will be led by such people). This specialist (or team of experts, depending on the number of hazards and scale of the project) should set a framework for the design and construction, which may then be executed by other engineers, builders and workers.

2 CDMP. *Costs and benefits of hazard mitigation for building and infrastructure development: A case study in small island developing states*. Caribbean Disaster Mitigation Project publication series. Washington, DC: Organization of American States, 2004. Available at: <http://www.oas.org/CDMP/document/papers/tiems.htm>

3 MAE. *The Bhuj Earthquake of 2001*. CD Release 01-04. Mid-America Earthquake Center Reconnaissance Report, 2001.

4 Gunne-Jones, A. *Land-use planning: How effective is it in reducing vulnerability to natural hazards?* Institute of Civil Defence and Disasters Studies, 2006. Available at: <http://www.icdds.org/>

5 Gibbs, T. *How can the resilience of infrastructure be increased?* Proceedings of the 682nd Wilton Park Conference, Wiston House, West Sussex, England, 9–11 September 2002.

6 Dowling, D.M. 'Adobe housing in El Salvador: Earthquake performance and seismic improvement'. In Rose, W.I. et al. (eds), *GSA Special Paper 375: Natural Hazards in El Salvador*. Geological Society of America, 2004, pp 281–301.

Contrary to common perception, the implementation of hazard-proof measures in building can be relatively inexpensive in terms of construction costs. What can be expensive is the provision of an effective framework for the take-up of these measures (e.g., the provision of skills training, appropriate hazard studies, research into low-cost strengthening solutions). However, if an effective mechanism exists for the enforcement of quality control and codes of practice, these costs will all be covered by the construction industry. The problem in many cases is the lack of legal mandating of building codes and consequent lack of their enforcement, which puts the onus on agencies commissioning and funding development projects also to provide the necessary research and development, training and education. However, CDMP⁷ found that the development and enforcement of appropriate building codes and standards do not make development costs prohibitive. An investment in disaster mitigation can result in a manifold saving in disaster relief and development setbacks (see Box 2). Where development agencies have invested in the promotion of hazard-resistant construction, many of the projects have been well thought out and have shown large benefit (see Box 3).

Box 2 What is the cost?

The implementation of hazard-proof measures in building can be relatively inexpensive and provide long-term benefit to development projects:

- The implementation of simple modifications to improve the cyclone-resistance of (non-masonry) *kutcha* or temporary houses in Bangladesh is only 5 per cent of the construction costs.⁸
- Introducing earthquake-resistance principles (optimum layout, use of capacity design principles and more stringent criteria for the design of connections) in the design stage of modern infrastructure will increase the construction costs by 5 to 14 per cent.
- The retrofit for hurricane resistance of the Victoria Hospital (St Lucia) in 1993 and the Princess Margaret Hospital (Dominica) in 1980 was estimated by Consulting Engineers Partnership to be, respectively, 1 per cent and 2.2 per cent of their contemporary replacement costs.⁹

3. Merging hazard-risk considerations in construction projects

An integrated and comprehensive approach is necessary to improve the safety of buildings from natural hazards. This includes investing in strengthening existing structures and promoting safer building in development projects and post-disaster reconstruction projects. In hazard-prone countries, it is essential that both funding and development organisations ensure that engineers specialised in hazard-resistant construction be consulted in the initial stages of construction projects.

Box 3 Some observed successes

Ascertaining whether the use of safe building or strengthening techniques successfully provides adequate hazard resistance is not easy, as the constructions have not been subjected to the hazard they were designed for. Some exceptions do, however, exist:

- In 1977, following a cyclone that devastated coastal areas of Andhra Pradesh, India, a voluntary group, AWARE, built 1,500 houses in Krishna District. These houses followed the Central Building Research Institute's cyclone-proof designs, which consisted of concrete block (made of cement and granite rubble) walls with a reinforced concrete slab roof. Of these houses, 1,474 withstood the stronger cyclone that hit the region in 1990.¹⁰

⁷ CDMP (2001).

⁸ Lewis, J. and Chisholm, M.P. 'Cyclone-resistant Domestic Construction in Bangladesh'. In Hodgson, R.L.P., Seraj, S.M., and Choudhury, J.R. (eds), *Implementing hazard-resistant housing*. Proceedings of the First International Housing and Hazards Workshop to Explore Practical Building for Safety Solutions, Dhaka, Bangladesh, 3–5 December 1996.

⁹ Gibbs (2002); see footnote 5.

¹⁰ Sri, A.V.S. and Reddy, I.A.S. 'The cyclone-prone coastal region of the State of Andhra Pradesh, India – A state-government approach'. In Aysan, Y. et al., *Developing building for safety programmes: Guidelines for organizing safe building improvement programmes in disaster-prone areas*. London: Intermediate Technology Publications, 1995.

- In Peru, sheets of welded steel mesh covered in cement–sand mortar were applied to the walls of existing adobe houses during a prototype strengthening programme. When the Arequipa earthquake shook Peru in 2001, these houses survived undamaged, while nearby houses collapsed or were severely damaged.¹¹
- Only two schools were left standing in Grenada after the passage of Hurricane Ivan (September 2004). Both had been subject to retrofit through a World Bank initiative. One of the schools was used to house displaced persons after the event.¹²
- After the passage of Typhoon Sisang in the Philippines in 1987, the Department of Social Welfare and Development, in consultation with the Asian Disaster Preparedness Center (ADPC), constructed 450 housing units. They were designed with a core shelter consisting of concrete footings with steel post straps bolted onto four wooden corner posts and frames, roof frames and trusses. Indigenous materials were used for all roof and wall cladding. The houses resisted two subsequent typhoons without significant damage.¹³
- Between 27 August and 18 September 1995, Hurricanes Luis and Marilyn caused damage to 876 housing units in Dominica causing a total loss of US\$ 4.2 million. The small wooden houses that were destroyed did not comply with local building codes. But all the buildings that had been retrofitted, which consisted of simple modifications to local construction, through the CDMP Safer Construction Programme successfully withstood the hurricanes.¹⁴
- On 29 May 1990, an earthquake of magnitude 5.8 struck the Alto-Mayo in north-eastern Peru. The poor standard of construction (mainly houses made of *tapial* or rammed earth) resulted in the loss of over 3,000 houses; 65 people were killed and 607 injured. Tecnologia Intermedia (IT Peru)¹⁵ introduced an improved *quincha* house, which slightly modified traditional technology in order to reduce vulnerability to future earthquakes. When a second earthquake of magnitude 6.2 hit the region in April 1991, 70 *quincha* houses had been built and local people could see for themselves that they were more hazard resistant. A further 1,120 *quinchas* were built with aid from IT Peru over the next five years and later, local people built another 4,000 similar houses.

In order to set the design criteria for a risk reduction project, the hazards, the current risk and level of risk that is socially acceptable must be identified. A multi-hazard appraisal should be carried out at an early stage to identify the types of hazards, their likely severity and recurrence (see **Guidance Notes 2 and 7**). An evaluation of the current risk includes identifying locations most likely to become unsafe in the event of a natural hazard (e.g., areas prone to flooding, landslides or earthquake-induced liquefaction) and assessing their land use, as well as assessing the ability of local construction to resist the identified hazards. A survey of existing buildings and infrastructure can identify significant vulnerabilities prior to the occurrence of a hazardous event. In a post-disaster scenario, lessons can be learned from the behaviour of different construction types during the event. Post-disaster diagnostic surveys should be integrated into disaster reconstruction programmes. In order to determine the socially acceptable risk,¹⁶ local and national building codes,¹⁷ international legislation and good practice should be examined to obtain an idea of current accepted levels of risk for different hazards and infrastructure. For example, in the case of most earthquake engineering codes, structures of normal importance are designed to withstand an earthquake with a 10 per cent probability of being exceeded in 50 years (i.e., an event with a return period of 475 years). The local government and community should then be consulted and a level of risk determined for the design. It is important to note that the level of socially acceptable risk will vary according to the use and importance of the facility and the desired post-natural hazard event performance. Finally if, for the identified hazards, the level of current risk is greater than that which is socially acceptable, then the need for hazard-proofing (and/or re-siting) is established, and the socially acceptable risk and identified hazards become the design criteria for the new construction or strengthening works.

11 Blondet, Garcia and Brzev (2003).

12 World Bank. *Grenada, Hurricane Ivan: Preliminary Assessment of Damages, September 17, 2004*. Washington, DC: World Bank, 2004. Available at: http://siteresources.worldbank.org/INTDISMGMT/Resources/grenada_assessment.pdf

13 Diacon, D. 'Typhoon resistant housing in the Philippines: The Core Shelter Project'. *Disasters*, 16 (3), 1992.

14 CDMP. *Toolkit: A Manual for Implementation of the Hurricane-resistant Home Improvement Program in the Caribbean*. Caribbean Disaster Mitigation Project publication series. Washington, DC: Organization of American States, 1999. Available at: <http://www.oas.org/cdmp/document/toolkit/toolkit.htm>

15 Based on Maskrey, A. 'The Alto-Mayo reconstruction plan, Peru – an NGO approach'. In Aysan et al. (1995) and in Ferradas, P., 'Post-disaster housing reconstruction for sustainable risk reduction in Peru', *Open House International*, 2006, 31(1).

16 Socially acceptable risk is the probability of failure (damage) of infrastructure that is acceptable to governments and the general population in view of the frequency and size of natural hazards, and the infrastructure use, importance and potential consequences of its damage. For example, it is unacceptable that a nuclear power station be damaged by any natural hazard event; the acceptable risk is, therefore, zero. In most cases constructing buildings and infrastructure that can fully resist the largest possible natural hazard is uneconomical (and often unjustified due to the rare nature of some natural hazards). Hence a limited risk is accepted.

17 Building codes are defined as standards and guidelines for the construction of buildings and infrastructure to a minimum level of safety for the occupants. See CDMP, *Hazard-resistant Construction*. Washington, DC: Organisation of American States and USAID's Unit of Sustainable Development and Environment, 2006. Available at: <http://www.oas.org/CDMP/safebldg.htm>

Box 4 Challenges, opportunities and good practice in post-disaster reconstruction

Post-disaster reconstruction projects present a real opportunity for the introduction of hazard-proof measures in construction and land use planning. Heightened hazard awareness and increased funding for construction can be harnessed to promote these measures and to achieve the legislative reforms required for regulating land use, hazard-resistant building code change, enforcement and construction quality control.

Development and humanitarian agencies should take a coordinated approach to reconstruction in a post-disaster scenario. Furthermore, local or national governing bodies must support major reconstruction initiatives. It is important that viable institutional frameworks and appropriate funding partnerships are established. Reconstruction should not be precipitate. Immediate needs can be addressed with temporary measures and a realistic timescale should be established which will allow hazard-proof design experts to be consulted and long-term goals to be considered in the reconstruction. Social needs, land availability and economic constraints mean that it is not always possible to secure land that is safe from all hazards in post-disaster reconstruction. However, it is still possible to reduce future losses from disasters through appropriate construction and planning measures.

It is important to note that resources made available immediately after a disaster for reconstruction will probably not be available for longer-term capacity building or to bring about a change in practice. One solution, contained in the United Kingdom's Department for International Development (DFID) Disaster Risk Reduction policy paper,¹⁸ is to set aside 10 per cent of disaster funds to reduce the impact of related future disasters.

Throughout the project design and implementation it is essential that local stakeholders are actively involved. Local stakeholders include the direct beneficiaries, the wider affected community, local authorities, government and local academic and building experts. This will aid in the development of a truly sustainable technical solution (for infrastructure strengthening or reconstruction) and will increase acceptance of the project. A sustainable and successful project goes beyond site selection, the choice of a sustainable solution and training of local builders, to also involve issues of land tenure, finance, education for risk awareness and future maintenance (see Box 5).

Box 5 Beyond building

Proposing safe building or repair and strengthening practices is not sufficient to ensure take-up by communities. Integrated, community-based approaches for safer building should be promoted by:

- raising hazard awareness through education;
- community participation in developing the project, in decision-making and in design selection;
- developing locally acceptable, affordable and sustainable technological improvements;
- developing effective ways of communicating technical messages to target groups;
- skills development training for local builders and craftspeople;
- improvement of general living conditions;
- training architects and engineers (in both public and private sectors), building officials and building by-law enforcement officers; and
- community-based disaster preparedness planning.¹⁹

Hospitals are critical facilities for post-disaster relief, and it is not only the loss of structural integrity that can compromise operation but also damage to hospital equipment and to surrounding infrastructure (e.g., loss of access, water supply and electricity). Full structural, contents and systems network risk analyses should be carried out. The Pan American Health Organization (PAHO)²⁰ provides a series of guidelines for such analyses. Apart from the enormous emotional impact of student deaths, damage to schools and the loss of teachers have a negative impact on the education of survivors. Schools can provide community shelter and organisational foci in the aftermath of a disaster and are essential for a return to normality after the event. This is being increasingly recognised in both engineering and development communities:

- The United Nations Educational, Scientific and Cultural Organization is launching a campaign called Disaster

¹⁸ DFID. *Reducing the risk of disasters – Helping to achieve sustainable poverty reduction in a vulnerable world: A DFID policy paper*. London: Department for International Development (UK), 2006. Available at: <http://www.dfid.gov.uk/pubs/files/disaster-risk-reduction-policy.pdf>

¹⁹ Aysan et al. (1995).

²⁰ For example, PAHO (2003 and 2004).

Reduction Begins in School which promotes disaster reduction education in schools and encourages the application of more stringent construction standards in schools.

- In October 2005, ActionAid, the Institute for Development Studies, Pamoja and the United Nations International Strategy for Disaster Reduction (UN/ISDR) started the Disaster Risk Reduction through Schools Project. The five-year project, which involves seven countries, aims to make schools safer and have them act as focal points for disaster prevention, preparedness and mitigation initiatives in the community.

Box 6 Schools and hospitals

Recent events have once again highlighted the vulnerability of schools and hospitals to natural hazards:

- Hurricane Ivan (category 3) hit Grenada on 7 September 2004, causing major losses to public infrastructure, in particular schools and hospitals. Only two of 75 primary and secondary schools survived with minimal damage, the largest hospital on the island, the Princess Alice Hospital, was more than 70 per cent damaged and St. Georges, the second largest hospital, suffered some roof damage and loss of laboratory equipment.²¹ Windows were broken, which meant that even minimally damaged infrastructure could not be used immediately after the hurricane.
- The earthquake of magnitude 7.6 that struck Pakistan on 8 October 2005 caused severe damage to or the collapse of 95 per cent and 53 per cent of the educational buildings in the regions of Azad Jammu Kashmir and North-West Frontier Province, respectively; 18,095 students and 853 teachers died in these provinces. In addition, 423 health facilities sustained full or partial damage. Health-care staff were killed or injured and information records and systems lost, which resulted in a complete breakdown of the health system.²²
- The Kobe General Hospital situated on Port Island, Kobe, Japan, was operational following the January 1995 earthquake. However, its functionality was compromised by the collapse of the bridge linking Port Island to the mainland.²³

A technique to strengthen constructions or make them hazard-safe should consider all potential hazards, not just the natural hazard that has caused the most recent disaster. In many cases, design features intended to enhance resilience to one type of natural hazard will augment resilience to others, for example, the provision of good connections between foundations, frames, walls and roofs of buildings. However, in certain cases, design features that help resist one type of hazard may be detrimental to the resistance of another. For example, heavy roofs help withstand strong winds due to cyclones, storms or typhoons, but will increase the forces on buildings subjected to earthquakes.

In developing countries it is often not necessary to implement completely new building methods and materials in order to provide a safe solution. Local building practice should be assessed and weaknesses and strengths identified considering the local type and recurrence of natural hazards. Simple and inexpensive structural improvements, combined with good-quality construction methods and continued maintenance can overcome major weaknesses.²⁴ If new materials are introduced care must be taken to ensure that an adequate skills base exists for their use, or that training is provided, in order to avoid increased vulnerability from poor construction.

The siting and design of critical facilities and infrastructure that are essential for relief and recovery purposes in the event of a disaster should be given special consideration (see Box 6 above). The adoption of hazard-proof criteria set out in codes of practice for normal structures are not adequate in these cases as the non-operation of these facilities is not socially acceptable. New developments (e.g., FEMA 356²⁵ and PAHO, 2004) advocate the 'performance-based design' of critical facilities to allow for the lower level of socially acceptable risk. This involves the association of desired performance objectives (e.g., operation and severe damage but life-safety ensured) with different hazard-event return periods (e.g., a very rare event and largest possible event) for the determination of the loading for the building design. In the case of wind hazard, it is feasible to aim for a 'zero (damage) tolerance' approach in the design and construction of critical facilities. Tested technologies (such as base isolation) might also be promoted for use in the design of new facilities that are required to remain operational after a hazard event. Often, simply by considering natural hazards in the siting of critical facilities and the design of the infrastructure serving them,

21 World Bank (2005).

22 EEFIT. *EEFIT mission: October 8, 2005 Kashmir earthquake*. EEFIT: 2006. Available at: <http://www.eefit.org.uk>

23 Davis, I. *Location and operation of evacuation centres and temporary housing policies*. Committee for Global assessment of earthquake countermeasures. Hyogo Prefecture, Kobe Disaster Management Division, Japan, 2001.

24 Aysan et al. (1995).

25 ASCE. *Prestandard and commentary for the seismic rehabilitation of buildings, FEMA 356*. Washington, DC: American Society of Civil Engineers, 2000.

their resilience and post-disaster functionality can be significantly improved. For example, the de-concentration of critical services introduces redundancies and avoids the ‘domino’ effect of service outage in communities affected by disasters. Most importantly, all critical facilities should be designed by professionals with appropriate certification and specialised expertise. In California, for example, the design of schools and hospitals is limited to professionals with a special licence and is strictly controlled by a state organisation.

4. A step-by-step approach

Several organisations have suggested procedures for hazard-proof construction and strengthening initiatives based on the success or failure of projects they have been involved in. From a review of these procedures,²⁶ engineering sources^{27,28,29,30} and successful past initiatives (e.g., Box 3), the following table has been drawn up. It presents a summary of the considerations that need to be made in the appraisal stages of such a project. These considerations are in addition to those outlined in **Guidance Note 1**.

Table 1 A summary of considerations to be made in the programming, identification and appraisal stages of a construction or strengthening project for hazard-risk reduction

Stage	Key considerations
Define roles and responsibilities	<ul style="list-style-type: none"> ■ Clearly define the roles and responsibilities with regard to the main aspects of the project (i.e., the hazard risk assessment, design and siting of appropriately hazard-resilient infrastructure, enforcement of design and quality control of construction, operation and maintenance) of the various individuals, agencies and organisations involved in the project: <ul style="list-style-type: none"> ■ Coordinate with other development or relief (humanitarian) organisations working in the area to avoid duplication of research effort into hazard-proof construction and to promote a harmonised use of hazard-proof construction standards ■ Set up a system of consultation and collaboration with engineers, academics, local government and the affected community ■ Ensure that engineers and other infrastructure service providers participate fully in the design of projects, rather than merely building/supplying to order
Hazard assessment	<ul style="list-style-type: none"> ■ Assess the frequency and ‘size’ of all potential sources of natural hazards (geological, meteorological or hydrological) in the area (see also Guidance Notes 2 and 7) and determine the most likely hazard scenarios for consideration in the infrastructure design: <ul style="list-style-type: none"> ■ Ideally, the development organisation’s country strategy paper should already provide some overview of the significance of disaster risk in a particular country (see Guidance Note 4) ■ Existing academic studies and hazard maps may provide information for the hazard evaluation. However, depending on the prevalent hazards and the site, it may also be necessary to conduct site-specific risk analysis or micro-zonation studies ■ The possibility of local secondary effects (e.g., landslides from excessive rain or ground shaking) should be considered
Review of legislation and good practice	<ul style="list-style-type: none"> ■ Assess existing codes of practice for hazard resistance and determine whether they are adequate for use: <ul style="list-style-type: none"> ■ Ideally, this review would have already been completed at the national level, by a development organisation or by a local research/academic body. This can then be drawn upon as relevant to the specific project context ■ If an existing review does not exist, effort must be spent in researching existing codes of practice for hazard resistance. This exercise might include: <ul style="list-style-type: none"> ■ Exploring the history of the code development and level of hazard inclusion

26 Aysan et al. (1995); UNDRO (1982); World Bank (2005).

27 Coburn, A. and Armillas, I. ‘Earthquake Reconstruction for Future Protection’. In Aysan, Y. and Davis, I. (eds), *Disasters and the small dwelling: Perspectives for the UN IDNDR*. Oxford: James and James Science Publishers Ltd., 1992.

28 EERI/IASPEI. *International norm for seismic safety programs. Draft. Working group of the International Association of Earthquake Engineering and the International Association of Seismology and Physics of the Earth’s Interior*. EEFIT/International Association of Seismology and Physics of the Earth’s Interior, 2006. Available at: <http://www.world-housing.net>

29 Davis, J. and Lambert, R. *Engineering in emergencies: A practical guide for relief workers*. Bourton-on-Dunsmore: ITDG Publishing/Red R, 2002. 2nd ed.

30 Lubkowski, Z. and da Silva, J. *Aceh and Nias post-tsunami reconstruction: Review of Aceh housing program*. London: Arup, 2006. Available at: <http://www.arup.com>

Stage	Key considerations
	<ul style="list-style-type: none"> ■ Looking at the performance of buildings/infrastructure designed to the codes during past hazard events ■ Comparing loading and design criteria to building codes developed for countries with similar hazards and neighbouring countries with similar construction practice ■ Reviewing good practice and international building codes, designing guidelines appropriate to the identified hazards and assessing their applicability
Review of construction methodologies and local capacity	<ul style="list-style-type: none"> ■ Identify the main local construction practices for the relevant type of infrastructure. A fairly rapid assessment may be made in the case of new constructions, but a more detailed analysis is required in a retrofitting project: <ul style="list-style-type: none"> ■ Weaknesses in the structures and the vulnerability of infrastructure to the identified natural hazards must be assessed. This will be obvious in a post-disaster scenario. This may include a study of the rate of degradation of the structure and its materials over time to assess resilience against projected hazards ■ The strengths and durability of materials need to be determined ■ Identify who carries out the design and construction (engineered, non-engineered, self-build or contractor build) and the level of code compliance ■ Assess the resistance of local construction to the determined hazards and the level of risk these pose
Set hazard safety objectives	<ul style="list-style-type: none"> ■ Establish clear and measurable objectives for hazard-safety, based on the level of risk that can be supported by the affected public and government agencies. Take into account development agency accountability issues ■ Consider different performance objectives for critical facilities and infrastructure, in particular factoring in the potential impact on the users or clients who would be negatively affected to varying extents by loss of service
Site selection	<ul style="list-style-type: none"> ■ The site for development will typically be defined by local government based on availability and economic criteria. The suitability of these sites needs to be assessed. This can be done by following checklists (such as Corsellis and Vitale,³¹ and the Sphere Standards,³² among others). Any hazard assessments carried out in previous stages should also be considered ■ Determine whether additional works are required to render the site viable for development or whether land use should be restricted to reduce vulnerability to natural hazards ■ Consider whether re-siting to a location of reduced risk is an option: <ul style="list-style-type: none"> ■ Topographical features and landscape can be used to reduce the impact of potential natural hazards (e.g., to minimise flood risk or modify wind-speed and wind direction) ■ Land swaps might be a potential solution in collaboration with local government, although there is probably a stronger track record in terms of environmental protection
Design and procurement	<ul style="list-style-type: none"> ■ Design a sustainable and socially acceptable strengthening/building solution that satisfies the hazard safety objectives: <ul style="list-style-type: none"> ■ Consider limitations of finance, construction skills and material availability ■ In a strengthening initiative take into account disruption to normal activity ■ Ensure that the environmental and social impacts of the proposed solution are acceptable (see Guidance Notes 7 and 11) ■ Ensure (e.g., through testing and research) that the proposed solution will yield the performance objectives determined in the previous step ■ Develop a procurement strategy that provides overall value for money and resources during the entire life of the service/facility ■ Assess the competency of the contractor: <ul style="list-style-type: none"> ■ Consider the level of necessary site supervision ■ Address any skills training issues necessary for the implementation of the proposed solution (e.g., possible on-the-job training included in the implementation stage) ■ Develop building aids and guidelines, accounting for local hazard conditions, building material characteristics, construction skills and quality, using the results of the studies above

31 Corsellis, T. and Vitale, A. *Transitional settlement displaced populations*. Cambridge, UK: University of Cambridge Shelter Project and Oxfam, 2005.

32 Sphere Project. *Humanitarian Charter and Minimum Standards in Disaster Response*. Geneva: Sphere Project, 2004. Available at: <http://www.sphereproject.org/content/view/27/84/lang,English/>

Stage	Key considerations
Construction	<ul style="list-style-type: none"> ■ It is essential that the quality of the construction does not compromise the design intent. A procedure must therefore be established for the multidisciplinary inspection and checking against specifications of works throughout the building process: <ul style="list-style-type: none"> ■ Test materials and check adherence to design guidelines ■ Ensure implementation of the quality assurance system
Operation and maintenance	<ul style="list-style-type: none"> ■ Guidelines for operation and maintenance should be provided to maintain the design level of hazard resilience ■ Set up a funding and management structure for operation and maintenance ■ Define a procedure to be followed for the approval of any structural alterations carried out through the design life of the structure
Evaluation	<ul style="list-style-type: none"> ■ The adequacy of the chosen infrastructure design and the success of the project as a whole must be carried out. The many considerations include: <ul style="list-style-type: none"> ■ Functionality, social acceptability and sustainability ■ Project cost with respect to the potential benefits of hazard-proof design in future events, of any skills provided to builders and of new construction guidelines introduced ■ Reporting of the performance of the infrastructure under any hazard events that have occurred ■ Lessons learned regarding strengthening hazard resilience should be summarised, divulged and drawn on for future projects

5. Critical factors for success

The critical factors that need to be addressed for ensuring the successful mainstreaming of safer construction are:

- **Incorporating design checks, enforcement and quality control.** Appropriate policies, effective implementation measures and relevantly trained technical personnel are necessary for the checking of designs, enforcement of good building practices and inspection of construction quality throughout the building process. Effective checking of designs cannot be carried out by individuals less knowledgeable and less experienced than the designers. The satisfaction of quality goals can be tied to criteria for payment, schedules for contractors and performance bonds. Enforcement and quality control are generally the weakest part of the system, often due to lack of human and financial resources allocated to this function and political interference with the regulatory system.³³ However, it is estimated³⁴ that checking and monitoring of the design and construction of infrastructure amounts to an additional cost of 1 to 2 per cent of the construction cost. This is a small sum if it is considered spread over the lifetime of the construction and to be offset by maintenance cost savings.
- **Consultation of hazard and construction experts.** A major factor for the success and mainstreaming of hazard-proof measures in development construction projects is the recognition by development and funding agencies that hazard specialists and civil/structural engineers need to be engaged in the coordination and design of the project and construction works. A small input by such people at the outset of the project can ensure that the design incorporates the correct levels of risk and that appropriate technical solutions/construction practice are being employed. Lack of expert involvement and reliance on best local practice can lead to the re-creation or promotion of vulnerability.
- **Land use planning and improving building codes for hazard-resistance.** Development organisations may need to provide support to governments, professional institutions and other national bodies to improve hazard assessment and representation in building codes, adjust codes to account for increasing hazards due to climate change (if codes were based on historical precedent), and improve structural design criteria and land use zoning.
- **Improving practice.** In developing countries, technical guidance, training and education may need to be provided to local engineers, builders and architects. This requires cooperation with hazard-proof construction experts for the development of appropriate educational and training materials and appropriately trained technical people to transfer the knowledge. A recent example of such a project was the GOAL Pakistan housing construction training following the 2005 earthquake.³⁵

³³ CDMP (2001).

³⁴ Gibbs (2002); see footnote 5.

³⁵ See <http://www.goal.ie/newsroom/report0306.shtml>

- *Encouraging local uptake and community participation.* Unsuccessful development schemes involving hazard-proof construction (or strengthening) of housing have mainly failed due to a lack of local take-up. This has occurred mostly when the proposed strengthening, building or repair techniques have been developed without consulting the affected community and are, therefore, unsustainable and do not meet local needs. Common faults are that the proposed solutions are too expensive or adopt new materials and building techniques for which local construction skills are inadequate, or that the materials and forms introduced are socially, economically, culturally or climatically inappropriate.
- *Guidelines for performance-based design of structures subject to natural hazards with different recurrence.* This involves the determination of acceptable risk levels for different types of structures, on the basis of their desired performance in the case of a range of frequencies of occurrence of natural hazards. This concept, proposed in the earthquake engineering field,³⁶ should be extended to include multiple hazards and policies introduced to ensure that schools and hospitals are designed for increased hazard resistance. Risk posed by the failure of non-structural components (e.g., the loss of a facility's serviceability due to damage to equipment) should also be considered when doing this. Consideration of desired post-natural hazard event performance at the design stage would result in the prioritisation and more stringent design of hospitals, schools and other critical infrastructure.
- *Adequate operation and maintenance expenditure.* This is required to maintain the designed hazard-resilience of infrastructure. The annual maintenance budget for a public building will be about 4 per cent of its contemporary capital cost.³⁷ Funding for operation and maintenance may with time be diverted to other uses. This may result in the facility no longer being suitable for normal use and its increased vulnerability to natural hazards. A method for ensuring continued operation and maintenance expenditure is to link it to insurance, which would cover the eventual damage due to a natural hazard if the infrastructure were maintained.
- *Promoting research into non-engineered structures and the effects of natural hazards.* There is a need for a better understanding of the performance under natural hazard events of non-engineered structures and traditional building materials and technologies. The effects of different natural hazards on buildings have been researched to different degrees. Cyclones, typhoons, storms, floods, landslides and earthquakes have been the subject of active research. But recent events in the Indian Ocean have highlighted the lack of research into the effects of violent flows and tsunami on the built environment.³⁸
- *A technological solution is insufficient on its own.* Hazard-proof construction is only one part of disaster-risk mitigation project and must be linked to other types of risk reduction, including evacuation planning and other community preparedness measures.

Box 7 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.³⁹

³⁶ SEOAC. *Performance-based seismic engineering of buildings, Vision 2000 Committee*. Sacramento, USA: Structural Engineers Association of California, 1995.

³⁷ Gibbs (2002); see footnote 5.

³⁸ EEFIT. *The Indian Ocean Tsunami, 26th December 2004. Earthquake Engineering Field Investigation Team Report*. EEFIT, 2005. Available at: http://www.istructe.org/eeffit/files/Indian_Ocean_Tsunami.pdf

³⁹ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

Building, strengthening and repair projects must be tailored to the individual needs, hazards and resources of the affected community. Numerous technical solutions exist and guidelines have been drawn up by various associations based on past project experience. A list of some key literature and web resources for further information is provided here.

Managing hazard-proof construction projects

Aysan, Y., Clayton, A., Cory, A., Davis, I. and Sanderson, D. *Developing building for safety programmes: Guidelines for organizing safe building improvement programmes in disaster-prone areas*. London: Intermediate Technology Publications, 1995.

Balamir, M. 'Methods and tools in urban risk management'. In Komut, E. (ed.), *Natural Disasters: Designing for Safety*. International Union of Architects and the Chamber of Architects of Turkey, 2001.

OAS. *Primer on Natural Hazard Management in Integrated Regional Development Planning*. Washington, DC: Organization of American States, Department of Regional Development and Environment Executive Secretariat for Economic and Social Affairs, 1991. Available at: <http://www.oas.org/dsd/publications/Unit/oea66e/begin.htm>.

UNDRO. *Shelter after disaster: Guidelines for assistance*. Office of the United Nations Disaster Relief Coordinator, 1982. Available at: <http://www.sheltercentre.org/shelterlibrary/publications/172.htm>

Wamsler, C. 'Mainstreaming risk reduction in urban planning and housing: A challenge for International aid organisations'. *Disasters*, 30(2)151–177, 2006.

World Bank. *Lessons from natural disasters and emergency reconstruction*. Washington, DC: World Bank, Operations Evaluation Department, 2005.

Hazard-proof designs and practical building guides

Blondet, M., Garcia, G.V. and Brzev, S. *Earthquake-resistant construction of adobe buildings: A tutorial. Contribution to the World-Housing Encyclopedia*. International Association for Earthquake Engineering, 2003. Available at: <http://www.world-housing.net/Tutorials/Tutorial.asp>

CDMP. *Hazard-resistant construction*. Caribbean Disaster Mitigation Project, Organization of American States Unit of Sustainable Development and Environment, USAID Office of Foreign Disaster Assistance and the Caribbean Regional Program, 2001. Available at: <http://www.oas.org/CDMP/safebldg.htm>

Coburn, A., Hughes, R., Pomonis, A. and Spence, R. *Technical principles of building for safety*. London: Intermediate Technology Publications, 1995.

Federal Emergency Management Agency (USA) website: Guides for safer building. http://www.fema.gov/rebuild/recover/build_safer.shtm

IAEE. *IAEE guidelines for earthquake resistant non-engineered constructions*. Second edition. 2004. Available at: http://www.nicee.org/IAEE_English.php

Shelter Library website: Resource for books on practical building with low-cost material and guides for post-disaster shelter. <http://www.sheltercentre.org/shelterlibrary/index.htm>

United Nations HABITAT website: Reports on materials and construction. <http://www.unhabitat.org/programmes/housingpolicy/bmct.asp>

USAID–OAS. *Basic minimum standards for retrofitting*. United States Agency for International Development and Organization of American States, Caribbean Disaster Mitigation Project, 1997.

School and hospital safety

PAHO. *Guidelines for the vulnerability reduction in the design of new health facilities*. Washington, DC: Pan American Health Organization, World Health Organization, World Bank, ProVention Consortium, 2004. Available at: <http://www.paho.org/english/dd/ped/vulnerabilidad.htm>

PAHO. *Protecting new health facilities from natural disasters: Guidelines for the promotion of disaster mitigation*. Washington, DC: Pan American Health Organization, World Health Organization, World Bank, 2003. Available at: <http://www.disaster-info.net/viento/books/ProtNewHealthFacEng.pdf>

Wisner, B. et al. 'School seismic safety: Falling between the cracks?' In Rodrigue, C. and Rovai, E. (eds), *Earthquakes*. London: Routledge, 2004. Available at: <http://www.fssbc.org/downloads/SchoolSeismicSafetyFallingBetweenTheCracks.pdf>

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Evaluating Disaster Risk Reduction Initiatives

Guidance Note 13

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note is an introduction to evaluating disaster risk reduction. It sets out the main steps in planning evaluations, collecting and analysing data, and using the results; and it discusses issues associated with these activities. The note is aimed principally at programme or project managers responsible for designing, supervising and implementing different kinds of disaster risk reduction initiative, either free-standing or within wider development or post-disaster recovery activities. It should also be of use to evaluation teams.

A comprehensive source book on monitoring and evaluation in disaster risk reduction is under development by the ProVention Consortium (see Further reading).

1. Introduction

An evaluation is “an assessment, as systematic and objective as possible, of an on-going or completed project or policy, its design, implementation and results”.¹ Evaluations are analytical exercises, focusing on project outputs and especially outcomes or impact.² Good evaluation is essential for effective project and programme management.

Box 1 Purpose and value of evaluation

The two main purposes of evaluation are:

- To improve future aid policy, programmes and projects through feedback of lessons learned.
- To provide a basis for accountability, including the provision of information to the public.

Other benefits include:

- Evaluations are the key means by which agencies seek to learn lessons from their work and incorporate them into policy and practice.
- Organisational learning (through evaluation) is a prerequisite for knowledge transfer between agencies.
- Evaluation is often the only consolidated source showing how a project or programme progressed.
- Evaluations are a means of retaining and building institutional memory.
- Evaluations question and test basic assumptions and create a space for lesson learning.
- Learning from experience is particularly valuable at times of policy uncertainty.

Sources: OECD-DAC (1991); Hallam (1998), pp 23–4.

¹ OECD-DAC (1991).

² Outputs are the immediate results the project achieves (sometimes called ‘deliverables’). Impact (or outcome) is significant or lasting change brought about by the project. Many development agencies evaluate projects according to the OECD-DAC’s five criteria of efficiency, effectiveness, impact, sustainability and relevance (modified for humanitarian work to seven criteria: relevance/appropriateness, connectedness, coherence, coverage, efficiency, effectiveness and impact).

Current state of the art

The range of monitoring and evaluation (M&E) approaches and methods in development and relief has grown considerably in recent years. Far less thought has been given to M&E methods specifically for disaster risk reduction (DRR). Organisations working in this field have paid relatively limited attention to evaluation. Progress has been hindered by both institutional and methodological obstacles: the latter include the scope and complexity of DRR as a comprehensive approach to reducing vulnerability and the threat of disasters (see Table 1).

Table 1 Components of disaster risk reduction

<i>Thematic area</i>	<i>Main components</i>
<i>Governance</i>	<ul style="list-style-type: none"> ■ Policy and planning ■ Legal and regulatory systems ■ Resources and capacities ■ Integration with development ■ Institutional mechanisms, capacities and structures ■ Political commitment ■ Accountability and participation
<i>Risk assessment</i>	<ul style="list-style-type: none"> ■ Hazards/risk data and analysis ■ Vulnerability and impact data/indicators ■ Early warning systems ■ Scientific and technical innovation
<i>Knowledge and education</i>	<ul style="list-style-type: none"> ■ Information management and sharing ■ Education and training ■ Public awareness ■ Learning and research
<i>Risk management and vulnerability reduction</i>	<ul style="list-style-type: none"> ■ Environmental and natural resource management; climate change adaptation ■ Sustainable livelihoods ■ Social protection ■ Financial instruments ■ Structural and technical measures ■ Planning regimes
<i>Disaster preparedness and response</i>	<ul style="list-style-type: none"> ■ Organisational capacities and coordination ■ Preparedness and contingency planning ■ Emergency response mechanisms ■ Participation and voluntarism

Sources: Adapted from UN/ISDR, *Hyogo Framework of Action 2005–2015*. Geneva: United Nations International Strategy for Disaster Reduction, 2005. Available at: <http://www.unisdr.org/eng/hfa/hfa.htm>; UN/ISDR, *Living with Risk: A global review of disaster reduction initiatives*. Geneva: United Nations International Strategy for Disaster Reduction, 2004, I: 393–395. Available at: http://www.unisdr.org/eng/about_isdr/bd-lwr-2004-eng.htm

However, interest is increasing rapidly. A number of recent and ongoing evaluation and indicator initiatives focus on different dimensions of DRR (see Box 2).

Box 2 DRR evaluation and indicator initiatives

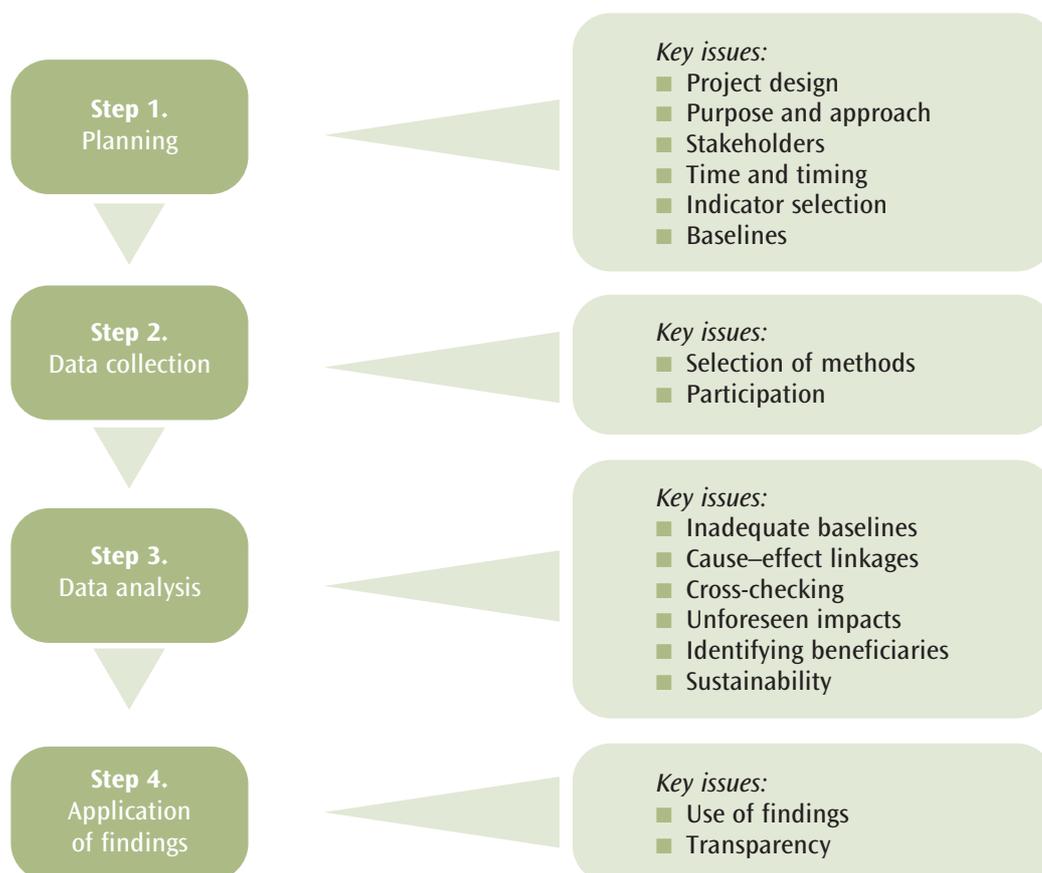
- The United Nations' International Strategy for Disaster Reduction (UN/ISDR) and Office for Coordination of Humanitarian Affairs (OCHA) are developing indicator sets for measuring progress towards the Hyogo Framework of Action 2005–2015 agreed at the World Conference on Disaster Reduction in January 2005.
- The ProVention Consortium commissioned work on risk reduction indicators which fed into the Tsunami Recovery Impact Assessment and Monitoring System (TRIAMS) programme.
- The World Bank recently published a comprehensive evaluation of its disaster assistance efforts over the past 20 years (see Box 11).
- A group of international non-governmental organisations has commissioned work on indicators of DRR at community level.

Sources: UN/ISDR, *Hyogo Framework of Action 2005–2015*. Geneva: United Nations International Strategy for Disaster Reduction, 2005. Available at: <http://www.unisdr.org/eng/hfa/hfa.htm>; ProVention Consortium (2006); World Bank (2006); 'Indicators of Community-Level Disaster Risk Reduction' web page, http://www.benfieldhrc.org/disaster_studies/projects/communitydrindicators/community_drr_indicators_index.htm

2. Steps in evaluating disaster risk reduction

In this guidance note, the evaluation process is broken down into four basic steps. This is a deliberate oversimplification to present actions and issues more clearly. In reality, every evaluation is distinct in its aims and methods, because every project and programme is different. Careful planning will ensure that the evaluation process matches the objectives and needs of the initiative being assessed.

Figure 1 Steps in evaluating disaster risk reduction



Step 1. Planning

The evaluation process begins at the project design stage, when goals and objectives are set and logical or other results-based frameworks are developed, to which later evaluations will relate (see **Guidance Notes 5 and 6**). Use of such planning frameworks also facilitates agreement by all stakeholders about the project's aims and approach.

Evaluations do not have to be formal, externally-led actions at the end of a project or afterwards, although donors often require this. They can take many other forms, including real-time evaluations, after-action reviews with communities, strategic reviews and internal or self-evaluations by project staff and partners. Good monitoring is an integral component of the evaluation system: it assists ongoing lesson-learning by managers during the project, as well as providing data for evaluation teams and external accountability.³

A range of factors, including balance between internal and external evaluators, the range of technical and local knowledge required and gender balance, will guide the selection of participants in evaluations. Involvement of communities is essential (see Step 2). Where the process is led throughout by project teams, in partnership with other stakeholders, there is stronger and more widespread ownership of the results and lessons feed into the ongoing implementation, or where necessary redesign, of the project.

Time and timing are important factors. If insufficient time is allocated to carry out evaluations, quality is likely to suffer. Evaluations can take place at any point in the project cycle (mid-term, end of project or post-project). They are most useful when the project is sufficiently advanced to assess effectiveness or outcomes. Longer-term, post-project assessments provide a more comprehensive picture of impact (see Box 3). Ideally, there should be a series of evaluation exercises during and after the project, to permit longitudinal analysis, although this rarely happens.

Box 3 Long-term impact assessment

An independent participatory evaluation of a rainwater-harvesting initiative in an arid district in Kenya begun over ten years previously covered many different aspects of the project's impact on reducing vulnerability:

- Impact on average sorghum yields and comparison of yields between traditional sorghum gardens and those improved by rainwater harvesting, in both good and bad rainfall years.
- How the sorghum harvest was used in good and bad years (e.g., to purchase food, seeds or livestock, sell for cash or give to relatives and friends).
- Impact on diet.
- Impact on wealth.
- Gender issues in control and decision-making (relating to decisions about whether to improve a garden, when to begin planting, division of labour and control over disposal of the harvest) and impact on women's status.
- How the creation of new sorghum gardens affected traditional land tenure arrangements.
- Positive and negative impacts on the environment (water run-off, soil erosion, soil fertility).

Source: Watson, C. and Ndung'u, B. *Rainwater Harvesting in Turkana: An Evaluation of Impact and Sustainability*. Nairobi: ITDG (now Practical Action), unpublished evaluation report.

Indicator selection. Selection of appropriate indicators is central to project design and evaluation. Indicators are objective ways of demonstrating that progress is being made. They can be used to assess progress and outputs or outcomes and impact, relating to the project's aims and objectives. Indicators can be quantitative or qualitative. They may measure changes directly or, where this is not possible, measure things that represent or approximate changes ('proxy indicators'). Identification and validation of appropriate impact indicators is a methodological challenge in all evaluations, including those of DRR projects.

Indicators are first identified in the results-based frameworks used for project design (see above); they may be modified or added to as the project proceeds. Box 4 is an example of a results-based framework and hierarchy of indicators developed for a recent DRR initiative.

³ Monitoring usually addresses inputs, activities and outputs; it takes place throughout the project cycle. Traditionally, monitoring was seen as relatively distinct from evaluation, but they are increasingly seen as part of a single process directed towards lesson-learning and accountability.

Box 4 Results-based framework for disaster risk reduction

The Asian Disaster Preparedness Center's multi-country Asian Urban Disaster Mitigation Program (AUDMP) developed a Strategic Objective and Results Framework with targeted results and indicators to guide and assess progress and achievements (summarised in an objectives and results tree; see diagram).

Programme goal: Reduced national disaster vulnerability of urban populations, infrastructure, lifeline facilities and shelter in Asia

Programme objective:

Establishment of sustainable public and private sector mechanisms for disaster mitigation in Asia

Indicators:

- 1 Number of operational plans developed with resources identified by national collaborating institutions to carry out mitigation measures after demonstration activities end
- 2 Number of replications or adaptations of mitigation skills and procedures promoted in AUDMP demonstration activities by other organisations, communities or countries in Asia
- 3 Amount of investment from non-AUDMP funding sources attracted by programme and demonstration activities
- 4 Number of households potentially benefiting from AUDMP-sponsored activities to reduce disaster vulnerability

Result no. 1

Improved capacity of municipal officials to manage risk and apply mitigation skills and technologies

Indicators:

- 1.1 Number of new or improved assessment methods and guidelines/standards used for public and private sector development
- 1.2 Number of emergency preparedness and response plans written or revised to reflect improved information on hazards and vulnerability

Result no. 2

Improved access to hazard mitigation information and skills (e.g., techniques, methodologies, experience) throughout the region

Indicators:

- 2.1 Percent of public and private sector professionals with AUDMP-initiated disaster mitigation training who are employed and using knowledge gained in fields impacting disaster management or urban development
- 2.2 Number of institutions where AUDMP-initiated training and professional development course modules are institutionalised
- 2.3 Level of participation in the AUDMP regional information and contact network

Result no. 3

Improved policy environment for disaster mitigation

Indicators:

- 3.1 Number of policies established or revised to facilitate action, regulation, enforcement and/or incentives

The framework also specified targets, baseline information, data sources and critical activities. For example, under Result no. 2, Indicator 2.1 (percentage employed and using knowledge gained), these were:

- Standard/target: 75 per cent of the public and private sector professionals trained in AUDMP-initiated mitigation courses held during the programme period.
- Baseline: Number trained estimated to be 150 (counting participants in regional and national core courses, but not those taking project-specific skills training).
- Data sources: ADPC and national partner training organisation records. Surveys of individuals and employers, conducted approximately six to nine months following the training, to track whether the knowledge conveyed is being put to use. Activity reports showing number trained and number of trainees working in related jobs, course schedules, course participant lists with names and position information.
- Critical activities: Development of training materials/curriculum, conduct of courses; follow-up survey/assessment tool.

Sources: AUDMP web pages <http://www.adpc.net/AUDMP/M&E.html> and <http://www.adpc.net/AUDMP/ME-framework.html>

In essence, measuring DRR is about assessing positive and negative changes in vulnerability and capacity or resilience brought about by project interventions. A baseline vulnerability and capacity analysis can be used to identify key indicators of this at the outset (see **Guidance Note 9** and below, section on baseline data). However, vulnerability and resilience, like DRR, are complex and multi-faceted.

In practice, most projects and programmes focus on a few specific aspects of DRR, being unable to tackle every factor contributing to people’s vulnerability. In planning individual evaluation exercises, decisions are needed to focus the assessment and ensure its objectives are realistic. The priority will be to collect the data needed for understanding progress towards the project’s aims and objectives, while at the same time remaining aware of the wider context in which the project is located.

Indicators should be measurable in some way, but the indicators that are easiest to measure are not necessarily the most useful. Evaluators therefore look for a range of indicators that give a comprehensive, balanced view of the key issues. Indicators should also be easily understood, by communities and implementing organisations alike.

Evaluation is designed to measure change (positive and negative). DRR can present problems because of what has been called its ‘reverse logic’: i.e., the success of an intervention is that something – the disaster or a particular form or level of loss in the event of a disaster – does *not* happen. However, evidence from subsequent disaster events and the response to them is a strong indicator of the impact of pre-disaster mitigation and preparedness measures. It can demonstrate, for instance, the effectiveness of early warning and evacuation systems, the capacity of response agencies and the resilience of houses and infrastructure.

Step 2. Data collection

Most DRR project evaluations adopt a mix of data collection methods (see Table 2 for examples). Selection depends on the nature and scale of the project, the type of information required and the frequency, ease and cost of collection.

Table 2 Data collection methods

<i>Method</i>	<i>Examples of application to DRR evaluation</i>
Formal surveys of beneficiaries and other stakeholders ⁴	<ul style="list-style-type: none"> ■ Survey of builders and occupants of hazard-resistant housing to ascertain application of skills and increased security (see Box 5) ■ Household survey on food production, availability, consumption and marketing to identify patterns and shifts in vulnerability
Structured and semi-structured interviews with staff, partners, beneficiaries and other stakeholders	<ul style="list-style-type: none"> ■ Individual stakeholder interviews building up picture of level of understanding of the project, agency–community working relationships, effectiveness of coordination mechanisms and outcomes of DRR interventions
Group discussions with stakeholders, especially beneficiary communities (e.g., participatory workshops, focus groups)	<ul style="list-style-type: none"> ■ Beneficiary workshop to identify and assess benefits of particular DRR interventions and unforeseen impacts ■ Expert workshop to assess potential effectiveness of new DRR methods or approaches ■ Feedback workshop with beneficiaries and other stakeholders to test/confirm evaluation findings
Rapid assessments	<ul style="list-style-type: none"> ■ Post-disaster telephone or field survey to indicate effectiveness of warning and response mechanisms and factors affecting them
Direct observation and visual surveys	<ul style="list-style-type: none"> ■ Visual surveying of structural mitigation measures to determine quality of design and workmanship, take-up of technologies or techniques – disaster resilience inferred from this or assessed through post-disaster surveys ■ Observation of coping strategies and other risk-reducing behaviour – before, during and after disasters

⁴ Such information can also be generated by interviews and group discussions.

Method	Examples of application to DRR evaluation
Case studies	<ul style="list-style-type: none"> Personal or group accounts of use of skills, materials and organisational capacity acquired from disaster management training courses during subsequent events
Simulations	<ul style="list-style-type: none"> Group simulation or exercises (table-top or field) of disaster management activities or responses to disaster events, to test plans, skills, equipment, etc.
Documentary evidence	<ul style="list-style-type: none"> Content analysis of educational material on risk reduction and management produced by project Quantitative and qualitative data about project delivery, effectiveness, impact and costs, from project documentation Secondary data collection to complement or validate information collected by the evaluators in the field

Box 5 Use of surveys to assess reduced risk

An evaluation of a housing finance and improvement programme in Andhra Pradesh, India, surveyed a sample of 100 beneficiaries from five villages through individual interviews, using a formal questionnaire which covered a range of issues.

Ninety-four per cent of the interviewees strongly agreed with the questionnaire statement that having a proper house had brought increased security from theft, cyclones and monsoon rains. In additional comments, many also stated that the risk of fire in a traditional hut, which was a constant threat, was now greatly diminished. Others commented that they had greater peace of mind when they left the house to work in the fields and were no longer fearful of theft occurring in their absence.

Source: Platt, R. *Ensuring Effective Provision of Low Cost Housing Finance in India: an in-depth case analysis*. Working Paper No. 9725. Bradford, UK: University of Bradford Management Centre, 1997, p. 40.

The choice between participatory and non-participatory methods is a key decision. The value of participatory approaches in DRR is now generally accepted; this applies equally to evaluation. Participatory evaluation enables the voices of project stakeholders, especially beneficiary communities, to be heard, draws on their local and expert knowledge and creates ‘ownership’ of the evaluation’s findings.

In participatory projects it is crucial that the community is involved in evaluation, not merely data collection, and is empowered to make appropriate decisions about future activities as a result. Although external agencies and donors need evaluation reports, collection of data solely for external use can undermine the participatory process. Experience with participatory M&E systems suggests that communities must develop their own targets, indicators and priorities, as these may differ considerably from those of agency staff.

Adoption of a participatory approach does not prohibit the use of more formal, extractive data collection methods such as secondary data, project documentation, questionnaire surveys and formal interviewing. These can complement information gathered through participatory processes or help to validate it. Each method should be selected according to its value in helping to understand the project’s impact.

Step 3. Data analysis

This is usually the most complex and difficult part of the evaluation process. The principal challenge concerns indicators: the use and value of different indicators and developing an analysis from different indicator sets.

Quantitative and qualitative indicators. Evaluations usually combine quantitative and qualitative indicators.

Quantitative indicators are widely used to assess progress towards stated targets (e.g., the number of community disaster response teams and their members trained and equipped, the number of hazard-resistant houses built or

public buildings retrofitted and the number of disaster mitigation plans developed and individual actions taken under those plans).

Evaluators can be tempted to place too much reliance upon quantitative data. Numbers alone do not measure quality or effectiveness. For example, knowing the number of people trained in disaster management does not reveal the quality of that training, nor its value when applied to real-life disaster risk reduction. (However, these may have some value as proxy indicators: see below.)

Qualitative indicators are extensively used in DRR evaluations, particularly to demonstrate increased capacity to manage disaster risk. Qualitative data typically comprise stakeholders' views collected through workshops, focus groups and semi-structured interviews (see Table 2). Simple qualitative indicators can give a good impression of progress and achievement, especially if checked on a regular basis.

Participatory methods tend to generate qualitative information. In cases where quantitative data would have been valuable but are not readily available, participatory methods can provide relative data through ranking and comparison. They are also used to assess the take-up and effectiveness of mitigation strategies.

Baseline data. Evaluation relies on good baseline data. Creation of baselines is an important element in project design (see Step 1).

A vulnerability and capacity analysis (VCA) should provide good baseline data and guide interventions (see **Guidance Note 9**). A repeat VCA during or after the project should provide evidence about impact. To date, VCA has not been used for evaluation, perhaps because it is still a new technique for many agencies or they consider it expensive.

Although it is impossible to predict all the information that might be needed later, lack of adequate baseline data often presents a problem to evaluators of DRR projects. It may be necessary to reconstruct baselines from project documents, interviews with key informants and data from other organisations (see Box 6). Findings from previous evaluations can also be used, if available.

Box 6 Reconstructing a baseline

The University of Delaware Disaster Research Center's evaluation of the United States government's Disaster Resistant Communities Initiative ('Project Impact') created a retrospective baseline: an 11-point checklist of possible disaster mitigation actions that could have been taken by the seven pilot communities before the project began. In-depth interviews with key stakeholders and project documentation were then used to form judgements about how much progress was being made during the project. A simple quantitative score was used to assess in which areas mitigation activity was taking place. An increase in the range or type of mitigation activities then became an indicator of progress. This overview was supplemented by more detailed follow-up on the progress of individual activities in each community, and the reasons for this.

Source: Nigg, J.M. et al. *Disaster Resistant Communities Initiative: Evaluation of the Pilot Phase Year 2*. Newark, USA: University of Delaware, Disaster Research Center. Available at: <http://www.udel.edu/DRC/projectreport41.pdf>

Identifying causality (linking process to impact). Analysis of the relationship between process (activity and output) indicators and outcome or impact indicators makes it possible to understand cause–effect linkages. This can be difficult, especially where DRR initiatives are complex, comprising a range of structural and non-structural measures.

Process indicators often have to act as proxy indicators of impact for DRR interventions, especially where the hazards concerned are infrequent (e.g., earthquakes). Actions during a project can be used as indicators of potential effectiveness. In a community disaster preparedness project, for example, process indicators might include: recruiting, training and establishing a community disaster management team; organising public meetings to identify threats and the most vulnerable households; building relevant structures; and ongoing evacuation drills. Potential impact may be inferred from different kinds of data (see Box 7).

Box 7 Indicators of potential DRR impact

An evaluation of a food security project in Cambodia concluded that distribution of 86.8 tonnes of rice seed to 3,750 families in 98 villages, together with the rehabilitation of small-scale irrigation systems, might have a significant positive impact on food security the following year.

The conclusion was not based on distribution figures alone, but drew on more qualitative evidence. In participatory meetings, the target villagers had selected the most vulnerable beneficiary families (the elderly, disabled, those with little or no land or with insufficient rice seed for planting following previous floods). The government's Department of Agriculture, Forestry and Fisheries had provided technical assistance: a market survey of available seed and quality-control testing of potential seed varieties.

Using such evidence, the evaluation was able to make informed assumptions about potential impact on food security the following year.

Source: Tracey, R. *Food Assistance through Small-Scale Infrastructure Rehabilitation*. Geneva: International Federation of Red Cross and Red Crescent Societies/Cambodian Red Cross/European Community Humanitarian Office, unpublished paper.

When using process indicators, evaluators assess the quality of the process and ask what it is leading to. Where project design is based on results-based frameworks of some kind (see Step 1), there should already be a clear hierarchy of indicators, allowing evaluators to form judgements at all levels (activity → output → outcome → impact). At the community level, participatory methods such as impact trees can also be used to identify cause–effect linkages.

Cross-checking data. Cross-checking (triangulation) of different data sets and sources is helpful in isolating factors affecting success or failure. This is particularly important for qualitative data collected through stakeholder interviews, where much of the evidence may be individual and subjective. Triangulation of interview data or documents can also reveal differences in partners' aims and expectations. Feedback workshops with stakeholders provide a combined triangulation–validation mechanism, but if these are held towards the end of the evaluation it may be too late for further data collection or cross-checking.

In the field, direct observation is a useful way of identifying discrepancies between what people say and what they do (see Box 8), although evaluators do not always have enough time to do this.

Box 8 Use of direct observation to cross-check findings

People living on the banks and islands of the Jamuna River in Bangladesh are very vulnerable to floods and erosion. Researchers who asked them about their views of these risks found that a significant proportion explained them as the 'will of god' and saw prayer as the best response. The researchers concluded that the people were largely fatalistic and that their strategies for managing risk were limited.

An anthropologist on the mid-river islands obtained a similar response when using a standard questionnaire. However, when living on the islands during the 1998 floods, she observed that people followed a variety of strategies that had been used for generations. They built platforms out of reeds and banana stalks for their animals, fixed beds below the roofs of their houses, cooked on portable ovens, lived off stocks of food saved from the winter harvest, switched temporarily to other sources of income and referred to their wide networks of relatives.

At the same time, the people expressed their faith in god, interpreting the floods as his way of showing his power and testing their belief. God was thought to have sent the floods, but he also gave believers the strength to survive them.

Source: Schmuck, H. '“An Act of Allah”: Religious Explanations for Flood in Bangladesh as Survival Strategy', *International Journal of Mass Emergencies and Disasters*, 2000, 18(1): 85–95. Available at: http://www.ijmed.org/PDF_Files/March_2000.pdf

Unforeseen impacts. Tracking unforeseen impacts is a major methodological challenge. Indicators chosen to verify impact can only identify expected change and will only reflect changes that have been made explicit or agreed by the stakeholders. But M&E systems need to be sensitive to the problem of change that is unexpected, was not agreed by stakeholders or where a particular group did not reveal an area of change that was important to them.

For smaller projects, it may be enough for staff to identify and monitor unexpected impacts as they appear, but more formal methods will be needed in larger and more complex initiatives. Box 9 illustrates one method used to deal with the problem of unforeseen impacts.⁵

Box 9 Group-based assessment of change

This method, piloted by ActionAid in Vietnam, works without predetermined indicators. By keeping questions as open as possible, it produces unexpected but important information that might have been missed in a more defined evaluation. Representative samples from groups of poor people supported by a project are asked how well the other members have fared during the past year, in particular:

- Which members' households have experienced improvement in their situation, which have experienced deterioration and which have remained in the same condition?
- For households whose situation has improved or deteriorated, how has their situation changed?
- For households whose situation has improved or deteriorated, why has their situation changed?

Individual answers are collated to gain a picture of change within the group. Repeat exercises give a fuller picture of the dynamics of change.

Intended to give a comprehensive picture of local livelihoods, the piloting of the method in Vietnam shed light on vulnerability to hazards by indicating the relative significance of harvest failure due to a recent drought among those households whose situation had deteriorated. The low importance assigned to this factor surprised the facilitators (and was perhaps misleading, since other data from the exercise showed that food production deficits were an important aspect of deterioration).

Source: Smith, W. *Group based assessment of change: method and results 1998. RDA 2 Can Loc district, Ha Tinh province.* Hanoi: ActionAid Vietnam, 1998.

Control groups. Some development project evaluations use control groups for comparison. In disaster reduction (and particularly humanitarian response), agencies may be uneasy about studying at-risk groups that the organisation is not attempting to protect. However, this method can be useful. Some evaluations interview community members not involved in projects, though usually to identify reasons for non-participation. Talking to groups that have dropped out of a project can also provide valuable information about the way the project was implemented.

The University of Delaware Disaster Research Center's evaluations of Project Impact (see Box 6) held focus group interviews with members of communities that had joined the scheme and those that were not involved, to find out if experiences and approaches used in the seven pilot initiatives would be transferable without substantial government seed funding.

Beneficiaries. The importance of identifying who benefits from a DRR initiative cannot be overemphasised. Evaluators should not assume that benefits are spread evenly across a community. They should assess the socio-economic characteristics of beneficiary communities, considering gender issues and people who are vulnerable due to other factors such as ethnicity, age and disability.

Considerable guidance is now available on incorporating gender aspects into risk and vulnerability analysis and project planning. However, tools for evaluating gender-specific outcomes of disaster reduction actions are not widely available.⁶

⁵ Approaches such as this, without predefined indicators, are becoming more widely used. One of the best developed is the 'Most Significant Change' method: see Davies, R. and Dart, J. *The 'Most Significant Change' (MSC) Technique: A Guide to its Use.* Cambridge: privately published, 2005. Available at: <http://www.mande.co.uk/docs/MSCGuide.htm>

⁶ One potentially useful tool is the 'Gender equality results and indicators for disaster-related programmes' indicator framework, developed recently by an evaluation team: Gander, C. et al., 'Evaluation of PAHO's Disaster Preparedness Programme in Latin America and the Caribbean' (London: Department for International Development (UK), unpublished evaluation report), reproduced in Benson and Twigg (2001), pp 124–125.

Evaluators should not be content with limited indicators of activity – for example, the number of women taking part in project activities such as emergency preparedness training – as evidence of greater gender equity in DRR.

Sustainability. It may be difficult to judge the probability of a project's long-term sustainability and replication during its lifetime, but this can be inferred from other evidence. As in the development sector, DRR initiatives are more likely to be sustainable where extensive time and effort have gone into preparatory work with communities, partners and other local and national stakeholders. Another indicator that has been used is the level of stakeholder contributions of financial and other resources to the project, on the assumption that sustainability is linked to the degree of local ownership.

In community-based projects, the strength of community organisation is the central factor. Evaluations often place great emphasis on creation or revival of local groups such as disaster management committees. But the mere existence of such groups is a weak indicator of their capacity to manage risk and attitudinal analysis may only demonstrate short-term enthusiasm. Therefore, evidence of group activity should be collected (e.g., risk assessments, preparation of emergency plans, purchase of equipment, building of mitigation structures such as embankments). The frequency, nature and quality of such activities and the degree of community involvement can be monitored and evaluated internally or by outsiders.

Evaluators should consider external factors that may affect sustainability, such as changes in official policy or funding regimes, staff turnover and economic downturns.

Structures, systems and organisations. Most M&E methods address relatively discrete or small-scale projects, but larger-scale (e.g., national-level or system-wide) interventions also have a vital role in DRR. Evaluation of national and other higher-level DRR systems requires a comprehensive perspective covering policy and institutions as well as practice (see Table 1). It also needs to consider the roles of different actors in DRR: national and local government, the private sector, civil society and inter-governmental and regional institutions.

Methodological guidance on assessment in these contexts is limited and there is little documented evaluation experience, making it difficult to specify good practice. However, a few methods have been developed recently to assess national-level progress in DRR and to help set goals and targets (see Further reading). National-level risk and vulnerability indices (see **Guidance Note 4**) can also be used here.

The processes by which DRR might be effectively 'mainstreamed' into development organisations' policy and practice are not well understood, although some promising assessment tools have appeared recently (see Further reading). A broad perspective is required, which will probably cover the following areas of an organisation's work:

- Policies
- Strategies or business plans
- Operational guidelines for planning and implementing projects and for running the organisation itself
- Geographical and sectoral plans
- Programme and project design and proposals
- Organisational structures, systems and capacities
- External relations

Step 4. Application of findings

Evaluation reports are potentially valuable documents: they enable practical lessons to be learned and applied, provide a basis for discussion about better practice and policy, feed into strategic planning and build up institutional memory. Willingness to learn from experience is essential. Evaluation should be embedded within an organisation's systems and regular practice to ensure that learning takes place.

Box 10 Institutional take-up of evaluation findings

An evaluation in 2003–2004 of the Inter-American Development Bank's policy and operational experience related to natural disasters demonstrated disasters' significant impact on development prospects, which was not adequately addressed by the countries concerned, while the Bank's own approach was largely reactive to events. The evaluation's findings stimulated the development of a four-year action plan (2005–2008) for improving the Bank's disaster risk management, based on new approaches to country programming and business management; changes to policies, procedures and financial products; and an organisational approach focusing on pre-disaster risk reduction. Making the plan a reality has required securing the support of senior management, obtaining financing and resources and engaging technical staff in the process.

Source: Clarke, C.L. *From Evaluation to a Renewed Business Model: The IDB Experience. Presentation to 'Disaster Risk Management: Conference on Taking Lessons from Evaluation and Evaluators' Roundtable*. Paris, 20–21 November 2006. Available at: http://www.worldbank.org/ieg/naturaldisasters/paris/presentations/IADB_Clarke.pdf

The evaluation process should be as open as possible and the results made widely available. Feeding findings back to all project stakeholders before reports are submitted allows for discussion and clarification. Participatory evaluations that create ownership of the final product among stakeholders increase the likelihood that lessons will be acted upon.

Reviews of collected individual evaluations can identify salient lessons and themes that are more widely applicable in policy and operations (see Box 11). In some cases, joint reviews by agencies might be carried out to encourage mutual learning, knowledge sharing and transparency.

Box 11 Wider lesson-learning

An International Federation of Red Cross and Red Crescent Societies (IFRC) review in 1999 drew on evaluations of disaster preparedness programmes in three continents to generate lessons relating to six issues: appropriateness of a regional approach; integration with other activities; partnerships and capacity building; programme communication; impact and issues concerning disaster preparedness delegates; and volunteers. These issues appeared in all or most of the programmes evaluated and echoed findings in the IFRC's international strategy. The review therefore assisted reflection on strategy within the IFRC.

In 2006, the World Bank's Independent Evaluation Group published a comprehensive evaluation of the Bank's assistance to countries affected by natural disasters. Based on analysis of 528 projects since 1984, the evaluation made numerous recommendations relating to the nature and effectiveness of the Bank's response to disasters, the integration of risk management into development strategies and internal and external coordination.

Sources: Mitchell, J. *Learning from the Past: a look back at evaluations and reviews of disaster preparedness programmes*. Geneva: IFRC, unpublished paper, 1999; World Bank. *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. Washington, DC: World Bank, Independent Evaluation Group, 2006. Available at: http://www.worldbank.org/ieg/naturaldisasters/docs/natural_disasters_evaluation.pdf

3. Critical factors for success

- Realistic and practical planning, with clear aims and objectives.
- Adequate resources (time, personnel and budget) allocated to M&E in project planning.
- Use of a mix of data collection methods that are appropriate to the project and the aims of the evaluation.
- Involvement of key stakeholders, especially beneficiaries, in evaluation – as genuine participants in the process, not merely providers of information.
- Identification and selection of relevant indicators, which demonstrate impact as well as cause–effect relationships between project processes (activities and outputs), outcomes and impact.
- Recognition that project benefits may not be shared equally; identification of impacts on different sections of the community.
- Application of lessons learned to improve practice and policy.
- Transparency in the process, and sharing of findings with other stakeholders.

Box 12 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk and their inherent degree of vulnerability or resilience.⁷

Mitigation is any structural (physical) and non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs; restore normal activities; and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or the variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

Further reading

Monitoring and evaluating disaster risk reduction

Benson, C. and Twigg, J. *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation – a scoping study*. Geneva: ProVention Consortium, 2001. Available at: http://www.proventionconsortium.org/mainstreaming_tools

ProVention Consortium. *Risk Reduction Indicators*. TRIAMS Working Paper. Geneva: ProVention Consortium, 2006. Available at: http://www.proventionconsortium.org/themes/default/pdfs/TRIAMS_full_paper.pdf

ProVention Consortium: Details of the Consortium's forthcoming *Monitoring and Evaluation Sourcebook* will be posted on its Tools for Mainstreaming Disaster Risk Reduction web page: http://www.proventionconsortium.org/M&E_sourcebook

Twigg, J. *Disaster Risk Reduction: mitigation and preparedness in development and emergency programming*. Good Practice Review no.9. London: Overseas Development Institute, Humanitarian Practice Network, 2001. Available at: <http://www.odihpn.org/publist.asp>

World Bank. *Hazards of Nature, Risks to Development: An IEG Evaluation of World Bank Assistance for Natural Disasters*. Washington, DC: World Bank, Independent Evaluation Group, 2006. Available at: http://www.worldbank.org/ieg/naturaldisasters/docs/natural_disasters_evaluation.pdf

Tools for evaluating national-level DRR systems

Mitchell, T. *An Operational Framework for Mainstreaming Disaster Risk Reduction*. London: Benfield UCL Hazard Research Centre, 2003. Available at: http://www.benfieldhrc.org/disaster_studies/working_papers/workingpaper8.pdf

⁷ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

World Bank. *Natural Hazard Risk Management in the Caribbean: Revisiting the Challenge*. Report no. 24166, vol. 1. Washington, DC: World Bank, Caribbean Country Management Unit, 2002. Available at: <http://www.worldbank.org>

World Bank. *Natural Hazard Risk Management in the Caribbean: Good Practices and Country Case Studies. Technical Annex*. Report no. 24166, vol. 2. Washington, DC: World Bank, Caribbean Country Management Unit, 2002. Available at: <http://www.worldbank.org>

Tools for assessing DRR mainstreaming in organisations

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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Budget Support

Guidance Note 14

Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes for use by development organisations in adapting programming, project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series is also of relevance to stakeholders involved in climate change adaptation.

This guidance note addresses the issue of budget support, providing guidance on how to ensure that disaster risk and related options for reducing vulnerability are adequately and systematically examined in developing programmes of budget support. This guidance note is intended for use by development organisation staff involved in the design, implementation and evaluation of budget support.

1. Introduction

The term budget support is used to describe external assistance channelled directly to recipient governments using the governments' own allocation, financial management, procurement and accounting processes and systems. It is not linked to specific project activities but may be accompanied by related technical assistance and capacity building. Budget support encompasses a range of instruments, entailing varying forms of conditionality and policy dialogue and degrees of earmarking of resources. During the 1980s and 1990s, much of it was provided by international financial institutions (IFIs) in the form of structural adjustment finance, with the basic objectives of reducing external and internal imbalances and promoting economic growth. Provision of this form of budget support was conditional on the implementation of specific economic adjustments and reforms relating to factors such as deregulation, privatisation, inflation and public sector deficits. Since the late 1990s, a new form of budget support has emerged in support of the achievement of government-determined policies and programmes. This budget support is directly aligned with government initiatives, such as poverty reduction strategies (PRSs), and places particular emphasis on the development of effective underlying processes, including macroeconomic and budgetary management and good governance. Budget support has also been provided as far back as the post-Second World War Marshall Plan in the form of unconditional assistance programmes, such as balance of payments support and programme food aid, to meet temporary gaps in external financing or domestic budgetary resources.¹

Budget support is provided by IFIs and bilateral agencies, sometimes acting jointly to fund a particular budget support programme, such as a PRS. It may be provided to sub-national entities such as provinces or states, as well as to national governments. Budget support can be in the form of general budget support, entailing the provision of overall budget financing. Alternatively, it can be in the form of sector budget support, under which funding is earmarked for use in a specific sector or sectors with any conditionality relating to these sectors.

There is an ongoing shift away from project-based assistance towards general and sector budget support as part of a broader effort to improve aid effectiveness. Budget support can increase government ownership of budgetary and policy processes, improve policy dialogue, enhance donor harmonisation and help ensure that external assistance is better aligned with national goals, strategies and systems. Over the medium term, the shift towards budget support is also expected to reduce transaction costs and improve the predictability of resource flows.²

¹ See DFID (2004a); and IDD and Associates, *Joint Evaluation of General Budget Support: Inception Report*. Birmingham, UK: University of Birmingham, International Development Department, 2005. Available at: <http://www.dfid.gov.uk/aboutdfid/performance/files/evd2-inception-report.pdf>

² See DFID (2004a).

The growth of budget support offers considerable potential for helping governments to strengthen their resilience to natural hazards, especially with the increasing emphasis on efforts to support underlying processes and good governance and on tailoring programmes of budget support to individual country circumstances. In particular:

- The development of more effective processes of medium-term macroeconomic and budgetary planning and management is intrinsic to improved disaster risk management, helping to ensure that risk reduction needs are not overshadowed by shorter-term, more immediate, but perhaps ultimately less important, concerns.
- Systems of prioritisation of expenditure – an element of good fiscal management – can play an important role in ensuring that key development programmes are protected from the possible reallocation of resources in the aftermath of a disaster.
- Efforts to ensure that recurrent maintenance budgets are adequate can help enhance hazard resilience of physical structures by ensuring that they remain in a good state of repair.
- Budget support implies a potentially more predictable flow of resources, an important factor in supporting effective decision-making in an immediate post-disaster context (although in practice commitments and flows of budget support funding have often been short term and unpredictable to date).
- Ongoing budget support implies that a country's performance is being closely monitored, providing early indications of difficulties emerging as a consequence of any disaster events and so helping to facilitate the provision of appropriate forms of external assistance that keep priority development policies and initiatives on track as well as meet humanitarian and reconstruction needs.

By the same token, increased provision of budget support also creates new challenges for development organisations in pursuing disaster risk reduction objectives. In particular:

- Although budget support creates opportunities for enhanced policy dialogue, objectives such as disaster risk reduction can get lost among other priorities in the shift from project to budget support, particularly where there is little political commitment to disaster risk reduction and where disaster risk reduction achievements are not captured in programme monitoring and evaluation.
- Efforts to respect and support country ownership can reduce the room for policy dialogue on difficult issues such as disaster risk reduction and the introduction of new approaches and thinking.
- Disaster risk reduction objectives can similarly get lost in attempts to harmonise donor priorities and limit donor micro-management of government policies and programmes.
- Budget support offers less automatic direct contact with vulnerable groups, creating additional challenges in addressing disaster risk reduction sensitively and appropriately.

However, these difficulties are not unique to the issue of disaster risk reduction and development organisations are developing different ways of working to overcome such problems, as discussed in further detail below. In more problematic cases, sector budget support or more traditional forms of aid may be more appropriate than general budget support. For instance, it may be easier to actively mainstream disaster risk reduction into sector budget support in areas where the need to address disaster risk is immediately obvious (e.g., road infrastructure). Sector budget support in support of specific disaster risk management policies and programmes could also be appropriate. Certain other aspects of disaster risk reduction, such as the strengthening of building codes and practice, will almost always be best supported through other aid instruments regardless of the country context. Technical cooperation can also be important in strengthening government capacity to monitor, analyse and address forms and levels of disaster risk and in enhancing the participation of marginalised vulnerable groups in this process.

Examining disaster risk and encouraging appropriate disaster risk management concerns, in turn, can be critical to the success of budget support. Disaster events can potentially undermine the implementation, performance, effectiveness and long-term sustainability of achievements of policies and programmes with which budget support is linked (see Box 1 and Section 2, Step 1). The specific nature of supported policies and programmes, in turn, can contribute to shifts in forms and levels of vulnerability to natural hazards at micro, meso and macro levels. The possibility and implications of such shifts also need to be explored.

Box 1

Undermining achievements of budget support: Disaster shocks hurt

A public sector reform programme in Honduras, supported by the Inter-American Development Bank (IDB) and the World Bank, which sought to modernise the public sector and remove structural imbalances contributing to recurrent fiscal imbalances, ran into certain difficulties as a consequence of Hurricane Mitch in 1998. In recognition of the substantial budgetary pressures caused by the hurricane, the second tranche of IDB

budget support was released despite insufficient progress in the institutional and public sector management components of the programme. However, the envisaged sale of the state-owned telecommunications enterprise, originally valued at US\$ 440 million, did not proceed because, in part due to physical losses suffered as a result of Hurricane Mitch, when the enterprise was put up for sale in 2001 the highest bid received only reached US\$ 80m. This sale had previously been expected to result in a 50 per cent reduction in the enterprise's debt and a US\$ 12.5m reduction in annual debt servicing.

Source: IDB. *Country Program Evaluation (CPE): Honduras*. RE – 263. Washington, DC: Inter-American Development Bank, Office of Evaluation and Oversight, 2002.

Current state of the art

Budget support is generally best suited to high aid-dependent countries with relatively good macroeconomic management and sector policy and good budget management.³ Yet capacity to manage and reduce disaster risk is rarely considered in undertaking related assessments to determine whether, indeed, the quality of macroeconomic and budgetary management and related policies is sufficient to support effective programmes of budget support. Similarly, the potential hazard vulnerability implications of the policies and programmes to be supported through budget support, whether positive or negative, are rarely considered with a few notable exceptions (see Box 2), nor efforts made to maximise their disaster risk management benefits. In hazard-prone countries, this is a potentially significant oversight. Disaster risk must be explicitly considered in scoping programmes of budget support, agreeing terms and conditions and determining related technical assistance, and in subsequent implementation and evaluation.

Box 2 Potential benefits of budget support for disaster risk

Disaster risk is rarely considered in the preparation of programmes of budget support, other than in passing in the context of factors affecting recent economic performance where significant. However, there are a few exceptions. For instance, the loan policy document for a World Bank Development Policy Loan (DPL) for Mexico, which was approved in 2006 in support of financial sector policy reforms, commented that the operation could benefit efforts to lower the destabilising impact of disasters. The Bank and other donors had already been actively involved in providing technical assistance to the government on the use of financial instruments that could lower the fiscal impact of disasters. This assistance had included some technical studies on catastrophe bonds, which would provide liquidity to the government in the event of a disaster and generally enhance its ability to spread and hedge financial risks. As the DPL policy document noted, the reforms supported by the DPL would seek to facilitate the operation of the capital markets and ultimately its increase in liquidity, so creating a suitable environment for the issue of these catastrophe bonds.

Source: World Bank. *International Bank for Reconstruction and Development Program Document on a Proposed First Programmatic Finance and Growth Development Policy Loan in the Amount of US\$501.26 million to the United Mexican States*. Report No. 34552-MX. Washington, DC: World Bank, 2006. Available at: http://www-wds.worldbank.org/external/default/main?pagePK=64193027&piPK=64187937&theSitePK=523679&menuPK=64187510&searchMenuPK=64187283&siteName=WDS&entityID=000090341_20060209093959

Advocated good practice

Four essential actions are required in developing programmes of budget support to ensure that disaster risks are adequately assessed and managed:

- An early assessment of vulnerability to natural hazards should be undertaken in hazard-prone countries. Ideally this will have already been undertaken as part of the national or sectoral policy or programme being supported.
- Development organisations should explore and encourage governments explicitly to address any shortcomings in their disaster risk management policies and strategies that could potentially jeopardise the implementation, performance, effectiveness or long-term sustainability of achievements of the policies and programmes supported. Ultimately, the quality of disaster risk management aspects of these policies and programmes will depend on the extent to which the principle of disaster risk reduction is integrated within them and the strength of government and civil society buy-in.

³ IDD and Associates (2006).

- Development organisations should consider the provision of accompanying technical assistance to strengthen disaster risk management in cases where weaknesses in existing practices could jeopardise the success of the policies and programmes supported.
- Deliberate steps should be taken to ensure that planned disbursements of budget support are not deferred or cancelled in the event of a disaster.

2. Basic steps in merging disaster risk considerations into budget support programmes

The scope and emphasis of budget support can vary considerably, between both development organisations and recipient countries. However, a broadly similar process is followed by all development organisations in preparing and implementing programmes of budget support. Measures required to ensure that disaster risk is adequately and systematically examined and addressed at each of these steps are outlined below and summarised in Figure 1. It should be noted that, in practice, some of these steps are likely to overlap, rather than be sequential. In particular, Steps 3 and 4 may be undertaken in conjunction with Step 2.

Step 1. Undertake background analysis

Consider disaster-related issues in undertaking analytical work to assess the capacity to use the budget support resources effectively and identifying any shortcomings.

In hazard-prone countries, the obvious first step is to establish the types, magnitude, geographical scale and probabilities of hazards faced and related forms and levels of risk. Ideally, an overall assessment of disaster risk will have already been completed in preparing the development organisation's country strategy (see **Guidance Note 4**).

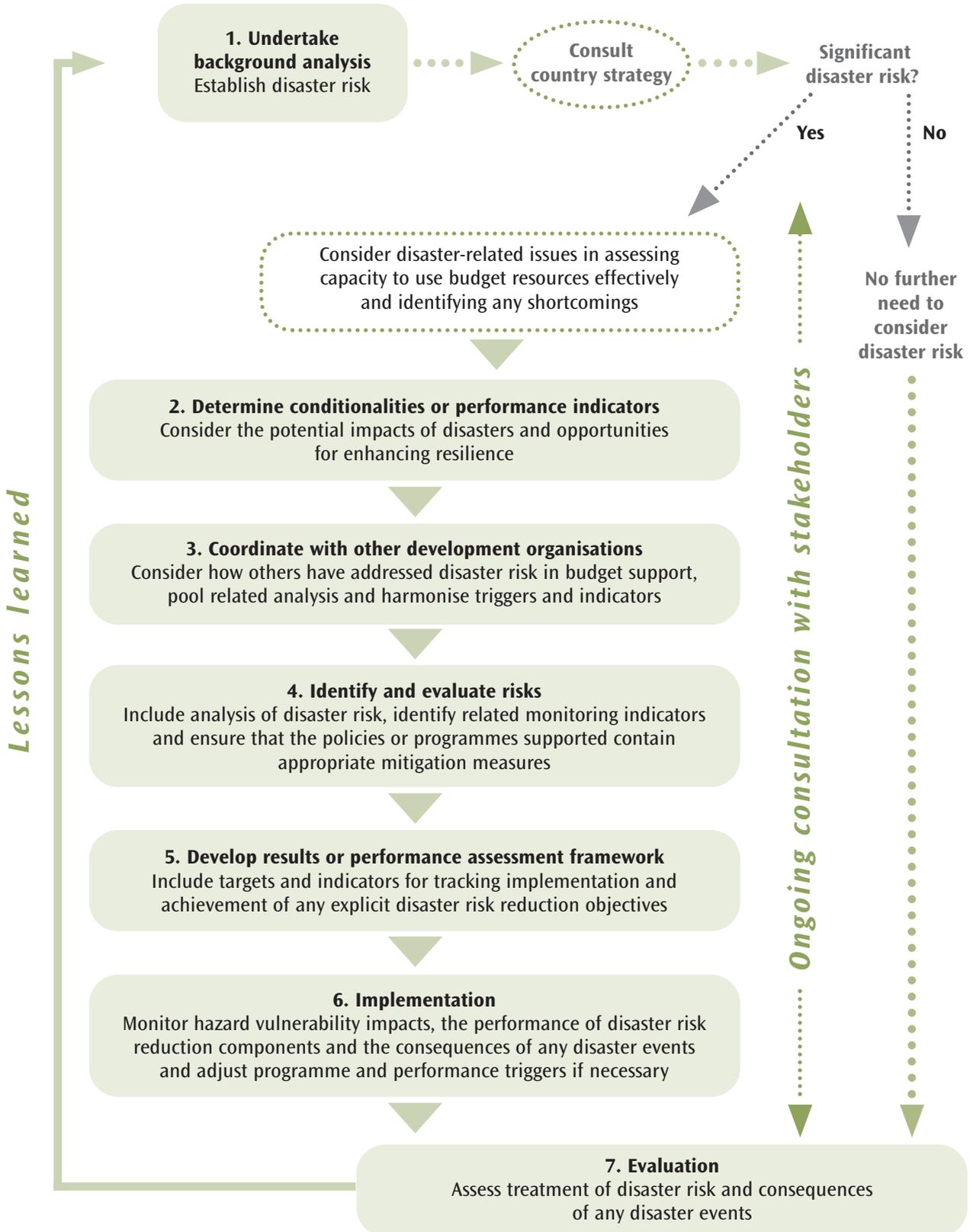
Particular regard should be paid to the national or sectoral policies and programmes against which the proposed budget support would be aligned and the extent to which disaster risk management principles and measures are integrated within these (see also **Guidance Note 3** with specific regard to PRSs). As already noted, the principle of disaster risk reduction needs to be firmly embedded within the government policies and programmes supported, rather than in budget support agreements, and linked to adequate budgetary allocations if it is to be effective. Development gains may be unsustainable if disaster risk is not adequately addressed.

In hazard-prone countries, disaster-related issues also need to be considered within the context of all other background analyses. The following provides an indicative list of assessments that may be consulted or undertaken and how each of these should examine and address disaster-related issues, ideally building on related analytical work already undertaken for country programming purposes (see **Guidance Note 4**):

- *Poverty and social impacts.* The likely impact of the policies and programmes supported on known hazard-vulnerable groups should be considered in exploring their poverty and social impacts. This analysis should consider both poor and non-poor vulnerable groups as disasters can force additional numbers into poverty. (See also **Guidance Notes 3, 9 and 11.**)
- *Macroeconomic policies, frameworks and management.* A substantial amount of budget support is directly aligned with macroeconomic policies and goals. The related assessment should consider the potential macroeconomic impact of major disaster shocks, whether government strategies to address disaster risk from a broad macroeconomic perspective are adequate and the implications of supported economic policies and strategies for future vulnerability. Major disasters can and do have severe negative short-run economic impacts. Disasters can also have negative longer-term consequences, particularly when they occur frequently. However, high macroeconomic exposure and related disaster-induced instability are not inevitable, even in the most hazard-prone countries. Vulnerability is determined by a complex, dynamic set of influences relating to factors such as economic structure, stage of development, prevailing economic conditions and the policy environment as well as the types of hazard experienced (see Box 3) and can be reduced.⁴ In highly hazard-prone countries, macroeconomic policies and programmes may, therefore, need to be adjusted to balance disaster risk against socio-economic objectives. Economic forecasting exercises should also be extended to consider major disaster scenarios in high-risk countries (see Box 4). (See also **Guidance Notes 3 and 8.**)

⁴ For further discussion, see Benson, C. and Clay, E.J., *Understanding the Economic and Financial Impacts of Natural Disasters*. Disaster Risk Management Series No. 4. Washington, DC: World Bank, 2004. Available at: http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&id=000012009_20040420135752

Figure 1 Integration of disaster risk concerns into budget support



Box 3 Bangladesh – the dynamics of vulnerability

The sensitivity of Bangladesh's economy to extreme monsoon flooding has declined significantly over the past three decades. This decline has been partly due to structural change in the agricultural sector, with a rapid expansion of much lower-risk dry season irrigated rice, and partly due to internal market integration and increased private food imports during disaster years. Hydrologically, the 1998 floods were a 1 in 50-year event. However, food grain production actually increased 5.6 per cent year on year in volume terms, substantially exceeding even the government's pre-flood forecast of 2.4 per cent growth. Initial post-flood assessments had anticipated a 10–11 per cent decline in annual output but underestimated the country's greatly enhanced capacity to increase dry season production when required.

Other influences increasing resilience include the spread of formal (including micro) credit and growing remittances from internal and international migrants. International remittance flows have increased further post disaster – for instance, rising by 18 per cent following the 1998 floods – providing a new form of coping mechanism. Change in the composition of productive activity has been another factor: export-oriented garment manufacturing has gradually expanded and to date has been relatively flood-proof. There has also been relative financial stability in recent years, in contrast to the hyperinflation that prevailed during the famine-haunted mid-1970s. However, the hydrologically less extreme 2000 and 2004 floods demonstrated that massive poverty-related vulnerability still persists, requiring more targeted measures for consumption smoothing and livelihood protection.

Source: ODI. *Aftershocks: Natural Disaster Risk and Economic Development Policy*; ODI Briefing Paper. London: Overseas Development Institute, 2005. Available at: http://www.odi.org.uk/publications/briefing/bp_disasters_nov05.pdf

Box 4 Modelling the impact of disasters on long-term growth

The International Institute for Applied Systems Analysis (IIASA), in conjunction with the World Bank, has developed a planning tool for incorporating future probabilistic losses resulting from natural hazards into macroeconomic forecasting models and quantifying the implications. In essence, this tool is based on a simple model focusing on the impact of disaster-related capital losses on rates of national economic growth. To illustrate its use and the nature of the findings that it can generate, the model was applied to three case studies (Argentina, Honduras and Nicaragua), under varying assumptions about the sourcing and adequacy of post-disaster relief and rehabilitation funding. It could be similarly used for macroeconomic forecasting exercises elsewhere.

Source: Freeman, P.K., Martin, L.A., Mechler, R. and Warner, K. with Hausmann, P. *Catastrophes and Development: Integrating Natural Catastrophes into Development Planning*. Disaster Risk Management Working Paper Series 4. Washington, DC: World Bank, 2002. Available at: http://www.proventionconsortium.org/themes/default/pdfs/cat_dev.pdf

- **Public expenditure management.** In the case of general budget support, the assessment should examine how disaster-related issues are taken into account in the allocation of public resources, considering whether there is sufficient expenditure on disaster risk reduction and adequate financial planning for future disaster events (see **Guidance Note 4**, Box 6 for a fuller discussion). In assessing both general and sector budget support, the likely consequences of a major disaster event for the policies and programmes supported should also be explicitly explored, including an examination of the likelihood of a reduction in funding due to the reallocation of budgetary resources for relief and reconstruction purposes. The assessment should also, more specifically, consider whether any disaster risk management activities included in the policies and programmes supported have been adequately budgeted for.
- **Procurement and financial accountability systems.** The implications of disaster events for capacity to adhere to country procurement procedures and financial reporting arrangements should be explored.
- **Institutional and legislative arrangements.** The assessment should cover disaster risk management institutional capacity, legislation and related expertise as relevant to the particular focus of the proposed budget support. It should explore whether existing arrangements are sufficient to ensure that budget support objectives will not be compromised in the event of a disaster and to support the exploitation of any opportunities to enhance resilience. Any shortcomings should be identified. Particular regard should be paid to building codes and land

use planning to help ensure that any related physical structures are built to acceptable standards (see **Guidance Note 12**). Institutional and legislative capacity to implement any specific disaster risk reduction policies and programmes with which provision of the budget support is aligned should also be examined, at the level of both national and local government if relevant.

- **Governance.** In addition to aspects of governance touched upon above, a few further disaster-related factors should be considered in examining the quality of governance, exploring its implications for the potential effectiveness of the proposed budget support and identifying any shortcomings. In particular, the level of long-term commitment to disaster risk reduction should be explored. Demonstrated capability to enforce land-zoning laws and building codes and standards and to ensure good quality of construction is also important, as corruption in the construction sector is particularly high in many countries,⁵ exacerbating disaster-related damage and loss of life. Strong systems of land tenure and titles are similarly important as weak land security discourages investment in risk reduction and the uptake of insurance.
- **Environment and natural resources management.** The assessment should examine whether natural hazards, vulnerability and related measures to enhance resilience are adequately considered within the government's environmental policies, standards and assessment procedures as applied to the policies and programmes to be supported, and whether there is adequate hazard data available for assessment purposes. Development organisations' own environmental policies also often require them explicitly to assess any significant environmental impacts of the policies and programmes against which the budget support would be aligned and related government measures to reduce any adverse effects and enhance positive ones. This assessment should include examination of the implications of any environmental impacts for vulnerability to natural hazards, the potential impact of hazard events on the policies and programmes and required mitigation measures (see also **Guidance Note 7**, Box 4 on strategic environmental assessments (SEAs) and Box 3 on country environmental analysis (CEA)).

The disaster-related findings of these analyses will help inform the budget support agreement and related policy dialogue. They may also indicate the need for complementary project-based support or technical assistance to strengthen disaster risk management capacity and capabilities – for instance, to support the strengthening of relevant institutions and legislation, improve climatic forecasting and warning systems, provide training or construct structural mitigation measures.

Step 2. Determine conditionalities or performance indicators

Consider the potential implications of disaster events and opportunities for enhancing hazard resilience in determining the conditions of budget support, including output and outcome indicators and policy and institutional measures.

Conditionalities may be in the form of prior actions that must be taken before the initial disbursement of credit and of indicative triggers determining the release of further tranches of funding or new budget support actions. These conditionalities are increasingly based on a subset of the actions, targets and outcomes set by recipient governments themselves in the policies and programmes being supported. In other cases, release of tranches of budget support is based on a more general assessment of overall progress in key strategies, such as poverty reduction.

Disaster-related factors have not featured much, if at all, in budget support conditionalities to date, reflecting the relatively limited attention they receive in overall government policies and strategies. However, it is important to consider the impact that a potential disaster could have on the achievement of other selected conditionalities, both to emphasise the importance of permitting some relaxation of conditionalities post disaster and to encourage dialogue on ways of strengthening hazard resilience (see Box 5). In highly disaster-prone countries, it may be appropriate to run disaster scenarios and consider the potential implications of disasters both for the overall policies and programmes being supported and for specific performance triggers against which the budget support is attached. It may even be appropriate to set reduced performance triggers in the first place if major disasters occur with high frequency. More generally, a flexible set of conditionalities may be appropriate in hazard-prone countries, allowing lack of progress in particular areas to be offset by achievements in others.

The findings of the background analysis under Step 1, together with this examination of conditionalities, could also result in adjustments to the policies and programmes with which the budget support is aligned and the inclusion of related triggers as additional conditionalities. For instance, development of a comprehensive financial disaster risk management strategy could be required as part of efforts to help strengthen broader public financial and

⁵ Transparency International. *Global Corruption Report: Special Focus on Corruption in Construction and Post-Conflict Reconstruction*. London: Pluto Press, 2005. Available at: http://www.transparency.org/publications/gcr/download_gcr/download_gcr_2005

macroeconomic management. Release of budget support in favour of a PRS could be dependent upon revisions to the building code to require improved hazard resilience of related infrastructure investments. At a sectoral level, improved climatic forecasting capacity and dissemination, say, could be required as a conditionality on the provision of budget support to help strengthen agricultural performance.

Box 5 Disasters – a potential threat to the achievement of conditionalities

A major disaster event can have wide-reaching impacts, potentially threatening the successful achievement of a number of budget support conditionalities. Possible examples are indicated below:

Macroeconomic performance

- Overall and sectoral gross domestic product growth targets may not be achieved.
- Inflation may exceed the target rate.

Poverty reduction

- Targeted reductions in the percentage of the population below the poverty line may not be achieved (see **Guidance Note 3**).

Public financial management

- Budgetary resources may be reallocated to help finance the relief and rehabilitation efforts, implying that:
 - targeted improvements in the variation between planned and actual expenditure may not be achieved, either overall or by sector;
 - specific minimum resource allocation requirements for particular programmes or sectors (e.g., health, education) may not be met; and/or
 - particular initiatives may be under-funded.
- Targeted reductions in the budget deficit or the domestic borrowing requirement may not be achieved if additional resources are required to help finance relief and rehabilitation efforts.
- Targeted reductions in state enterprise deficits may not be achieved due to disaster-related damage and operating problems (see also Box 2).
- Tax revenue targets may not be met due to lower productivity and the possible temporary suspension of some forms of taxation to help foster recovery.
- Progress in implementing financial management and fiscal reforms may be delayed as attention is diverted.

Private sector development

- Targeted increases in rates of domestic and foreign direct investment may not be achieved if the disaster causes major infrastructural damage and harms investment climate perceptions.

Financial sector development

- Progress in expanding microfinance may be hindered if microfinance institutions have large portfolios of highly vulnerable clients, leading to post-disaster liquidity problems.

Education

- Targeted improvements in the pupil:classroom ratio may not be achieved due to the diversion of budgetary resources and loss of existing school buildings.
- Targeted increases in the percentage of school-age children attending school may be temporarily hindered if children are withdrawn from school to help support their families.

Agriculture and rural development

- Targeted improvements in marketing infrastructure, such as roads, may not be met due to disaster-related damage.

Step 3. Coordinate with other development organisations

Consider whether and how other development organisations have addressed disaster-related issues in their programmes of budget support, share and coordinate related analytical work and seek to harmonise relevant performance triggers and related monitoring and reporting requirements, ensuring that selected triggers take

appropriate account of disaster risk and, if relevant, agreeing on any specific disaster risk management triggers. Donor harmonisation on realistic, relevant and appropriate disaster risk reduction objectives and related performance indicators is an important element in securing their successful achievement.

Step 4. Identify and evaluate risks

In hazard-prone countries include analysis of both disaster risk and the implications of potential disaster events for other forms of risk, drawing on the work already completed under Step 1. Ensure that appropriate mitigation measures are included in the policies and programmes against which the budget support is aligned (or covered under other initiatives) and identify indicators to monitor high-probability risks.

Fiduciary risk is often of particular concern to development organisations and can be exacerbated if there is inadequate financial planning for disasters, as budget support resources may be reallocated in the event of a disaster. Alternatively, budget support resources may be less effective than envisaged if they are used as intended but total funding for the policies and programmes supported is reduced post disaster. The threat of disasters can also exacerbate other forms of risk – including operational, developmental, macroeconomic and governance risk – and potentially undermine achievements at any level of the results framework (see below), hindering inputs from leading to desired activities, activities to outputs, outputs to outcomes or outcomes to impact (see also **Guidance Note 6**, Box 3).

Step 5. Develop the results or performance assessment framework

The results or performance assessment framework should include any explicitly intended disaster risk reduction outputs and outcomes and related monitoring and evaluation indicators, baseline data and data collection requirements, drawing directly on the results framework for the development organisation's country strategy (see **Guidance Note 4**) or, if significantly different, for the policies and programmes against which the budget support is aligned. As discussed under Step 2, in highly hazard-prone countries all conditionalities and performance indicators should be realistically set to reflect disaster risk. Specific indicators to monitor remaining disaster risk, as identified in Step 4, should also be included, together with any necessary indicators required to measure the impact of the supported policies and programmes on hazard-vulnerable groups (see Step 1).

Step 6. Implementation

In collaboration with the government, monitor the hazard vulnerability implications of the policies and programmes supported, the performance of any disaster risk reduction components (including whether related expenditure commitments are being met) and the impact of any actual disaster events. Any necessary adjustments should be encouraged, whether to the policies and programmes themselves or related performance triggers.

The results-based orientation of newer tools of budget support encourages modification of the programmes with which budget support is aligned and related performance indicators in the face of changing circumstances, in sharp contrast with the relatively inflexible adjustment lending programmes of the 1980s and 1990s. This is particularly beneficial in the event of a disaster, which can result in considerable short-term upheaval both destroying physical infrastructure and the normal functioning of a country and forcing potentially difficult policy decisions. For instance, a government could choose to expand overall credit availability to support productive recovery and refinance microcredit rather than tighten monetary growth to stem inflationary pressures of post-disaster food shortages and a construction boom, thereby failing to meet inflation targets. Alternatively, it could decide to remain within its existing budgetary envelope to satisfy budget support conditionalities when an expansionary fiscal policy might, in fact, be temporarily more appropriate.⁶

A reduction in budget support, its total cancellation and even deferment of disbursements should be avoided if possible in the aftermath of a disaster as this will only exacerbate financial difficulties and disruption to priority development initiatives. However, it should be appreciated that a government may face particular absorptive difficulties, reflecting the combined effects of potentially reduced capacity and a substantial increase in the flow of external resources. Provision of additional budget support specifically in response to a disaster requires careful design to ensure that disbursement is timely and that it helps strengthen disaster risk management practice and capabilities (see Box 6).

⁶ For further discussion, see Benson, C. and Clay, E. J., *Understanding the Economic and Financial Impacts of Natural Disasters*. Disaster Risk Management Series No. 4. Washington, DC: World Bank, 2004. Available at: http://www-wds.worldbank.org/servlet/WDS_IBank_Servlet?pcont=details&eid=000012009_20040420135752

Box 6 Responding to disasters with budget support

Some budget support is provided post disaster, primarily intended as quick-disbursing support to help meet immediate balance of payment and foreign exchange imbalances. For instance, the International Monetary Fund has provided disaster-related emergency assistance since 1962 to meet related foreign exchange financing difficulties arising as a consequence of a decline in export earnings and/or increased imports. Between 1995 and 2005, it extended 11 such loans, totalling US\$ 980 million in nominal terms.⁷

However, a recent World Bank evaluation revealed that disbursement of the Bank's post-disaster balance-of-payment support lending has been much slower than intended. The World Bank has made a total of 15 such loans, aimed at providing quick-disbursing resources to stabilise macroeconomic conditions and facilitate recovery. The evaluation revealed that "despite its emphasis on the rapid disbursement of funds, balance of payment support took an average of about 7 months (214 days) to reach effectiveness and 2.4 years (860 days) to reach closing and therefore did not meet institutional intentions that it be an effective means to provide quick transfer of resources to affected countries".⁸

Much post-disaster budget support also appears to be extended without any related conditionalities supporting the strengthening of underlying disaster risk management, an apparently missed opportunity. However, the World Bank is currently developing a Contingent Hazard Recovery and Management loan, a specialised form of rapidly disbursing development policy lending which governments could access post disaster. In contrast to previous Bank post-disaster budget support operations, this lending would be linked to conditionalities relating to the development of risk management capacity, possibly accompanied with related technical assistance. Under Track III of the Global Facility for Disaster Reduction and Recovery (GFDRR), it is also intended to provide post-disaster budget support to low-income countries as part of a Standby Recovery Financing Facility. Recipient countries will have to meet certain conditions regarding ex-ante risk management. The World Bank and the United Nations International Strategy for Disaster Reduction launched the GFDRR in September 2006 (see **Guidance Note 1**).

Pre-negotiated post-disaster budget support could be another new option, offering opportunities for rapid disbursement and incentives for improved disaster risk management. For instance, a World Bank disaster risk management project approved in 2005 for Vietnam includes a rapid disbursement facility to fund post-disaster reconstruction of small-scale public infrastructure, supporting a recurrent financing gap in public resources and related strengthening of the budgetary management of disasters. In Phase II (2009–2012) of this project, if requested by the government, additional funds could be provided for post-disaster reconstruction following the government's disbursement mechanism for the State Contingency Budget, in effect as budget support.

Step 7. Evaluation

With the benefit of hindsight, explore:

- whether disaster risk and the vulnerability implications of the policies and programmes supported were adequately analysed and addressed;
- the benefits and achievements of any specific disaster risk reduction-related conditionalities;
- how any disasters occurring over the period of budget support affected its use, outcome and effectiveness and also the performance of underlying processes, including government monitoring activities and budgetary and macroeconomic management;
- whether the sustainability of achievements is potentially threatened by future disaster events; and
- the impact of the policies and programmes supported on vulnerability to natural hazards.

Repeated step: Ongoing consultation with stakeholders

Invite dialogue on disaster-related issues in determining the precise form and nature of the budget support and during subsequent implementation and evaluation. The new generation of budget support places increasing emphasis on policy dialogue with governments, offering opportunities to enter into discussion on disaster risk management and encourage good practice where relevant to the policies and programmes with which the budget support is aligned. These discussions should explore the feasibility of achievement of conditionalities and broader aims and

⁷ IMF. *IMF Emergency Assistance: Supporting Recovery from Natural Disasters and Armed Conflicts – Factsheet*. Washington, DC: International Monetary Fund, 2005. Available at: <http://www.imf.org/external/np/exr/facts/conflict.htm>

⁸ World Bank. *Hazards of Nature, Risks to Development - An IEG Evaluation of World Bank Assistance for Natural Disasters*. Washington, DC: World Bank, Independent Evaluation Group, 2006, p. 32. Available at: <http://www.worldbank.org/ieg/naturaldisasters/report.html#An>

objectives of the policies and programmes supported in the event of a disaster and ways of promoting greater hazard resilience and sustainability of achievements, through either the policies and programmes themselves or complementary initiatives. The discussions should draw and build on relevant disaster-related consultations undertaken in preparing the development organisation's country strategy (see **Guidance Note 4**) and on relevant consultations undertaken by the government in preparing its PRS (see **Guidance Note 3**). The consultative process should also give a voice to poor and marginalised groups, who are often among the most vulnerable to natural hazards, and to other relevant stakeholders.

3. Critical factors for success

- *Development organisations need to accept greater accountability for disaster-related losses.* Lines around aid agency responsibilities appear to be ever-more blurred as external assistance is increasingly provided in the form of budget support and individual buildings and items of infrastructure cannot be linked to specific donors. However, development organisations are accountable for seeking to ensure that their resources are used as effectively as possible and, as such, have a responsibility for ensuring that recipient government building codes and practices are adequate and that disaster risk management practices, more generally, including financial risk planning arrangements, are appropriate.
- *Governments and civil society in hazard-prone countries need to prioritise disaster risk reduction.* As provision of budget support is increasingly directly aligned with national and sectoral development and PRSs, it is important that governments and civil society prioritise risk reduction as a critical development challenge in hazard-prone countries and develop related policies, capabilities and legislative and institutional arrangements. Development organisations need to explore incentives for encouraging governments in this process, support efforts to strengthen knowledge and understanding of hazard-related issues and undertake related advocacy work to promote the benefits of disaster risk reduction, including by facilitating and working with networks of committed champions in civil society.
- *Internationally recognised targets for disaster risk reduction need to be established.* There is a growing tendency towards greater coherence of key development targets, such as the Millennium Development Goals (MDGs), providing donors and governments a common focus. Establishment of similar targets for disaster risk reduction or explicit incorporation of disaster risk reduction concerns within the MDGs would play an important role in securing greater consideration of disaster risk (see **Guidance Note 3**) and in holding governments and development organisations to account. Such targets could be included in government and development organisation results-based management and performance assessment frameworks.
- *Agreements on principles of good practice in the provision of budget support should include disaster risk reduction objectives.* International initiatives to harmonise and coordinate donor approaches to budget support and related good practice – as, for instance, under way by the Organisation for Economic Co-operation and Development's Development Assistance Committee (DAC), the Strategic Partnership for Africa (SPA) and the Public Expenditure and Financial Accountability (PEFA) Program – should include good practice principles in the assessment of disaster risk and the support of related measures to strengthen hazard resilience.
- *Complementary projects and technical assistance may be required to support disaster risk reduction more directly.* It may be relevant to consider complementary project-based support and technical assistance to strengthen disaster risk management capacity and capabilities – for instance, to support the development of institutions, legislation or financial risk transfer arrangements, provide training, construct structural mitigation measures or retrofit existing structures. The use of other instruments is particularly important in countries with little commitment to disaster risk reduction and in countries with decentralised but ineffective systems of government where national commitment to disaster risk reduction may not be translated into local action.

Box 7 Hazard and disaster terminology

It is widely acknowledged within the disaster community that hazard and disaster terminology are used inconsistently across the sector, reflecting the involvement of practitioners and researchers from a wide range of disciplines. Key terms are used as follows for the purpose of this guidance note series:

A *natural hazard* is a geophysical, atmospheric or hydrological event (e.g., earthquake, landslide, tsunami, windstorm, wave or surge, flood or drought) that has the potential to cause harm or loss.

Vulnerability is the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, *resilience*, are determined by physical, environmental, social, economic, political, cultural and institutional factors.

A *disaster* is the occurrence of an extreme hazard event that impacts on vulnerable communities causing substantial damage, disruption and possible casualties, and leaving the affected communities unable to function normally without outside assistance.

Disaster risk is a function of the characteristics and frequency of hazards experienced in a specified location, the nature of the elements at risk, and their inherent degree of vulnerability or resilience.⁹

Mitigation is any structural (physical) or non-structural (e.g., land use planning, public education) measure undertaken to minimise the adverse impact of potential natural hazard events.

Preparedness is activities and measures taken before hazard events occur to forecast and warn against them, evacuate people and property when they threaten and ensure effective response (e.g., stockpiling food supplies).

Relief, rehabilitation and reconstruction are any measures undertaken in the aftermath of a disaster to, respectively, save lives and address immediate humanitarian needs, restore normal activities and restore physical infrastructure and services.

Climate change is a statistically significant change in measurements of either the mean state or variability of the climate for a place or region over an extended period of time, either directly or indirectly due to the impact of human activity on the composition of the global atmosphere or due to natural variability.

⁹ The term 'disaster risk' is used in place of the more accurate term 'hazard risk' in this series of guidance notes because 'disaster risk' is the term favoured by the disaster reduction community.

Further reading

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Tools for Mainstreaming Disaster Risk Reduction is a series of 14 guidance notes produced by the ProVention Consortium for use by development organisations in adapting project appraisal and evaluation tools to mainstream disaster risk reduction into their development work in hazard-prone countries. The series covers the following subjects: (1) Introduction; (2) Collecting and using information on natural hazards; (3) Poverty reduction strategies; (4) Country programming; (5) Project cycle management; (6) Logical and results-based frameworks; (7) Environmental assessment; (8) Economic analysis; (9) Vulnerability and capacity analysis; (10) Sustainable livelihoods approaches; (11) Social impact assessment; (12) Construction design, building standards and site selection; (13) Evaluating disaster risk reduction initiatives; and (14) Budget support. The full series, together with a background scoping study by Charlotte Benson and John Twigg on *Measuring Mitigation: Methodologies for assessing natural hazard risks and the net benefits of mitigation*, is available at http://www.proventionconsortium.org/mainstreaming_tools



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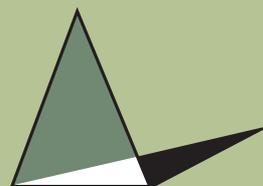
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