

Helpdesk Research Report

Measuring disaster resilience

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Question

What are the different approaches and methodologies being applied by donors, NGOs, the UN and others in measuring resilience within programming? In defining resilience the review should refer to DFID's strategy "Defining Disaster Resilience".

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1. Overview

Several agencies have developed guidance for measuring disaster resilience. One of the most comprehensive and widely-cited frameworks is Twigg's (2009) 'characteristics of resilience' framework. Based on five dimensions of resilience identified in the Hyogo Framework for Action (governance, risk assessment, knowledge and education, risk management and vulnerability reduction, disaster preparedness and response), it provides an extensive inventory of 28 components and 167 characteristics or indicators. DFID's Multi-Hazard Risk Assessment Framework and Oxfam GB's Multidimensional

Approach for Measuring Resilience are two other frameworks with detailed recommendations for indicators.

On the other hand, many agencies do not recommend standard sets of indicators, but instead emphasise the need to develop locally-relevant indicators through participatory methods involving local communities. These agencies provide strategies and tools for developing context-specific indicators and approaches to measuring resilience.

There is a tension between the need for indicators to be both comparable and tailored to particular social groups and contexts (Castleden et al. 2011, 375; Turnbull et al. 2013, 40; Twigg 2009). Moreover, Levine et al. (2012) warn that quantification can de-contextualise resilience, particularly where it fails to account for factors operating at multiple levels (household, national, international).

The following report presents summaries of seven frameworks with different approaches to measuring resilience which were identified in the course of preparing the GSDRC topic guide on Disaster Resilience which is to be published in early 2014.

2. Multi-Hazard Disaster Risk Assessment (DFID, 2012)

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/204933/Multi-hazard_risk_assessment_guidance.pdf

This brief How-To Note sets out a framework for undertaking a multi-hazard risk assessment, which is the first step in preparing a disaster resilience country strategy. The framework follows six stages:

<i>Topic</i>	<i>Detail</i>	<i>Methodology</i>	<i>Data Sources</i>
1. Magnitude and likelihood of hazards	<ul style="list-style-type: none"> What shocks or stresses? Where might it happen? Scale and trends Impacts and potential fatalities 	<ul style="list-style-type: none"> Secondary data analysis Interviews with key stakeholders Historical data, e.g. evaluations. Early Warning Systems 	<ul style="list-style-type: none"> IPCC, FEWSNET Maplecroft and others
2. Vulnerability analysis	<ul style="list-style-type: none"> Who are most vulnerable? Where are the most vulnerable? Why are they vulnerable? What makes them vulnerable? What assets are vulnerable? 	<ul style="list-style-type: none"> Poverty assessments Humanitarian evaluations Post-Disaster Needs Assessments Household surveys Historical data 	<ul style="list-style-type: none"> Government, UNOCHA, UNISDR, UNDP, NGOs, Red Cross/Red Crescent
3. In-country capacity to address disaster risk	<ul style="list-style-type: none"> Who are the stakeholders? What are the government 	<ul style="list-style-type: none"> External analysis Country Assistance Strategies, Poverty Reduction Strategy Papers 	<ul style="list-style-type: none"> Government departments + partner agencies UN

	<ul style="list-style-type: none"> structures, policies and capacities? ▪ Where is the leadership? ▪ What are others stakeholders' roles and actions? ▪ Political economy of decision making 	<ul style="list-style-type: none"> and country strategies ▪ Household surveys ▪ Research reports 	<ul style="list-style-type: none"> ▪ NGOs
4. Overall impact assessment	<ul style="list-style-type: none"> ▪ Economic, social, environmental, political impacts and potential fatalities ▪ Review of potential scenarios ▪ Priorities for action 	<ul style="list-style-type: none"> ▪ Risk matrix 	<ul style="list-style-type: none"> ▪
5. What is DFID doing and what should it do?	<ul style="list-style-type: none"> ▪ Knowledge and experience ▪ Skills and capacity ▪ Whether mainstreamed or programmatic ▪ Level of ambition what DFID should do with national government and partners 	<ul style="list-style-type: none"> ▪ Operational plans, BAR bids, Business Cases ▪ Capacity and skills analysis 	<ul style="list-style-type: none"> ▪ C-O advisers and programme managers ▪ Partners ▪ Vertical programmes

3. Characteristics of a Disaster-Resilient Community (Twigg, 2009)

<http://community.eldis.org/.59e907ee/Characteristics2EDITION.pdf>

This detailed framework outlines a set of 'characteristics' that can be used to measure resilience. It emphasises the need for organisations working with the characteristics to use the framework as a starting point for identifying and discussing relevant issues, rather than as a 'checklist'. Characteristics should be seen as signposts for indicator development, describing attributes or elements that contribute to the resilience of communities. They then have to be translated into measurable indicators.

Characteristics are used mostly to frame the project review process. This can be done either by selecting relevant characteristics as indicators of activity or achievement in the areas of disaster risk reduction (DRR) that the project addresses, or by mapping all of the project's activities and accomplishments against the framework, seeking not only a measure of success but also an understanding of gaps and limitations in its DRR coverage.

The framework outlines five thematic areas based on the Hyogo Framework for Action, each of which contains a number of 'components of resilience' (shown below). In turn, each component of resilience contains more detailed and specific 'characteristics of a disaster-resilient community' (not shown in the table below). In total, the framework provides a total of 28 components and 167 characteristics.

<i>Thematic areas (5)</i>	<i>Components of resilience (28)</i>
Governance	<ol style="list-style-type: none"> 1. DRR policy, planning, priorities, and political commitment 2. Legal and regulatory systems 3. Integration with development policies and planning 4. Integration with emergency response and recovery 5. Institutional mechanisms, capacities and structures; allocation of responsibilities 6. Partnerships
Risk assessment	<ol style="list-style-type: none"> 1. Hazards/risk data and assessment 2. Vulnerability/capacity and impact data and assessment 3. Scientific and technical capacities and innovation
Knowledge and education	<ol style="list-style-type: none"> 1. Public awareness, knowledge and skills 2. Information management and sharing 3. Education and training 4. Cultures, attitudes, motivation 5. Learning and research
Risk management and vulnerability reduction	<ol style="list-style-type: none"> 1. Environmental and natural resource management 2. Health and well being 3. Sustainable livelihoods 4. Social protection 5. Financial instruments 6. Physical protection; structural and technical measures 7. Planning regimes
Disaster preparedness and response	<ol style="list-style-type: none"> 1. Organisational capacities and co-ordination 2. Early warning systems 3. Preparedness and contingency planning 4. Emergency resources and infrastructure 5. Emergency response and recovery 6. Participation, voluntarism, accountability

4. A Multidimensional Approach for Measuring Resilience (Oxfam GB, 2013)

<http://policy-practice.oxfam.org.uk/publications/a-multidimensional-approach-to-measuring-resilience-302641>

Oxfam GB's approach for understanding and measuring resilience is based on five dimensions affecting the ability of households and communities to minimise risks from shocks and adapt to emerging trends and uncertainty:

- **Livelihood viability:** The extent to which livelihood strategies can thrive in spite of shocks, stresses and uncertainty.
- **Innovation potential:** The ability to take appropriate risks and positively adjust to change
- **Contingency resources and support access:** Access to back-up resources and appropriate assistance in times of crisis.

- Integrity of natural and built environment: Health of local ecosystems, soundness of natural resource management practices, and robustness of essential physical infrastructure.
- Social and institutional capability: Extent formal & informal institutions are able to reduce risk, support positive adaptation, and ensure equitable access to essential services in times of shock/stress.

Several “resilience characteristics” will be relevant for each of the five dimensions, but these are not predetermined and will vary depending on context: “each particular suite of characteristics needs to be appropriately specified, given the nature of the population in question and the hazards and change processes to which it will likely be subjected” (p. 5). Specific research is needed in each context to identify relevant characteristics. For example, an Oxfam project in Ethiopia identified 37 resilience characteristics (p. 16):

Resilience Characteristics Used in the Ethiopia Somali Region Agro-Pastoral Impact Evaluation Study

<i>Dimension</i>	<i>Characteristics</i>	
Livelihood Viability	Household food security	Ownership of pack animal
	Household dietary diversity	Livestock lost to disease
	Livelihood diversification	Livestock lost to drought
	Gender risk differential	Livestock vaccination
	Crop portfolio	Access to drought warning information
	Livestock portfolio	Drought preparedness practice
	Livestock herd size	
Innovation Potential	Attitudes towards new livelihood practices	Access to credit
	Awareness of climate change	Access to state innovative support
	Innovation practice	Market access
Access to Contingency Resources and Support	Group participation	Savings
	Social connectivity	Remittances or formal earnings
	Perceptions of local government	Ownership of fungible livestock
	emergency support	
Integrity of the Natural and Built Environment	Extent of soil erosion	Access to water for livestock/consumption
	Access to irrigation for farming	Access to grazing land
Social & Institutional Capability	Awareness of drought preparedness plan	Violent dispute experience
	Receipt of drought prep. information	Participation in drought prep. meetings
	Awareness of community level drought risk reduction initiatives	Awareness of local leader/community institution in supporting adaptation
		Perceptions of effectiveness of local leaders/institutions

Source: Hughes et al. 2013, p. 16

Oxfam GB then applied a method proposed by Alkire and Foster for multidimensional poverty analysis to define thresholds of resilience for each characteristic, and assigns weights to each characteristic to produce an overall index of resilience.

5. Toward Resilience: A Guide to Disaster Risk Reduction and Climate Change Adaptation (Emergency Capacity Building Project, 2013)

<http://www.ecbproject.org/resources/library/341-toward-resilience-a-guide-to-disaster-risk-reduction-and-climate-change-adaptation>

This guide is a resource for staff of development and humanitarian organisations, providing principles of effective practice, guidelines for action, case studies, and tools and resources for the application of an integrated, rights-based approach to disaster risk reduction and climate change adaptation. The chapter on Program Cycle Management (pp. 31-46) provides advice on the design, implementation, monitoring and evaluation of programmes that build disaster and climate resilience, following a simplified programme cycle with three phases: analysis, design, and implementation. It notes the importance of reviewing and evaluating progress and achievements, and using this information to continually improve programmes.

The guide recommends the following key steps and information requirements at the **analysis** stage of programme development (pp. 34-36):

1. Define the analysis purpose and process.
2. Analyse the hazard and climate context:
 - Collect data from primary and secondary sources on historical climate conditions and projected climate change scenarios in the target area, as well as climate and non-climate related hazard occurrence in the target population and surrounding area.
 - Consult different socio-economic and livelihoods groups within the target population about observations of changing climate conditions and hazards affecting their community in their lifetime.
 - Analyse the effects of the above on the assets, resources and facilities on which community members' wellbeing and livelihoods depend, how current and future hazard and climate scenarios may affect any existing programs in the area and how information provided by climate information providers is understood and applied by the target population (and how it could be improved) and include this in baseline information.
3. Analyse capacities for resilience, and vulnerability within the target population to understand:
 - How different groups and sectors of the population currently deal with hazards and climate variability, and how effective and sustainable their methods are.
 - The potential impact of any current programs on the above.
 - The groups and sectors of the population most vulnerable to hazards and effects of climate change.
 - The reasons for their vulnerability: living and working conditions and underlying factors such as access to resources, political influence and social structures.
 - How vulnerabilities, capacities and coping mechanisms have changed over time.
4. Analyse the programming environment by conducting a power analysis:

- Identify the opportunities and obstacles for disaster risk reduction and climate change adaptation created by governmental and non-governmental programs being implemented in, or being planned for, the target area.
- Identify any relevant policies and/or policy gaps that may affect vulnerability and resilience among the target population.
- Identify any private sector activities that present opportunities and obstacles for disaster risk reduction and climate change adaptation.
- Analyse the interest of governmental, non-governmental and private sector organizations in disaster risk reduction and climate change adaptation, and their capacity for action (plans, structures, activities).

5. Validate and document the analysis, and establish a contextual baseline.

At the **design** stage, the guide recommends creating a **monitoring framework** and knowledge management plan (p. 40):

- Discuss and agree among stakeholders what kinds of indicators are most appropriate for monitoring the program's progress. Make use of recent participatory research on the characteristics of resilience, as well as other resources mentioned below to support the discussion. As with all programs, ensure the indicators selected are SMART (Specific, Measurable, Achievable in a cost effective way, Relevant for the program, and available in a Timely manner) and gender-specific where relevant.
- Refine the relevant aspects of the baseline created in the analysis stage to document the pre-program situation in relation to the indicators selected.
- Create a plan for collecting and analysing monitoring data in relation to the program baseline and the external baseline. It is very important to monitor both, as changes in the external context usually require program modifications.
- Identify potential areas of learning that may be useful for others, such as innovative technology, contextual challenges etc, and define how knowledge generated on these issues will be captured and shared. Add specific activities within the program logic to cater to this.
- Discuss and agree among stakeholders what kind of evaluation(s) should take place. For longer-term or highly innovative programs, a mid-term evaluation may be useful in addition to a final evaluation.

At the **implementation** stage, the guide recommends monitoring and modifying programmes continuously in response to new conditions and unforeseen situations. The guide does not suggest specific indicators for monitoring and evaluation, but recommends the following "key steps for monitoring, evaluation and learning, and knowledge management" (pp. 43-44):

- Ensure that the program's activities, outputs and outcomes, as well as the external context are systematically monitored in accordance with the monitoring plan, analysed, and that the results are shared with all stakeholders, so that the program can be refined in its design and improved for its ongoing implementation.
- Ensure that relevant data is disaggregated by gender and other differential factors.
- Be aware of unforeseen impacts, particularly negative ones, and make changes to the program if necessary.

- Produce and share examples of innovative or successful practice.
- Plan for, and carry out, learning reviews and evaluations at key intervals as part of the ongoing program cycle.

6. Community Based Disaster Preparedness (Catholic Relief Services, 2009)

http://www.fsnnetwork.org/sites/default/files/community_based_disaster_preparedness_guide.pdf

This guide was developed to support a community-led disaster preparedness process. It does not provide specific indicators for measuring resilience, but recommends participatory methods to collect information for monitoring progress and highlights the value of qualitative information. It provides participatory strategies and tools for a three-phase approach to developing disaster preparedness, the first two phases of which involve assessing resilience in the community:

- Getting to know the community: Meeting relevant stakeholders, conducting a mapping and transect walk, and participating in community life to understand disaster risks, infrastructure, and coping strategies.
- Understanding how disasters affect the community: The whole community participates in mapping exercises to analyse the impacts of disasters, and to identify relevant institutions and capacities within and outside the community.
- Planning how to prepare for disasters: Working in small groups formed according to socio-economic status, gender or location, community members identify the problems faced during disasters and possible solutions, and work together to develop a plan that uses local knowledge and is appropriate to the context.

The guide also recommends strategies and tools for participatory monitoring and evaluation (pp. 33-34), offering two main approaches:

1. The community checks its own progress in implementing its disaster preparedness plan, following a procedure that it develops itself with guidance from a facilitator; the guide presents a tool for helping communities develop a monitoring plan (pp. 70-72).
2. NGO staff use participatory methods to gather information about the impact of preparedness measures.

7. Participatory Capacity and Vulnerability Assessment (Oxfam GB)

<http://policy-practice.oxfam.org.uk/publications/participatory-capacity-and-vulnerability-analysis-a-practitioners-guide-232411>

The Participatory Capacity and Vulnerability Assessment (PCVA) framework is based on two social development methodologies. First, capacity and vulnerability analysis (CVA) methodology which enables programme design based on a community's capacities as well as its vulnerabilities. Secondly, it is based in the belief that enabling communities to genuinely participate in programme design, planning, and

management leads to increased ownership, accountability and impact, and is the best way to bring about change. PCVA draws on a range of participatory learning and action (PLA) techniques and tools designed to channel participants' ideas and efforts into a structured process of analysis, learning, and action planning.

Following is a simplified summary of the PCVA process and key questions to measure disaster resilience in order to create a Risk Reduction Action Plan.

Stage 1: Making preparations

Stage 2: Collecting secondary data

Stage 3: Beginning work with the community

- What is the demographic composition of the community?
- What are the gender/generational roles in the community?
- Which groups and organisations exist within the community?
- Which government and private sector institutions exist within the community, and which external institutions does the community interact with?
- What are the main livelihood strategies in the community?
- What cycles do the main livelihood strategies follow?
- Which natural and physical resources are important to livelihoods, life, and well-being in the community?

Stage 4: Analysing hazards, the impact of climate change, vulnerability and capacity

- What are the hazards affecting this community?
- How have the different hazards affected the community at different times?
- How have hazards changed (or how might they change) as a result of climate change?
- How do the weather-related hazards identified affect families and the resources on which they rely for their livelihoods?
- How does the community seek to reduce the impact of weather-related hazards?
- Why are community members negatively affected by hazards?
- How can the community reduce its vulnerability to hazards?

Stage 5: Prioritising risk

- Which hazards present the highest risk to the community?
- Which assets are at greatest risk?

Stage 6: Developing a risk reduction action plan

- How does the community want to address the most significant risks?
- How can the community address the causes of vulnerability?
- How will the community implement its risk reduction action plan?

Stage 7: Putting the action plan into practice

8. Participatory Assessment of Disaster Risk (Tearfund, 2011)

<http://tilz.tearfund.org/~media/Files/TILZ/Publications/ROOTS/English/Disaster/ROOTS%209%20Reducing%20risk%20of%20disaster.pdf>

This framework is based on a tool known as Participatory Assessment of Disaster Risk (PADR). The purpose of the tool is to enable a community to assess the factors that contribute to the size and scale of any potential disaster and to develop a locally owned plan to address those factors and reduce the risk of disaster. It also enables the community to identify and address the social, political and economic structures which contribute to their vulnerability.

The PADR tool suggests five categories of analysis:

- **Individual assets:** Skills, knowledge, literacy, experience, training, ability to work and physical health.
- **Social assets:** Relationships and networks that exist within the community and with people outside
- **Natural assets:** Natural resources available, such as forests, rivers, grazing areas, wild fruits and minerals
- **Physical assets:** All structures which are created by people.
- **Economic assets:** Household income, livelihoods and possessions that can be turned into money.

PADR is a five-step process (preparation; hazard assessment; vulnerability and capacity assessment; dynamic pressures and underlying causes; and risk reduction planning), in which three of the steps relate to assessing resilience. The framework recommends six participatory tools for use in community discussions:

<i>Tools</i>	<i>Which PADR steps?</i>	<i>Purpose</i>
Community mapping	Step 2: Hazard assessment Step 3: Vulnerability and capacity assessment Step 5: Risk management plans	<ul style="list-style-type: none"> ▪ To show buildings, structures and natural resources ▪ To show areas and resources affected by the hazard ▪ To show the capacities – things which are unaffected by the hazard ▪ To identify safe areas and define safe evacuation routes for contingency plans
Ranking	Step 2: Hazard assessment Step 3: Vulnerability and capacity assessment Step 5: Risk management plans	<ul style="list-style-type: none"> ▪ To determine which hazard or which impact of the hazard is of most significance to community ▪ To show which natural resources are most important ▪ To help people agree on which vulnerability is a priority and should be addressed first in planning
Timeline	Step 2: Hazard assessment	<ul style="list-style-type: none"> ▪ To show the history of local disaster events ▪ To identify any changes or trends in hazard type, frequency or intensity, giving clues for the future
Seasonal calendar	Step 2: Hazard assessment Step 3: Vulnerability and capacity assessment Step 5: Risk management plans	<ul style="list-style-type: none"> ▪ To show the specific times of year when hazards and livelihood activities occur, and which activities are most at risk ▪ To show the safer seasons of the year, which should be used to the full for agriculture and other livelihoods

Venn Diagram	Step 3: Vulnerability and capacity assessment Step 5: Risk management plans	<ul style="list-style-type: none"> ▪ To give a visual representation of the various social groups, demonstrating their relative importance and relationships between them ▪ To identify under-used groups which have capacities ▪ To identify groups which may need to be influenced to bring about change to a structure or a process affecting the community (a dynamic pressure)
Transect walk	Step 3: Vulnerability and capacity assessment	<ul style="list-style-type: none"> ▪ To gather additional information about the capacities and vulnerabilities in the community

Source: Hansford 2011, p. 35

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10. About this report

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