

Disaster Risk Reduction Tools and Methods for Climate Change Adaptation

Inter-Agency Task Force on Climate Change and Disaster Risk Reduction

“The view that disasters are temporary disruptions to be managed only by humanitarian response, or that their impacts will be reduced only by some technical interventions has been replaced by the recognition that they are intimately linked with sustainable development activities in the social, economic and environmental fields. So-called ‘natural’ disasters are increasingly regarded as one of the many risks that people face.”¹

I. Introduction

Floods, storms, droughts, and extreme temperatures strike communities around the globe each year. The top ten disasters of 2004, in terms of the number of people affected, were all weather and climate-related. These types of disasters have occurred throughout history but with total damages amounting to US\$130 billion from just these ten events, it is clear that the necessary steps to reduce disasters have not yet been taken.² As climate change begins to manifest itself—in the form of increased frequency and intensity of hazards such as floods, storms, heat waves, and drought—the need for communities to address climate risks is becoming urgent. The coming decades are likely to bring, among other changes, altered precipitation patterns so that many areas will experience more frequent floods and landslides, while others will experience prolonged drought and wildfires.³

As many communities are not prepared to cope with climate disasters facing them today, an ongoing challenge is to build their resilience. In answer to this challenge, disaster risk reduction (DRR)⁴ aims to address a comprehensive mix of factors contributing to communities’ vulnerabilities. There are numerous tools and methodologies that have been developed to put this approach into practice. The value of DRR and the experiences gained by DRR practitioners have been increasingly tapped by organizations active in climate change adaptation. For example, UNDP, OECD, the World Bank, and others have recently explored linkages between the two (see references).

This paper provides a brief description of DRR and then reviews a selection of tools that can provide an effective framework for combining the knowledge and experiences from the disaster management and climate change communities to build adaptive capacity.

II. The Disaster Risk Reduction Approach

The disaster management community has been evolving. Until the 1990s, disaster management was primarily focused on the response of governments, communities, and international organizations *after* disasters. This included the humanitarian aspects of relief, such as providing medical care, food and water, search and rescue, and containing the secondary disasters (e.g. fires that occur following an earthquake). Even now, only a tiny amount of humanitarian funding is spent on disaster risk reduction. Although the international community has increasingly realized that countries experience disasters differently, the unfortunate truth is that poorer countries are hit hardest, as they do not have

1 ISDR, 2004

2 www.cred.be, see 2004 statistics

3 IPCC, 2001

4 The International Strategy for Disaster Reduction, 2004, defines disaster risk reduction as: “The systematic development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development.”

sufficient resources to prepare for disasters. In addition, the socio-economic impacts following a disaster may linger far longer in poorer nations. A UNDP report states, “*In 1995, Hurricane Luis caused US\$ 330 million in direct damages to Antigua, equivalent to 66 percent of GDP. This can be contrasted with the larger economy of Turkey that lost between US\$ 9 billion and US \$13 billion in direct impacts from the Marmara earthquake in 1999, but whose national economy remained largely on track.*” The same report found that “*while only 11 percent of the people exposed to natural hazards live in countries classified as low human development, they account for more than 53 percent of total recorded deaths.*”⁵

Disaster risk reduction is increasingly recognized as a major factor in achieving sustainable development, although the systematic integration of DRR into development planning and activities remains a challenge. Time and again, investments in development have been wiped away by disasters, and these damages have only increased as countries grow. According to Munich Re, the recorded economic value of disaster damage has increased from US\$ 75.5 billion in the 1960s to US\$ 659.9 billion in the 1990s.⁶ These figures do not account for the losses suffered by communities in terms of lost lives and livelihoods.

To reduce human and economic losses, the *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters*, commits countries and agencies to: integrate DRR into sustainable development; develop and strengthen institutions, mechanisms and capacities to build resilience; and systematically incorporate DRR into emergency preparedness, response and recovery programmes. States have agreed to taking the lead in achieving these goals by:

- Strengthening policies and institutions
- Identifying, assessing and monitoring risk and enhancing early warning
- Using knowledge, innovation and education to build a culture of safety
- Reducing underlying risk factors, such as environmental degradation
- Strengthening preparedness for effective response

Focus on communities and vulnerability

One of the underlying principles of DRR is to consider disasters as a result of a community’s vulnerability. Vulnerability has been defined as “*a set of conditions and processes resulting from physical, social, economical, and environmental factors, which increase the susceptibility of a community to the impact of disasters.*”⁷ Taken from this standpoint and incorporating the resources within the community, risk can be defined as follows:

$$\text{RISK} = \text{HAZARD} \times \text{VULNERABILITY/CAPACITY}$$

By analyzing vulnerabilities and capacities, a fuller picture emerges of how to reduce disaster risks. The DRR approach considers a comprehensive range of vulnerability factors and aims to devise strategies that safeguard life and development before, during, and after a disaster. This approach is useful to the climate change community because, whereas the climate change debate and work has largely taken place at the international and national levels and focused on impacts/hazards, disaster managers have long experience working at the local level on the vulnerabilities that turn an impact into a disaster. Although a national disaster reduction strategy should be in place, DRR activities are often focused on specific locations, addressing the particular vulnerabilities and capacities of the community, its culture and processes. The rationale behind any action and how it is implemented should be firmly rooted in the beneficial impacts that can be realized for the community, and for the most part, these benefits should be measurable. The success of disaster risk reduction activities

⁵ UNDP, 2004

⁶ UNDP, 2004. Amounts in 2002 US dollars.

⁷ *Ibid*

depends to a large extent on the participation of community members. Adaptation to climate change risks may require effecting changes within local communities—by combining local knowledge and know-how with external information. Or adaptation may simply require increasing the scale of current climate risk reduction efforts by intensifying today’s efforts or expanding to other areas practices to deal with well-known hazards. By adopting the DRR focus of vulnerability reduction and making use of the specific tools developed for DRR, the climate change community can benefit from the vast experience gained in the reduction of hydro-meteorological risks.

III. Disaster Risk Reduction Tools

One common characteristic of DRR tools, as shown in the examples in the annex, is the emphasis on taking a holistic view of disaster risk reduction and the importance of linking with diverse stakeholders. Even for those tools with a narrower target group (e.g. climate forecasters or water utilities), the process requires drawing on wide-ranging sources of knowledge for successful risk reduction in the community. This attempt to analyze risk from diverse perspectives makes the tools suitable for climate change adaptation as impacts will affect various sectors and communities.

DRR tools have been developed by a range of institutions, including research centers, government agencies, the UN, NGOs, and IGOs. These include tools targeted for use at the international to the local levels, implemented in cooperation with diverse partners, and in response to numerous hazards. This paper does not attempt to catalogue the abundance of tools on offer.⁸ Instead, it looks at one or two specific examples for each aspect of DRR and briefly examines the links with climate change adaptation.

Policy and institutions. It is critical that decision makers at all levels are committed to disaster risk reduction, so that resources and planning guidance are provided. Just as important is the participation and understanding of individuals at the local level where disasters are felt. This category includes the country’s overall policies, the legislative process, and the institutional framework for implementing measures. The tools that have been developed for policy and institutions are aimed at mainstreaming disaster risk reduction into development planning from the national to community level. This aims to bring about a “culture of safety and resilience”.

Because of their comprehensive nature, these tools focus on the *process* of decision-making. For example, the methods recommend piggybacking on existing institutional structures and becoming integrated within national decision-making calendars⁹, rather than creating extra workloads through parallel activities. They aim to create an overall picture of risk and the options for reducing them. Through integration with existing development plans, the disaster risk reduction strategies explicitly support national goals. Furthermore, the process outlined in these tools is multidisciplinary, so that planners clearly see how activities in one sector may influence risks in another. The methods highlighted in the annex give an overview of priorities, potential actions, and roles and responsibilities. These tools can be utilized at various levels so that commitment is built throughout the system. For example, SOPAC’s Comprehensive Hazard and Risk Management (CHARM) is implemented through a series of workshops aimed at broad stakeholder consultations at the national and regional levels.¹⁰

These methodologies follow the same general consultative process as existing tools for climate change, such as guidelines on NAPAs and national communications. However, there are great opportunities for synergy between the two political frameworks, as traditionally disaster management has involved ministries of interior, civil defense and health, while the focal point for climate change is usually the ministry of environment. DRR tools encourage the engagement of officials from all

⁸ See www.proventionconsortium.org and www.unisdr.org for resources.

⁹ The United Nations Development Assistance Framework (UNDAF) is a good example of an existing development policy tool into which DRR could be incorporated.

¹⁰ ADB, 2002

relevant sectors, including finance and planning, in addition to interaction with National Hydrometeorological Services (NMHSs), which are the main providers of weather and climate data and information.

Risk identification and early warning. This is a familiar area when thinking of disaster management activities—assessing the risks facing a community and determining which ones are likely to affect people. Science and technology are important in understanding the physical processes behind hazards and how they will interact with community infrastructure and activities. For example, an extensive network of monitoring technology may be required for meteorologists and hydrologists to gather data on climate hazards and to build a picture of climate change trends. At the local level, this information is supplemented by community members' historical knowledge on events such as floods or droughts. Again, vulnerability must be added into the equation because the mere presence of a hazard does not automatically translate into a risk. Risk is *the probability of harmful consequences, or expected losses (deaths, injuries, property, livelihoods, economic activity disrupted or environment damaged) resulting from interactions between natural or human-induced hazards and vulnerable conditions.*¹¹ Communities need information both on hazards and their vulnerabilities to determine priorities for reducing their risk.

The tools for risk identification may include national assessments to gain a broad understanding of risk for entire sectors or geographical regions. Or, as shown in ADPC's *Community-Based Disaster Risk Management Field Practitioners' Handbook*, a tool can provide a framework for assessment teams working in a participatory manner with individual communities. Local knowledge is combined with scientific understanding and advanced technologies to generate a fuller picture of risks. This particular guideline is very specific, carefully describing exercises that help to build a common understanding of risk (e.g. through creating seasonal calendars or histories of floods/droughts over the last decades). Once they are understood and there is a system for monitoring them, it is also important to establish a communication system for early warning. The WMO *Guidelines for Climate Watches* are directed at national meteorological services to support the clear communication of climate information to users in a timely manner.

Including climate change in the disaster risk reduction framework enhances the analysis because climate change is likely to bring hazards for which there is no existing experience. For example, sea level rise or extreme events that go beyond today's boundaries will require planners to look outside of currently applied risk reduction measures. Climate change, along with urban growth, economic globalization, and emerging health issues are all combining to rapidly change the nature of communities' vulnerability.

Knowledge management and education. Supporting the local community's involvement is crucial for implementing strategies that will lead to a culture of safety. This area of disaster risk reduction includes managing the information and data that has been gathered, educating people about their risks, and building people's capacity to devise and implement risk reduction measures. The information and knowledge should not flow in only one direction; planners must also learn about the community's needs and wants so that they can better support development and risk reduction. These experiences can then be shared with other communities and successes replicated.

An important step is to translate risk information into dialogue with communities. The Emergency Management of Australia's guide on community awareness goes through the steps of identifying the target audience, the best methods of communication, and evaluating the results. As people are constantly bombarded by information, it is not sufficient to merely send messages out. Instead, these tools stress the importance of defining *what action* needs to be taken by the community, whether that is to change their behavior or to examine their disaster risks more closely. The process outlined by knowledge management and education tools, such as WMO's guidelines, requires cooperation between scientists and practitioners so that the necessary technical information is conveyed in a form

¹¹ ISDR online library: <http://www.unisdr.org/eng/library/lib-terminology-eng%20home.htm>

that community members can use. It also requires regular assessments by practitioners and end users to improve efficiency and strengthen interactions. The WMO *Guide to Climatological Practices* offers the World Climatic Atlas Project, climate maps, interpretation of climatological information, and climate classifications (e.g. bioclimatic, genetic, and special classifications).

Conveying the concepts and risks associated with climate change to people at the local level is a challenge for the adaptation community. The uncertainty regarding impacts on any particular location presents a unique hurdle in making climate change relevant to people's daily lives when they may be focused on their daily needs. Short-term considerations will take precedence over adapting to impacts that may not be immediately apparent. Linking into existing disaster risk reduction efforts for climate variability and extreme events is a good entry point for building understanding and adaptive capacity.

Reducing Underlying Risks. Risks must not only be identified and institutional capacity in place; action to reduce the factors that increase risk is necessary. This includes measures in environmental management, poverty reduction, protection of critical facilities, networking and partnerships, and financial and economic tools to ensure a safety net in case of disasters. Applications will be most effective if they build on local knowledge, respect local cultures, and provide multiple benefits. For example, conserving wetlands reduces risks through flood mitigation and storm protection while also providing livelihood support, water purification, and erosion control. Measures may strive to reduce the extent to which a planned development project will increase a community's vulnerability. In this case, a risk assessment should be conducted as part of the project's evaluation (e.g. planners for a waterfront property development should consider how sea level rise and storms may affect future residents), much the same way an environmental impact assessment or cost-benefit analysis are now often included. There are also measures to reduce the risks already existing in infrastructure and systems throughout the world, for example through retrofitting or enforcing land use zones.¹²

This type of DRR tool is by necessity sector-focused because the tools aim to develop concrete, detailed measures. This normally involves specialized knowledge and skills. The Pan American Health Organization (PAHO)'s guidelines, which have been used throughout Latin America and the Caribbean, focus on drinking water and sewerage systems. This tool guides a team within a water company through a vulnerability analysis and in devising risk reduction measures. It takes them through the process of identifying strengths and weaknesses in the physical infrastructure and organizational systems.¹³ This tool can help ensure that measures are in place to guarantee that drinking water supplies are protected from likely hazards and that the sewerage system would not break down in the event of a disaster leading to the spread of epidemics. Using this tool for adaptation could involve, for example, looking at how climate change will affect the water company's ability to maintain service with any changes in water resources. Another example from Switzerland discusses how more than 6% of the country is prone to slope instability. Regional authorities produced hazard maps and developed a system of three land use zones (indicated by three different colors on the maps) where construction could be undertaken without restriction, with certain safety measures, or not at all.¹⁴

As efforts within the adaptation field proceed from awareness and training to implementing measures on the ground, these tools will be useful for organizations aiming to tangibly reduce vulnerability. PAHO's guideline looks at likely impacts on water systems from various hazards, including earthquakes, floods, and droughts. By including climate change as a factor in designing risk reduction, the water system could be further strengthened and the margin of safety broadened.

Preparedness and response. DRR preparedness and response tools are often used ahead of a disaster to be ready when a hazard strikes. Preparedness can mean having sufficient relief supplies and

¹² Reducing the development project-induced vulnerability is "prospective risk management", while reducing existing vulnerability is "compensatory risk management". See UNDP, 2004.

¹³ PAHO, 1998

¹⁴ Raetz, *et al*, 2002

medical care, in addition to establishing coordination mechanisms between key organizations and individuals. This is the traditional realm of disaster management, which recent disasters like Hurricane Katrina have shown is extremely vital to limiting damage in the hours and days afterwards. The reconstruction and recovery period is the most opportune time to incorporate risk reduction. Political will and public awareness are high and often additional resources are available. However, there is great pressure to get homes assembled and infrastructure systems running very quickly so there can be a return to normalcy, with the result that DRR does not often take place during recovery. If risk reduction is not incorporated at this time, it's likely that vulnerabilities will merely be rebuilt rather than reduced.

Aside from large catastrophes, the damage from small- and medium-scale recurrent disasters is often devastating and flies under the radar of the international community. These impacts are likely to accumulate, with the result that a vicious cycle ensues in which successive disasters erode the community's resilience and more losses are suffered with each event. Preparedness and response are essential for communities facing such hazards.

Preparedness and response tools may include guidelines for needs assessments and recovery planning, standards for humanitarian relief, and checklists for preparedness. The International Federation of the Red Cross and Red Crescent Societies (IFRC) developed a self-assessment to support national organizations in analyzing their policies and plans, organizational structure, and capacities to respond to a disaster. One area for improvement for these tools would be to ensure that communities are prepared not only for disasters they have faced in the past but also new hazards that may accompany climate change. Climate change and DRR organizations could look beyond the usual severity of hazards and their usual areas of impact to jointly consider new risks and the preparedness mechanisms necessary to address them.

IFRC's *Guidelines for Emergency Assessment* is designed for generalists and based on decades of experience following emergencies. Another tool developed by ECLAC, on the other hand, targets specialists for socio-economic impact assessment. It aims to provide insight into how disasters impact society directly and indirectly on a longer time horizon. The capacities necessary for adapting to climate change could be included in such an assessment, including factors like livelihoods and community organization, among others. The output from these assessments should feed into reconstruction plans.

III. Conclusion

Climate change is recognized as an emerging risk that must be included in current DRR and development planning. Policy makers and practitioners working on climate change adaptation should benefit from the experiences and knowledge amassed by the DRR community in dealing with extreme weather events and recurrent hydro-meteorological hazards. Utilizing DRR tools developed for existing risks is one such opportunity. The tools presented in this paper are only a small selection of those used by the DRR community. New risks and the aggravation of existing risks posed by climate change need to be more comprehensively addressed in DRR tools. Committed individuals and organizations working in disaster risk reduction and climate change are steadily coming together toward integrated climate risk management. This collaboration will help to give communities a broader understanding of their vulnerabilities, while at the same time expanding effectiveness by working with partners in the fields of development, environment, poverty reduction, financial planning, and health. By focusing on decreasing vulnerabilities to current weather and climate related risks communities will benefit now and be prepared for the risks posed by climate change.

Selected DRR Tools

Political commitment and institutional aspects

Title	South Pacific Applied Geoscience Commission (SOPAC)'s Comprehensive Hazard and Risk Management (CHARM)
Description	CHARM is defined as a comprehensive hazard and risk management tool for use within an integrated national development planning process. It aims to facilitate greater collaboration between risk reduction projects at all levels (though mostly at the national level with participation from stakeholders for decision-making) and across sectors to enhance sustainable development. CHARM takes all hazards into account across the whole country.
Appropriate use	This tool can be used for mainstreaming disaster risk reduction into ongoing national development planning processes. It aims to address all hazards including natural and human-induced, and also to help identify measures that can be implemented in all phases of disaster management (prevention, preparedness, response, and recovery). The emphasis is on bringing a wide range of stakeholders together for risk reduction to enhance effectiveness of the combined efforts.
Scope	National level
Key output	The immediate output of the CHARM process is to develop a matrix summarizing national risks and risk reduction measures (or "treatment options") that considers the activities of all agencies. Planners then target the gaps identified in the matrix. Step 1 – Context established Step 2 – Risks identified Step 3 – Risks analyzed Step 4 – Risks evaluated Step 5 – Risks treated and results evaluated
Key input	Step 1 – Identification of national development priorities, organizational issues, and initial risk evaluation criteria Step 2 – Identification of hazard, vulnerable sectors, and impacts Step 3 – Assessment of risks with stakeholders based on agreed indicators, such as frequency of hazards, potential impacts, etc. Step 4 – Determination of acceptable levels of risks and priorities for action Step 5 – Selection of risk reduction measures; Assignment of roles and responsibilities for all partners; Evaluation against agreed criteria
Ease of use	Readily usable by those with experience in policy analysis, developing work plans, and inter-agency planning
Training required	Knowledge of tools for each step is needed (e.g. to rank development challenges, develop budgets)
Training available	Training is available through broad stakeholder consultation workshops involving both national and regional stakeholders. SOPAC has also developed a manual.
Computer requirements	Word processing and spreadsheets
Documentation	SOPAC, 2001. <i>Comprehensive Hazard Risk Management Regional Guidelines for Pacific Island Countries</i> . Suva: South Pacific Applied

	<p>Geosciences Commission.</p> <p>Guideline and manual available in print or on CD (see Contacts below)</p>
Applications	<p>CHARM has been used for planning in Palau, Kiribati, Vanuatu, Fiji, and Tonga, and it has also been aligned to the Joint Australia-New Zealand Risk Management Standard</p>
Contacts for framework, documentation, technical assistance	<p>SOPAC Secretariat Private Mail Bag, GPO Suva, Fiji Islands Tel: +679 338 1377 Fax: +679 337 0040</p> <p>Atu Kaloumaira, Community Risk Programme Advisor Email: atu@sopac.org</p> <p>Noud Leenders, Community Risk Management Advisor Email: noud@sopac.org</p>
Cost	Free
References	see Documentation

Risk Identification and Early Warning

Title	Asian Disaster Preparedness Center (ADPC)’s Community-Based Disaster Risk Management Field Practitioners’ Handbook
Description	<p>The handbook briefly explains the concept of community-based disaster risk management (CBDRM) and provides practical tools that can be applied in community-level programming. The Handbook is divided into four parts: 1) an introduction to CBDRM; 2) specific step-by-step exercises; 3) cross-cutting issues of gender and communication; and 4) disaster risks in Southeast Asia</p> <p>The tools in Section 2 cover seven types of activities in CBDRM:</p> <ol style="list-style-type: none"> 1. Selecting the community 2. Rapport building and understanding the community 3. Participatory disaster risk assessment 4. Participatory disaster risk management planning 5. Building/training a community disaster risk management organization (CDRMO) 6. Community-managed implementation 7. Participatory monitoring and evaluation <p>The resource pack for risk identification (Step 3) includes instructions and guiding questions for the most commonly used participatory assessment tools, e.g. constructing timelines, hazard maps, rankings, and calendars.</p>
Appropriate use	This handbook is a comprehensive how-to guide that can be used to assist project teams working at the local level to ensure the participation of community members in reducing disaster risks. Each of the seven steps, particularly Step 3, is clearly outlined, along with simple instructions for group exercises, information to gather, and stakeholders to involve.
Scope	Community level
Key output	<p>Overall: <i>“The CBDRM process should lead to progressive improvements in public safety and community disaster resilience. It should contribute to equitable and sustainable community development in the long term.”</i></p> <p>Step 1 – Priority vulnerable communities identified Step 2 – Trust between community and project members; understanding of community needs among project members Step 3 – Disaster risks identified and community members understand these risks Step 4 – Community disaster risk management plan Step 5 – CDRMO established and equipped with skills to implement their disaster risk management plan Step 6 – Planned activities implemented effectively and on time, with participation of stakeholders Step 7 – Appropriate indicators of program success developed and progress measured, with participation of stakeholders</p>
Key input	<p>Step 1 – Information on various criteria developed by decision makers Step 2 – Information about the community and efforts to develop relationships/understanding with community members Step 3 – Range of qualitative and quantitative data about the hazards,</p>

	<p>vulnerabilities, and capacities in the community</p> <p>Step 4 – Dialogue among stakeholders to identify needed measures</p> <p>Step 5 – Identification of CDRMO members and training</p> <p>Step 6 – Responsibilities carried out by members; periodic reviews</p> <p>Step 7 – Range of qualitative and quantitative data about activities’ impacts; dialogue between stakeholders</p>
Ease of use	Readily usable
Training required	Some training or experience in working at the local level would be useful
Training available	Contact Zubair Murshed at mzubair@adpc.net or adpc@adpc.net
Computer requirements	<ul style="list-style-type: none"> • none for community risk identification exercises • word processing and spreadsheet skills for program planning and implementation, depending on complexity of local activities • GIS optional for community disaster risk assessment (Step 3)
Documentation	Imelda Abarquez and Zubair Murshed, 2004. <i>Community-Based Disaster Risk Management: Field practitioners’ handbook</i> , Bangkok: Asian Disaster Preparedness Center. Can be downloaded from http://www.adpc.net/pdr-sea/publications/12Handbk.pdf
Applications	This methodology has been used in several communities throughout South and Southeast Asia.
Contacts for framework, documentation, technical assistance	Information Manager, PDR SEA Asian Disaster Preparedness Center (ADPC) P.O. Box 4, Klong Luang, Pathumthani 12120, Thailand. Tel.: (66-2) 516-5900 to 5910, Fax: (66-2) 524-5360, Email: adpc@adpc.net , Website: www.adpc.net
Cost	Free
References	Arcilla, M. J. D., Delica, Z. G. et al (Eds), 4B: <i>Project Development, Monitoring and Evaluation in Disaster Situations</i> , 1998: Quezon City, Philippines, Citizen’s Disaster Response Center. Gutteling and Wiegman, 1996, <i>Exploring Risk Communication: Advances in natural and technological hazards research</i> , Kluwer Academic Publishers, Dordrecht, The Netherlands.

Title	World Meteorological Organization’s <i>Guidelines on Climate Watches</i>
Description	The guidelines describe how to establish a climate watch system and the information required in a climate watch. Governments typically react to extreme climate events through “crisis management” rather than through continuous risk reduction. Decision makers have cited the lack of information about approaching climate hazards with sufficient notice to take action. Climate watches aim to deliver this necessary, accurate information to end-users through the national meteorological services (NMSs) in a timely and useful manner.
Appropriate use	<p>This tool targets “the special situation and needs of smaller NMSs, which have limited resources” in establishing the system and issuing climate watches. The process is based on continuous collaboration with climate information users, and it should serve as a mechanism to initiate preparedness activities to limit impacts from climate anomalies (e.g. excessive rainfall over several months). The guideline discusses the rationale for a climate watch system, current activities and capacity in NMSs, characteristics and operation of a climate watch system, format and criteria for issuing a climate watch, and various annexes, including examples of climate watches.</p> <p>Climate watch format:</p> <ul style="list-style-type: none"> • a standard heading, issuing authority, and time and date of issue • areas for which the advice is current (the appropriate regions) • period during which the climate watch is valid • where appropriate, an indication of the reason for the climate watch, which may include graphical information • relevant skill of long range forecasts • possible follow-on effects of the climate anomaly • date at which the next update will be issued
Scope	National level; meteorological services
Key output	<p>Information about significant climate anomalies for the forthcoming season(s) that may have substantial impacts on a sub-national scale.</p> <p>A. Establishment of national climate watch system</p> <p>B. Capacity built for the climate watch system</p> <p>C. Operation of national climate watch</p> <p>D. Climate watch system evaluated</p>
Key input	<p>A. A network of observation stations; an understanding of the current and recent past climate of the region in question; linkage with regional/global monitoring systems; dissemination channels to reach users; partnerships with key stakeholders</p> <p>B. Understanding of users’ needs; criteria for issuing a Climate Watch defined (e.g. average rainfalls below a certain level for the season); technical training; strengthening of communication links</p> <p>C. Monitoring and analysis of climate data; communication with other organizations that maintain their observation systems; communication with intermediaries to translate information for user groups</p> <p>D. Periodic reviews of the system and process; dialogue with users on</p>

	their needs to identify gaps in dissemination or content
Ease of use	Usable by national meteorological services
Training required	Requires expertise in meteorology/climatology and understanding of climate information users' needs
Training available	(see Contacts)
Computer requirements	Software for forecasting; word processing
Documentation	WMO, 2005. <i>Guidelines on Climate Watches</i> , Geneva: World Meteorological Organization. http://www.wmo.ch/web/wcp/wcdmp/html/Guidelines%20on%20Climate%20Watches.pdf
Applications	
Contacts for framework, documentation, technical assistance	Omar Baddour, Chief, World Climate Data and Monitoring Programme WMO, 7bis Ave. de la Paix C.P. 2300, CH-1211, Geneva 2, Switzerland Tel: (41-22) 730-8268 or 730-8214 Fax: (41-22) 730-8042 E-mail: obaddour@wmo.ch
Cost	Free
References	(See references and links in document) Technical documents published under the WMO World Climate Data and Monitoring Programme (WCDMP) http://www.wmo.ch/web/wcp/wcdmp/html/wcdmpreplist.html

Knowledge Management and Education

Title	EMA's <i>The Good Practice Guide: Community awareness and education in emergency management</i>
Description	<p>During the emergency period, a well-prepared community can reduce the impacts from the disaster. Community members often play a large role in providing relief for each other. This tool presents best practices, ideas, plans, and suggestions for educating the community on disaster preparedness, rather than a how-to guide on communications. The broad framework can be easily adapted for specific communities.</p> <p>The guide provides the following information:</p> <ol style="list-style-type: none"> 1. Introduction to the issue and how to get people's attention 2. Planning a campaign, with information on a range of communication tactics 3. Evaluating a campaign 4. Working with the media, partners and sponsors, and the community 5. Information resources
Appropriate use	<p>The guide aims to assist in planning and implementing community awareness and education campaigns. It is aimed at local government authorities, health services, police, fire services, schools, and other community organizations.</p> <p>It lays out the basic steps of an awareness campaign, describes communication tactics (e.g. print/electronic communications, give-aways, special events, etc.), and outlines a method for evaluating the campaign's performance.</p>
Scope	Local level
Key output	<p>Step 1 – Target audience identified</p> <p>Step 2 – Target audience's needs and wants identified</p> <p>Step 3 – Key message developed</p> <p>Step 4 – Measurable objectives identified</p> <p>Step 5 – Tactics chosen</p> <p>Step 6 – Required resources secured</p> <p>Step 7 – Awareness and education campaign implemented</p> <p>Step 8 – Awareness and education campaign evaluated and documented results available</p>
Key input	<p>Step 1 – Information on vulnerable groups and potential partners in reaching them</p> <p>Step 2 – Discussions with community representatives and members; Review of existing sources of information (newspapers, radio, etc.)</p> <p>Step 3 – Identification of hazards and priority messages</p> <p>Step 4 – Development of campaign objectives and concrete indicators to measure changes</p> <p>Step 5 – Identification of effective information sources and delivery methods for the target audience, as well as the required resources</p> <p>Step 6 – Partnerships developed; Information on available staff and financial resources</p> <p>Step 7 – Commitment of staff and volunteers; Definition of roles, responsibilities, and a timetable for activities</p> <p>Step 8 – Review of the campaign against indicators, e.g. through surveys, observation, or discussions</p>
Ease of use	Readily usable

Training required	none
Training available	see Contacts below
Computer requirements	none
Documentation	EMA, 2000. <i>The Good Practice Guide: Community awareness and education in emergency management</i> , Canberra: Emergency Management Australia. http://www.crid.or.cr/digitalizacion/pdf/eng/doc12728/doc12728.htm
Applications	Based on EMA's experience in Australia, but easily adaptable to other contexts
Contacts for framework, documentation, technical assistance	Emergency Management Australia PO Box 1020 Dickson, Australian Capital Territory 2602, Australia Tel: (61-2) 6256 4600 Fax: (61-2) 6256 4653 Email: ema@ema.gov.au
Cost	Free
References	References included in document on case studies, additional methodologies, communication tips, etc. Documents on local risk management, community education, community preparedness, and related sites (mostly in Spanish): http://www.crid.or.cr/crid/MiniKitCommunityParticipation/documentos_interes_participacion_comunitaria_ing.html#capacitacion EMA publications on community evacuation coordination, flood warnings, and other response activities at: www.ema.gov.au

Risk Management Applications

Title	Pan American Health Organization (PAHO)’s <i>Natural Disaster Mitigation in Drinking Water and Sewerage Systems: Guidelines for Vulnerability Analysis</i>
Description	<p>These guidelines provide the basic tools to evaluate the vulnerability of a drinking and sewerage system to various natural hazards. These systems are vital to development, as well as to ensuring a return to normalcy following a disaster. Conducting this vulnerability analysis helps identify preparedness and mitigation measures to limit risks. It also identifies the response mechanisms that should be put into action in the event of a disaster. The risk of damage to water systems increases with factors such as uncontrolled growth in urban areas, deficiencies in infrastructure, and climate change.</p> <p>The guide is divided into four sections:</p> <ul style="list-style-type: none"> • Planning • Principles of vulnerability analysis • Description of hazards and impacts • Conducting a vulnerability analysis for specific hazards
Appropriate use	<p>The tool is ideally used during the disaster preparedness phase to identify and implement mitigation measures. It is aimed at engineers and technical personnel of water service companies to project how the water systems will perform in the event of the disaster and to minimize damage. Vulnerability and probabilities of damage are expressed as various formulae.</p> <p>The guide provides an overview for each section with issues to consider at each step. It also includes checklists (e.g. Characteristics of an emergency operations center and the emergency committee; Components of an emergency response plan), matrices to describe system vulnerabilities (formats provided in annexes), and extensive information on impacts on water systems from earthquakes, volcanoes, hurricanes, floods, etc. in Chapter 3 and annexes.</p>
Scope	Water systems (with coverage being sub-national, municipal, etc.)
Key output	<ul style="list-style-type: none"> • Planning – Emergency committee established within the water company, with roles and responsibilities defined; Emergency operations center established; Partnerships with national organizations established. • Vulnerability analysis – Identification and quantification of deficiencies in the physical system and the organization’s capacity to provide services in a disaster; Strengths of the physical system and the organization identified; Recommendations for mitigating disaster impacts. • Mitigation and emergency response plans for <i>administration/operational</i> aspects – Identification of roles and responsibilities, resources required, and measures to reduce vulnerability. Measures may include: improvements in communication systems, provision of auxiliary generators, frequent line inspections, detection of slow landslides, repair of leaks, and planning for emergency response.

	<ul style="list-style-type: none"> Mitigation and emergency response plans for <i>physical</i> aspects – Identification of roles and responsibilities, resources required, and measures to reduce vulnerability. Measures may include: retrofitting, substitution, repair, placement of redundant equipment, improved access, etc.
Key input	<ul style="list-style-type: none"> Planning – Information on: national standards, institutional coordination, and resources available for preparedness and response; and dialogue with partners Vulnerability analysis – Information on: organizational and legal aspects, availability of resources, hazards and likely impacts on the water system, current state of system and operating requirements, sensitivity of components to hazards, and the response capacity of the services. Mitigation and emergency response plans – Information from the vulnerability analysis, priorities for implementing measures, and resources available.
Ease of use	Can be used as an overview for the emergency committee, although the vulnerability analysis should be conducted by a team of specialists.
Training required	Vulnerability analysis requires extensive experience in the design, operation, maintenance, and repair of a drinking water and sewerage system's components.
Training available	The Virtual Campus of Public Health is a consortium of institutions led by PAHO/WHO for continuing education. http://www.campusvirtualsp.org/eng/index.html
Computer requirements	Various specialized software, word processing, and spreadsheets
Documentation	PAHO, 1998. <i>Natural Disaster Mitigation in Drinking Water and Sewerage Systems: Guidelines for Vulnerability Analysis</i> . Washington, DC: Pan American Health Organization, Regional Office of the World Health Organization. http://www.paho.org/English/DD/PED/natureng.htm
Applications	Used throughout Latin America and the Caribbean. Case study in documentation from Limon, Costa Rica, to assess earthquake vulnerability.
Contacts for framework, documentation, technical assistance	Emergency Preparedness and Disaster Relief Coordination Program, Pan American Health Organization 525 Twenty-third Street, N.W., Washington, D.C. 20037, USA Fax: +1 202-775-4578 E-mail: disaster@paho.org Contact lists for the Americas during a disaster: http://www.paho.org/english/DD/PED/contactos.htm
Cost	Free
References	Bibliography available in document

Preparedness and Response

Title	Economic Commission for Latin America and the Caribbean (ECLAC)’s Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters
Description	<p>One of the problems following disasters is that damaged areas are often reconstructed quickly and without adequate resources. The result is that vulnerability is reconstructed rather than reduced. This tool helps to assess the direct and indirect socio-economic impacts of disasters, and to identify the most affected areas and priority areas for recovery. It outlines the conceptual and general methodological aspects of estimating the asset damage, losses in the flows of goods and services, as well as any effects on the macroeconomy. The handbook is divided into five sections:</p> <ol style="list-style-type: none"> 1. Methodological and conceptual framework 2. Assessing impacts in social sectors 3. Assessing impacts on infrastructure 4. Assessing impacts in economic sectors 5. Assessing impacts in cross-sectoral areas, such as the environment, gender, and employment
Appropriate use	<p>This type of assessment should follow the emergency phase of a man-made or natural disaster, so it will not interfere with urgent humanitarian activities. Sufficient quantitative information on damages is also more likely to be available after that period. The tool is good for organizations that want to understand a wider range of disaster risks. By assessing the direct and longer-term indirect socio-economic impacts, organizations then have a better idea of how to reduce the risks in future programs that may have development or environmental goals. The tool can be adapted to comprehensively assess socio-economic impacts of climate change.</p> <p>Sections 2-5 include a definition of the sector, an overview of likely direct and indirect damages, the quantitative and qualitative information needed, possible information sources, general instructions on analyzing the data, and issues to consider in assessing macroeconomic impacts arising from damages in that sector. It is not a step-by-step guide, but rather gives an overview of general steps to be taken in each assessment.</p>
Scope	National or sub-national level; sectoral
Key output	<p>A measurement, summarized in table form and in monetary terms where possible, of the impacts of disasters on the society, economy and environment of the affected country or region. Results are divided into direct, indirect, and macroeconomic effects (employment, the balance of payments, public finances, and prices and inflation). The disaster may also have benefits, so the assessment refers to the <i>net effect</i>. The assessment identifies the key geographical areas and sectors affected, together with corresponding reconstruction priorities. It can provide a way to estimate the country’s capacity to undertake reconstruction on its own and the extent to which financial and technical cooperation are needed. For the longer term, it may identify the public policy changes and development programs to address these needs.</p>
Key input	<p>Quantitative and qualitative information on conditions both before and following the disaster. The assessment team must decide on the balance between precision and speed in conducting the assessment. “Shadow prices” may be used to try to take into account the indirect effects and externalities of disasters.</p>

Ease of use	Experience with economic valuation and assessing damage in specific sectors required. The use of market vs. social prices will depend on the availability of information and time to conduct the assessment.
Training required	Specialist knowledge in each sector
Training available	Instituto Latinoamericano y del Caribe de Planificación Económica y Social (ILPES), ECLAC's training division, offers courses on various economic and social issues of the region. ILPES, Av. Dag Hammarskjöld 3477, Vitacura, Casilla 179-D, Santiago, Chile Fax: (56-2) 206-6104, Tel: (56-2) 210-2506/7 Email: cursosilpes-cepal@eclac.cl
Computer requirements	Various software programs are recommended for some assessments, e.g. Redatam by CELADE (see References) or other GIS programs (ArcView, MapInfo, IDRISI, or GISMAP)
Documentation	ECLAC, 2003. <i>Handbook for Estimating the Socio-Economic and Environmental Effects of Disasters</i> , Santiago, Chile: Economic Commission for Latin America and the Caribbean. www.proventionconsortium.org/toolkit.htm Hardcopies available at: ECLAC Publications, Casilla 179D, Santiago, Chile Email: publications@eclac.cl Fax: + 56 2-210-2069
Applications	The handbook has been used throughout Latin America and the Caribbean. Assessments following the Indian Ocean disaster also used the methodology, particularly in the cases of Indonesia and India.
Contacts for framework, documentation, technical assistance	Ricardo Zapata-Martí, Focal Point for Disaster Evaluations Economic Commission for Latin America and the Caribbean Av. Presidente Masaryk 29, 11570 México, D.F. Apartado Postal 6-718, México D.F. Telephone: +52 55-5263-9600, Fax: +52 55-5531-1151 E-mail: cepal@un.org.mx , izapata@un.org.mx
Cost	Free
References	Redatam software: http://www.eclac.cl/redatam/default.asp?idioma=IN The Handbook, sample reports, and case studies: http://siteresources.worldbank.org/INTDISMGMT/Resources/guidelines.htm

Title	IFRC's Guidelines for Emergency Assessment
Description	<p>These guidelines provide advice on the organization of emergency assessments, starting with an introduction of key concepts and then outlining each step. The steps are roughly laid out in the order required during an assessment. The chapter on fieldwork notes some basic principles that should underlie activities, such as participation, inclusion or marginal groups, looking out for biases, etc. Results of the general assessment can indicate where more technical assessment is needed. The framework can be easily adapted to incorporate climate change issues as it provides fairly general guidelines on the assessment process.</p>
Appropriate use	<p>Aimed at generalists in the Red Cross Red Crescent community conducting an assessment to provide an overview of the situation. The guidelines cover the following steps, some of which would overlap:</p> <ul style="list-style-type: none"> • Planning • Office tasks • Fieldwork (organization and management) • Analysis • Reporting <p>The chapter on fieldwork includes detailed descriptions of various types of information gathering exercises and issues to consider for each one, including tips on establishing trust, cultural sensitivities, suggested questions, and extensive checklists that were compiled by sector specialists. It gives very clear, easily understandable directions for carrying out activities.</p> <p>The chapter on analysis provides worksheets team members may use in synthesizing information. These are largely based on IFRC's vulnerability and capacity framework (see References).</p>
Scope	Local affected areas
Key output	<ul style="list-style-type: none"> • Planning – Determination of whether an assessment is needed, objectives and terms of reference, and type of assessment (rapid/detailed/continual). • Office tasks – Arrangements for coordination, required resources identified, team assembled and briefed, key locations identified. • Fieldwork – Sufficient information gathered in selected locations on issues identified during planning phase. • Analysis – Identification of the main problems, affected populations, and local capacity; Recommendations for further actions. • Reporting – Clear, concise reports following a recommended format: summary; background information; details and assumptions; needs, coping strategies, and assistance; and program proposals.
Key input	<p>The guidelines recommend that each of these steps are generally undertaken sequentially, so that the output of the planning phase is used as an input to the office-based tasks, and so on.</p> <ul style="list-style-type: none"> • Planning – Information from secondary sources on the nature of the

	<p>emergency and urgency of an assessment</p> <ul style="list-style-type: none"> • Office tasks – Objectives and terms of reference; Information on potential team members’ skills • Fieldwork – Secondary information, interviews with community members and authorities, group exercises, household visits, etc. • Analysis – Summaries of information that have been checked for consistency, discussion among team members. • Reporting – Results of the analysis.
Ease of use	Readily usable by anyone conducting an assessment.
Training required	None
Training available	Contact regional and country offices: http://www.ifrc.org/who/delegations.asp
Computer requirements	None, although word processing and spreadsheets may be useful for analysis and reporting.
Documentation	IFRC, 2005. <i>Guidelines for Emergency Assessment</i> . Geneva: International Federation of the Red Cross and Red Crescent Societies. http://www.proventionconsortium.org/files/tools_CRA/IFRC-guidelines-assessments-LR.pdf
Applications	Based on IFRC’s experience in conducting assessments following disasters around the world.
Contacts for framework, documentation, technical assistance	International Federation of Red Cross and Red Crescent Societies PO Box 372, CH-1211 Geneva 19, Switzerland Tel: +41 22 730 4222 Fax: +41 22 733 0395 E-mail: secretariat@ifrc.org Web site: www.ifrc.org
Cost	Free
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