

RESILIENCE IN ACTION

TECHNICAL BRIEF

CLIMATE & ECOSYSTEM-INCLUSIVE DISASTER RISK REDUCTION



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Core Concepts: Climate and Ecosystem-Inclusive Disaster Risk Reduction (CEDRR)

USAID defines resilience as “the ability of people, households, communities, countries, and systems to mitigate, adapt to, and recover from shocks and stresses in a manner that reduces chronic vulnerability and facilitates inclusive growth.”¹ Resilience is undermined, and systemic risk increased, when there is a loss of biodiversity and degradation of ecosystem services². Ineffective governance systems and services, degraded social networks and cohesion, inefficient market systems, and a decrease in livelihood opportunities also impact resilience. Immediate and long-term impacts from climate variability and change further intensify risks and undermine development and humanitarian gains. Risk is a result of the combination of exposure, vulnerability to that exposure, and the lack of capacities to deal with a particular hazard or threat. Exposure to natural and manmade threats is a direct result of poor planning, weak public infrastructure, and substandard building codes. Systemic socio-economic vulnerabilities like poverty and wealth inequity both drive exposure to threats and reduce people’s coping and adaptive capacities to endure and recover from disasters.

There is a clear relationship between environmental degradation and increasing vulnerability to hazards. Healthy ecosystems (e.g. mangrove forests) serve as important buffering zones or natural barriers to hazards

BOX I. EXAMPLES OF CEDRR NEXUS STRATEGIES

- **Rezoning** to prohibit hard infrastructure and promote **restoration** of sensitive coastal ecosystems & services (e.g. mangrove forest restoration) = protection from coastal hazards and reduction of disaster losses
- **Climate-smart diversified agriculture** = higher revenues, reduced losses to climate shocks and stresses and livelihood / economic security
- **Native species reforestation** = climate change mitigation (reduction of emissions & carbon sequestration) and improved ecosystem services of infiltration, fuelwood provision and biodiversity
- **Combined community-based resource management and CEDRR strategies** reduce exposure and vulnerability, improve capacities, and increase livelihood, food and water security.

such as tsunami and coastal storm surge, reducing exposure of people and infrastructure to these hazards. Well-managed ecosystems, such as upland terrestrial forests, provide ecosystem services, like groundwater recharge, soil fertility and flood reduction that support sustainable livelihoods such as community-based fuelwood extraction and replanting. Nexus strategies, which address risks while improving wellbeing outcomes, are examples of no regrets, win-win risk reduction³. CEDRR incorporates short- and long-term climate trends with traditional ecosystem-based DRR (Disaster Risk Reduction) to promote joint win-win nexus objectives of sustainable environmental management to reduce disaster risk and promote sustainable climate resilience development⁴. Support for improving resilience through CEDRR approaches, such as natural

¹ USAID. “[Building Resilience to Recurrent Crisis](#).” (December 2012)

² CBD/UNEP, 2018

³ Renaud, F.G. et al, 2016 and 2013

⁴ IUCN, 2018

resource management, environmental restoration and conservation, can lead to significant current and future savings and loss avoidance.⁵ Estimates of cost savings project that for every \$1 USD spent on ecosystem protection and restoration, such as of coral reefs, \$20 USD is saved in averted losses from hurricanes⁶

Evidence of win-win CEDRR nexus strategies (Box 1) illustrated in the case studies, a new proposed Framework (Fig. 1), and Table 1, best practices for operationalizing win-win CEDRR resilience strategies, jointly show how such strategies can be designed to reduce risk to climate change, address systemic natural and manmade risks, while improving livelihoods, environmental sustainability and human security. The Framework makes a strong case for employing win-win strategies through nexus approaches, and to overcome current challenges, which will be explored in the case studies presented.

Transforming Challenges into Opportunities

Although some frameworks make the connections between climate, environment, DRR and resilience, they often focus more on program assessment instead of program effectiveness and its ability to achieve its intended impact. The Climate, Environment and Disaster Risk Reduction Integration Guidance (CEDRIG), for example, is a framework to assess both the climatic, environmental and disaster risks to a program (e.g. operational risks), and the potential impacts said program may have on climate (greenhouse gas emissions),

environment and increasing hazard exposure (e.g. a programmatic environmental impact assessment)⁷. The PEDRR (Partnership on Environment and Disaster Risk Reduction) network and the recently released Convention on Biological Diversity *Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction* have also produced substantial guidance and technical toolkit resources. These frameworks place ecosystem management at the centerfold of achieving DRR and adaptation to climate change, with principles and safeguards that cover humanitarian and environmental rights and practices. However, such guidance often fails to integrate resilience capacity-building measures (see Fig. 1), does not directly inform adaptive management, and is not readily applicable in humanitarian contexts⁸. Such tools should be explored for suitability to be adapted and applied to humanitarian contexts and to more tangibly include provisions for understanding, building, monitoring and adaptively managing resilience capacities and achievement of sustainable development outcomes.

Additionally, traditional DRR practice and policies often fail to account for this complexity of risk and fail to integrate social resilience capacity-building as a core component. Often, DRR programs focus on small-scale, sector-specific approaches with relatively short time-horizons like public health system preparedness and response strengthening, without connecting with other sectors and actors upon which public health system resilience may be directly impacted. In addition, emergency response and recovery often tends to rebuild the previous (damaged or destroyed) structures as quickly as possible, with limited considerations for better

⁵ UNISDR, 2015; CBD/UNEP, 2018

⁶ IUCN, 2018

⁷ CEDRIG, 2018

⁸ Renaud, F.G. et al, 2016 and 2013; UN CBD, 2018

hardening. They often fail to: 1) account for the impacts climate change will have on future natural hazard risks in the short- and long-term; 2) measure and address the environmental changes and impacts that resulted from the hazard/s; 3) understand and address socio-ecological inequities and vulnerabilities long-term; and, 4) support the access and use of resilience capacities people need to better cope and adapt to these risks over time.

Failing to consider all systems and their dynamic, interacting nature, as well as impacts from climate change and variability, leads to ineffective, sector-specific, short-term interventions that fail to sustainably address systemic root causes of risk. This also means missed opportunities to build resilience capacities to better cope and adapt to risks. Unfortunately, without engaging in a CEDRR approach, traditional DRR measures often ignore these factors. One example is the lack of consideration of environmental services, which are capable of offering risk reduction functions, and instead focusing on physical mitigation measures (e.g. sea walls vs. shoreline restoration like oyster beds and coral reef regeneration). These challenges are addressed head-on in this brief, by presenting three case studies highlighting win-win CEDRR nexus strategies, and recommendations for how practitioners can operationalize this adapted CEDRR Resilience Framework.

A Framework for Achieving Resilience & Improved Humanitarian and Development Outcomes Through CEDRR

Taking a CEDRR approach to building resilience requires an integrated, holistic socio-ecological systems approach. This enables practitioners to better understand and plan strategies that consider the interconnected physical, sociological and ecological systems and processes that influence risk and vulnerability.⁹ CEDRR is both the toolkit and the process that enable practitioners to understand and address the causes and impacts of systemic risk, whilst enhancing the coping and adaptive capacities of social, ecological, economic and political systems and actors. Figure 1 illustrates the Mercy Corps Resilience Framework adapted to highlight opportunities for integration of CEDRR tools and processes into program assessment, design and adaptive management to foster risk reduction, build resilience to threats and achieve development outcomes¹⁰.

When this framework is operationalized, it offers guidance on important focal points for a variety of assessment, design and adaptive management tools to better understand and address CEDRR in support of building resilience. The focal points for each of the questions is summarized here by the stage of programming. [For a summary of the five resilience questions, see Figure 2.]

⁹ Mercy Corps, 2017; USAID REAL Brief 1, 2017

¹⁰ USAID, 2018

Figure 1. An Adapted Framework: Climate & Ecosystems-Inclusive Disaster Risk Reduction Approach to Building Resilience (Mercy Corps, 2018).

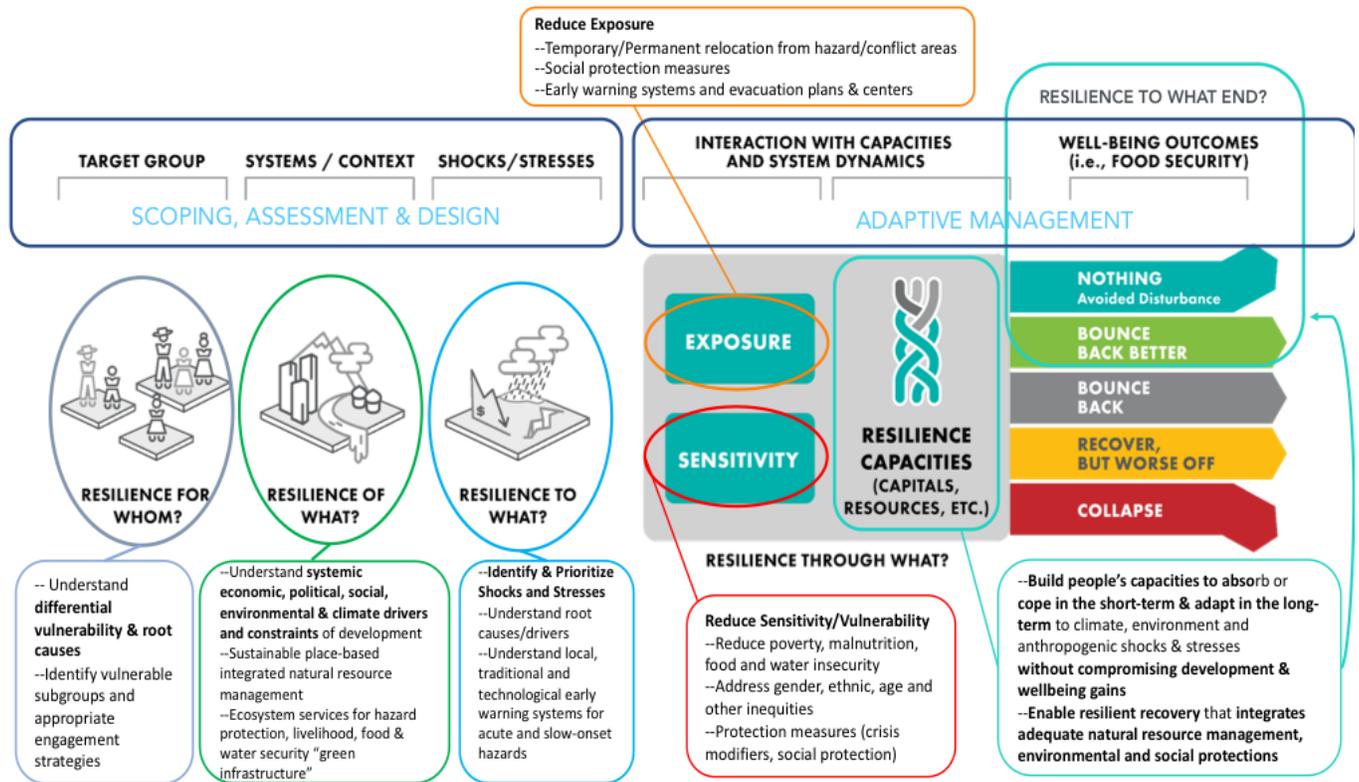


Figure 2. Applying Resilience Thinking: The Five Questions (Mercy Corps, 2018).

APPLYING RESILIENCE THINKING

The Five Questions



Program Scoping, Assessment & Design

The framework enables practitioners to have a comprehensive understanding of vulnerabilities, system dynamics, shocks and stresses through program scoping, assessment and design activities, in order to inform CEDRR interventions for adaptive management, done in the latter part of the framework. First, it is critical to understand the causes and impacts of differential vulnerability, or who is more vulnerable to what, how and why (“*Resilience for Whom*”). Through the “*Resilience of What*” question, the CEDRR information targets to investigate include understanding social, economic and political systems and dynamics and enabling (or disabling) environment within the program geography and boundaries, in order to better design and develop place-based climate and natural resource management strategies that offer nexus win-win strategies to reduce hazard exposure and improve livelihood, water and food security.

Next, the “*Resilience to What*” question focuses on identifying and prioritizing the most relevant climatic, environmental, human and technological shocks (acute high-impact hazard events) and stresses (long-term hazards or threats) and uncovering their drivers or causes. This information aids development of locally-appropriate traditional and technological early warning systems and associated DRR strategies (e.g. evacuation planning, mitigation projects). In answering these three questions through a series of background secondary data and participatory primary data (e.g. focus group discussions, participatory DRR activities like risk and resource mapping and action plans), opportunities for targeted CEDRR and resilience-building interventions within

humanitarian and development programs are better informed.¹¹ The remainder of the framework can be gleaned from additional assessment and design activities, but here we focus primarily on CEDRR.

Adaptive Management

Building on the information gleaned from the first three questions, adaptive management (implementation, monitoring and evaluation, and adaptive management), can be supported through engaging in CEDRR interventions across the remainder of the framework. “*Resilience through What*” consists of two critical components that together reduce risk and support resilience capacity-strengthening. The first is to reduce exposure of people to the shocks and stresses that most affect them, such as through pre-emptive or post-impact relocation that is either temporary (e.g. IDP camps) or permanent (e.g. resettlement, or rezoning to prohibit residences in hazard zones), improved social protection measures, and early warning systems, evacuation plans and resources. The second component is a strategic reduction of sensitivity or vulnerability of people and places to particular shocks and stresses. This can be done through both addressing root causes of vulnerability (highlighted in exploring “*Resilience for Whom*”) and identifying current and potential positive coping and adaptive capacities needed to better deal with shocks and stresses. This can be done, for example, through the following: 1) immediate humanitarian or post-disaster response and relief interventions to reduce poverty (e.g. cash transfers), malnutrition (food vouchers), and gender inequities (social protection measures); and/or 2) through longer-term development and DRR initiatives, such as changing gender norms, improving sustainability and risk diversity of livelihoods, access to

¹¹ USAID, 2018

markets and financial services. This framework and process enables designing and adaptively managing CEDRR interventions that jointly target both reduction of risk (exposure and vulnerability), as well as catalyze resilience capacity-strengthening to achieve wellbeing outcomes (“Resilience to what End?” see Table I) in the face of shocks and stresses.

Case Studies

Case Study I: Building Resilience through Transboundary CEDRR Coordination, Indonesia

Indonesia is one of the most vulnerable Asian countries currently dealing with the extreme effects of climate change.¹² Flooding is considered the most disastrous hazards in Indonesia and is expected to intensify with predictions of about 2 to 3% increases in rainfall each year¹³. Semarang City – the capital of Central Java Province residents, and particularly the urban poor, suffer from various types of floods (urban, tidal and flash floods), made more severe and exposed by industrial expansion, land degradation and urban migration. While efforts to address floods in Semarang have long focused on preparedness and response measures in downstream areas, including downstream flood mitigating infrastructure, they fail to consider the upstream causes and the importance of coordinated transboundary planning and action. Transboundary cooperation for flood risk management between Semarang City and Regency (municipality) is weak, due to a lack of clear incentives or mechanisms for longer term planning and action.



Photo Credit: Mercy Corps, 2018.

Photo of a tree-planting activity in upstream of Garang Watershed to promote conservation and better storm water management, TRANSFORM project, Indonesia

CASE I SNAPSHOT: TRANSFORM: FLOOD RESILIENCE IN SEMARANG, INDONESIA

- **Goal:** Reduced loss & damages caused by flooding
- **Process & Tools:** Built up- & down-stream community resilience to floods through transboundary coordination platforms, actionable information and decision-making tools.
- **Impacts:** Strengthened transboundary forum & community capacity, local-to-national information generation including a cost-benefit analysis and flood resilience measurement tools and products, improved access and collaborative cross-institutional decision-making for flood risk management, environmental education & private sector engagement.

The TRANSFORM program’s theory of change (Fig. 3) shows that if upstream and downstream stakeholders are connected through effective transboundary coordination platforms and identify shared interests in flood risk reducing measures through actionable information and decision-making tools, then they will invest in win-win resilience solutions that will enhance and sustain flood resilience.

¹² Case et al., 2017

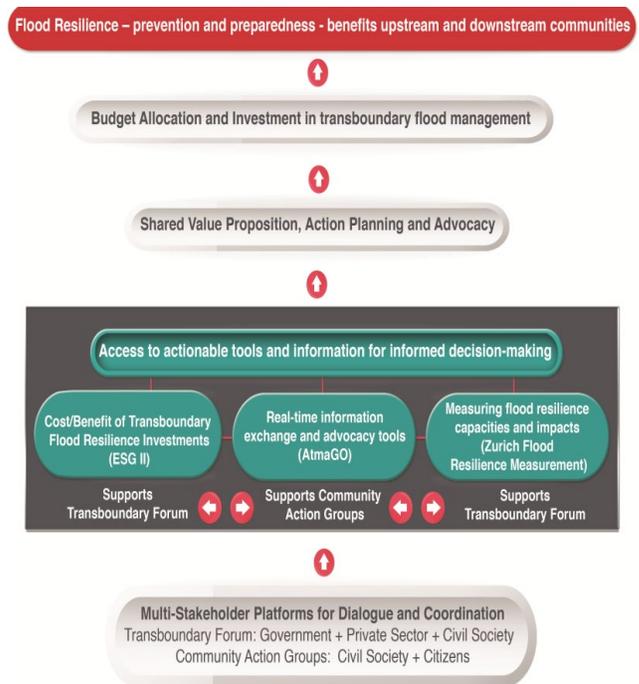
¹³ Maesey, 2010

Moreover, tools for informed decision-making at a Basin scale are not readily accessible. Lastly, Semarang Regency and City government, communities and businesses have limited actionable information on how land use and quality upstream affect flood patterns downstream.

To address this, Mercy Corps partnered with Mercy Corps Indonesia, Ecometrix Solutions Group (ESG), and AtmaConnect (tma) to implement “Transboundary Flood Risk Management through Governance and Information Technology” (TRANSFORM), an 18-month Global Resilience Partnership (GRP) project under the Water Window Challenge¹⁴. TRANSFORM applies a systems approach to DRR to unpack underlying causes of floods while working across various levels to create change. The project strengthens transboundary (cross socio-political border) linkages between upstream stakeholders in Semarang Regency, and downstream stakeholders in Semarang city who will both benefit from the solutions identified. Through a Transboundary Forum – a multi-stakeholder platform consisting of representatives from the government, private sector, civil society, academia and communities – relevant actors across the Basin are able to have dialogues, coordinate on and take action for flood resilience. The value proposition of this project revolves around transferring investments away from traditional preparedness and response (e.g. early warning) to focus on preventative approaches for flood risk reduction through improved watershed management. Through a cost-benefit analysis (CBA) using ESII¹⁵, the project quantifies the impacts to ecosystems within the transboundary watershed,

to help actors understand how impacts ultimately affect the people who rely on the benefits provided by ecosystems.¹⁶ The model enables running multiple scenarios of varying watershed management characteristics. These included changes of residential land cover coupled with changes in predicted additional annual runoff of varying percentages, and varying percentages of population increase, resulting in estimated financial/material, planning, labor, maintenance and time costs for different flood management interventions, including planting trees, shrubs and other groundcover, development of swales and drywells.

Figure 3. TRANSFORM Theory of Change for Flood Resilience



Findings¹⁷ were shared with the multi-stakeholder Forum to enable them to provide feedback, make informed decisions on

¹⁴ Funded by the Zurich Foundation

¹⁵ Through the [Ecosystems Services Identification and Inventory \(ESII\) Tool](http://www.esiitool.com/) (<http://www.esiitool.com/>), a free and publicly available tool developed by ESG, decision makers can rapidly and inexpensively measure the ecological benefits of upstream flood management activities for DRR.

¹⁶ Bené, 2018

¹⁷ Based on land use planning documents, assuming 20% population growth, the initial CBA findings identified that for every 1-hectare land conversion from rice paddy field into residential area, there is a 1,420,000-liter flow off of the site during a storm event, which is more than a quadrupling of run-off. For projected future flood risk conditions based on a relatively conservative estimate of 15% land cover change over the next 20 years, the results indicate an increase of 393 million

transboundary activities and investment strategies that align with their priorities, averting disasters and creating opportunities. Watershed management and flood risk reduction strategies were then designed through a multi-stakeholder and participatory process, directly resulting from information from the ESII tool on long-term flood risk reducing measures. TRANSFORM supports three pilot community-level flood risk mitigation interventions – tree planting, drywell, and swales drainage – that are based on the CBA results. The Transboundary Forum manages a fund for these community initiatives that the community networks apply for, furthering cooperation between communities and the Forum. Once proven successful, pilot investments have the potential to attract more funding from both the government and private sector and highlight paths forward for scaled and sustained transboundary cooperation at scale. For example, interest generated through TRANSFORM has led to additional locally led investments, including community-based waste management and dry well construction, and even replication of some activities in other communities. As part of TRANSFORM’s private sector engagement strategy, the Transboundary Forum also engaged with major upstream housing developers and encouraged them to invest more in storm-water management to offset the negative impact of their new housing development. The Forum was able to attract developers by demonstrating what they could gain in terms of social benefits and community acceptance. As a result, the housing developers decided to change their site planning maps and added storm water management components. They also committed to complying with the environmental agency agreement. This agreement was based on the environmental impact assessment they had initially signed, but

which was never enforced despite existing policies and regulations. This case study shows that taking a systems approach to CEDRR through ecosystems management and transboundary coordination not only offers an opportunity to strengthen natural infrastructure and resilience against hazard impacts, but also generates a range of other social, economic and environmental benefits for multiple stakeholders, which in turn feed back into reduced risk.

Case Study 2: A Resilience Nexus Approach to Market Systems Development and Disaster Risk Reduction, Timor Leste & Nepal

Notwithstanding differences in climate and geography, both Nepal and Timor Leste are food insecure and disaster-prone. Nepal’s annual monsoon season brings flooding and landslides—with evidence that climate change is adding to the severity and frequency of these events. In Timor Leste, higher temperatures, greater intensity of extreme rainfall, strong wind and droughts have increased the frequency and severity of disasters. Timor Leste is one of the most food insecure countries in the world, with 80% of the population reliant on agriculture for food and income. Many communities in Nepal and Timor Leste remain unprepared. DRR activities to-date focused on early response alone, and not comprehensive CEDRR (Fig. 1, Table 1). Apart from protecting lives and property, DRR activities are rarely tied to strategies that build economic security and increase incomes. Too often, assessment processes which seek to understand disaster risk, focus narrowly on hazards and issues related to direct exposure of vulnerable populations. As a result, the interventions resulting from them address only a narrow aspect of vulnerability.

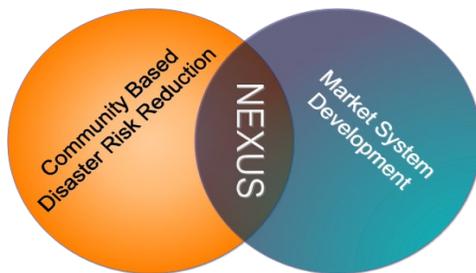
liters of run-off from a 25-year storm with considerable adverse effects to the hydrograph, and an annual asset loss up to \$140,000 USD in Semarang City due to flooding.



Photo from the M-RED Program in Timor Lest and Nepal

To address these multiple challenges, Mercy Corps is leading a five-and-a-half-year program, Managing Risks through Economic Development (M-RED + M-RED 2)¹⁸ in Nepal and Timor Leste. M-RED’s approach sought to ensure that communities not only have plans to cope with the next disaster, but that they also have made critical investments and built relationships instrumental to their success, while influencing the disaster policies and practices that impact their long term resilience. In each country, M-RED partnered with stakeholders to form the appropriate nexus interventions (Fig. 4) through an Integrated Disaster and Economic Analysis (IDEA).

Figure 4. CEDRR Nexus Intervention



The IDEA process takes a multi-systems approach, extending beyond typical disaster risk assessments by including a range of social,

CASE 2 SNAPSHOT: M-RED: LIVELIHOOD SECURITY + CEDRR IN TIMOR LESTE & NEPAL

Goal: Communities have jointly increased their coping and adaptive capacities to deal with disasters.

- **Process & Tools:** Engage in the Integrated Disaster and Economic Analysis (IDEA) process, a multi-system, a nexus approach to building resilience through community & government engagement, disaster policies and practices, livelihood generation & environmental recovery.
- **Impacts:** Win-win resilience gains including Increased livelihood security coupled with environmental / climate risk mitigation from riverine erosion, mutually reinforcing attributes.

Central to M-RED was the development of the “nexus” approach fostering win-win resilience strategies, through integrating DRR and market systems development (MSD) approaches throughout the program as an effective and sustainable model for DRR that is directly linked to livelihood and economic security in vulnerable communities.

ecological and economic assessment processes. As seen in Fig.5, through the IDEA process, the flow of information collection, analysis and filtering in M-RED at the systems and regional level included:

- 1) government policy mapping and complementarity planning;
- 2) key actor engagement;
- 3) ecosystems analysis; and,
- 4) a climate baseline study.

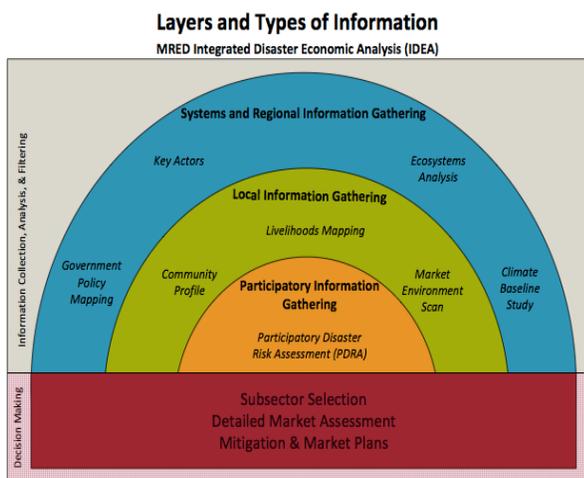
Local information gathered included:

- 1) community profile;
- 2) livelihoods mapping; and,
- 3) a market environment scan.

¹⁸https://www.mercycorps.org/sites/default/files/Mercy_Corps_climate_resilient_development_case_studies_Nepal_Timor.pdf

All of the local information gathering include considerations for natural resources and ecosystem services.

Figure 5. M-RED Integrated Disaster and Economic Analysis (IDEA)



Participatory information gathered included a PDRA or Participatory Disaster Risk Analysis. And finally, decision-making included subsector selection for nexus intervention strategies informed by a detailed market assessment, mitigation and market plans. These strategies highlight what community activities will support mitigation and livelihoods, and what market activities will facilitate systemic change and support mitigation.

Based on this compilation of assessment work, Community Action Plans (CAPs) were formulated. These included strategies to reduce risk to natural hazards, a plan for how the implementation of those strategies would provide economic support to households, market engagement plans to ensure sustained economic benefit over time, and links to central and sub-national government planning and policies. The first phase of M-RED (2012-2016) supported nexus interventions in over 60 disaster-prone communities in Nepal and Timor Leste, growing to 87 communities with M-RED 2 (between 2016-2019).

The nexus approach is exemplified by the work in the village Lalitpur-3, in the Kailali district of Nepal, where annual flooding of the Guraha and Mohana rivers is a significant hazard affecting lives and livelihoods. M-RED’s IDEA process identified the sugarcane sub-sector as a priority nexus intervention that made sense both in the Nepalese market system, and as a crop to mitigate environmental risk (Image of sugarcane planting in Nepal). The income-generating potential of sugarcane has proven an invaluable tool to mobilize communities to construct and maintain riverbank infrastructure, and to invest in cultivating and reclaiming marginal and hazard-prone lands. The results have reduced the seasonal emigration of men for employment and encouraged families to return to the riverbank to rebuild their homes and increase their agriculture production. M-RED illustrates the value of applying a resilience lens to local DRR activities, such as disaster risk assessments and community planning. In doing so, DRR strategies can go beyond the traditional approaches of structural mitigation of hazard risk and community capacity-building. The nexus approach in this case study shows how broader development outcomes such as livelihood security and market systems development can be supported by local CEDRR activities. In doing so, it ensures longer-term effectiveness and sustainability of DRR investments.



Image of M-RED Nexus Intervention: sugarcane planting in Nepal

Case Study 3: Transforming Humanitarian Response: Building Resilience through community mobilized CEDRR in the World's Largest Humanitarian Crisis, Cox's Bazar, Bangladesh

The Rohingya influx in August 2017 into Cox's Bazaar, Bangladesh resulted in the world's largest refugee 'camp' and complex humanitarian crisis¹⁹. A year later, Rohingya refugees and Bangladeshi host communities continue to face natural hazards and built risks, including makeshift shelters built in areas prone to landslide, flooding and wild animals and pests, poor water, sanitation and hygiene, limited food and fuelwood provisions driving food insecurity, environmental degradation and social tensions. In addition, a lack of mobility and income generation opportunities combined to perpetuate aid dependency and vulnerability. Humanitarian minimum standards have been a challenge to achieve due to systemic constraints (e.g. land availability) and refugees are often having to resort to negative coping strategies to survive, compromising their wellbeing and undermining future resilience capacities.

Mercy Corps recognized the interconnected negative feedback loops happening within the Rohingya refugee camps and host communities. In partnership with IOM Bangladesh, Mercy Corps attempted to understand and reverse these dynamics through conducting a Rapid STRESS (Strategic Resilience) Assessment.²⁰ The assessment utilized participatory learning CEDRR tools adapted iteratively, sometimes multiple times across each pilot site, for this context.



Photo Credit: Sarah Henly-Shepard for Mercy Corps, 2018.

Image of Rohingya refugees participating in STRESS Assessment, Cox's Bazar, Bangladesh.

CASE 3 SNAPSHOT: REDUCING RISK & BUILDING RESILIENCE THROUGH COMMUNITY MOBILIZATION IN ROHINGYA REFUGEE CAMPS

- **Goal:** Rohingya refugees, host communities, IOM/Interagency staff, Mercy Corps and Civil Society Organizations (CSO) engage in community-driven CEDRR activities promoting positive coping and adaptive resilience capacities to better deal with shocks and stresses without compromised wellbeing and human security
- **Process & Tools:** Participatory STRESS (strategic resilience) assessment and analysis toolkit
- **Impacts:** Humanitarian interventions are designed to integrate nexus CEDRR strategies to build resilience

The participatory Rapid Strategic Resilience Assessment conducted in 4 weeks in Cox's Bazar with Mercy Corps, IOM and Civil Society Organizations enabled transformation of how humanitarian actors and Rohingya refugees see their ability, influence and responsibility to address risk reduction and foster resilience capacity-building through adapting how humanitarian aid is done.

¹⁹ ISCG, Situation Report Rohingya Refugee Crisis, Cox Bazar, 2 August 2018 (covering 17th-30th July). Data based on Needs Population Monitoring

²⁰ STRESS-the Mercy Corps Strategic Resilience Assessment: <https://www.mercycorps.org/research-resources/resilience/strategic-resilience-assessment>

The assessment included participatory workshops with IOM staff, and six Training-of-Facilitator focus group workshops (3 females, 3 males) in three different refugee camps with civil society organizations, Rohingya refugees and community mobilizers. The Rapid STRESS explored the five questions of the Framework (Fig. 1). The participatory activities across both groups (IOM and Rohingya refugees) included raising awareness of vulnerabilities, hazards and capacities, and conducting a rapid humanitarian needs assessment, a community risk and resource map, and CEDRR action planning with a focus on building upon current and potential capacities. These activities facilitated gathering the information needed for the Scoping, Assessment and Design phase of the Framework (Fig. 1). This enabled the team to tease out systemic dynamics of the camps, identify the key vulnerable groups, prioritize the most pertinent shocks and stresses, and discuss the current and potential capacities needed to more positively cope and adapt in the face of threats. Rapid risk analysis tools were designed to translate the needs assessment, risk and resource mapping and action planning results into a matrix to consolidate and analyze findings.²¹ These findings highlighted sectoral trends across sites, as well as site-specific gaps in humanitarian access and major risks needing immediate and long-term address. Climate, environment and socio-political dynamics of risk and undermining of resilience were called out in the analysis and recommendations.

There was an explicit focus to highlight win-win CEDRR nexus strategies. These served as key resilience-gain investments for humanitarian actors and donors to strategically and collaboratively double-down on in the immediate term (under 6 weeks, to promote life-saving and

sustaining in ways that don't undermine resilience and increase risk), and the mid- to long-term (6 weeks to multi-year, to address transforming systemic drivers of risk). Such a participatory process and toolkit enables greater co-learning of CEDRR, improved transparency, accountability and efficiency of decision-making by and across sectoral and institutional actors. This leads to better design and adaptive management of humanitarian programs, such as site management, protection, WASH programs (Fig. 1, Table 1).



Image of Rohingya refugee camp, Cox's Bazar, Bangladesh, May 2018

Specifically, humanitarian actors can utilize such an assessment and analysis process to generate clearer evidence, provide direction on strategic risk reduction measures, targets, and indicators and avoid activities discovered to potentially undermine current or future positive coping and adaptive capacities. This CEDRR approach and toolkit for building resilience in a humanitarian context are essentially the application of the concepts and principles proposed in the *New Way of Working Commitment to Action*²² along with Mercy Corps and IOM's institutional thinking on building resilience within complex crises. This

²¹ The Rapid Strategic Resilience Assessment Report of the Rohingya Refugee Humanitarian Response, Bangladesh August 2018 is forthcoming. It will be available on the Mercy Corps site:

<https://www.mercycorps.org/research-resources/resilience/strategic-resilience-assessment>

²² <https://www.unocha.org/story/new-way-working>

pilot suggests that even within humanitarian contexts, transforming humanitarian aid can be achieved by rapid participatory risk and resilience assessments and transformation of perspectives through learning about CEDRR. Such an approach can and should be conducted to inform all actors on how to commit to intersector measures that actively promote community mobilization and agency, reduce risks, transform the systemic drivers of those risks, and improve resilience capacities over time. Such an intersector strategy is most successful when humanitarian actors are fostering operational resilience through contingency planning to ensure continuity of services. Rohingya refugee and host communities will also be better prepared and empowered through the development of their own community risk reduction plans, leadership, capacities and unity.

Implications for Programming

Four key tenets emerge across all three case studies for how programming scoping, assessment, design and adaptive management are enhanced when we integrate CEDRR within a resilience framework (Fig. 1):

Tenet 1: Utilization and linking of **cross-sector tools covering comprehensive risk and resilience assessments** (e.g. climate change adaptation and ecosystem services mechanisms, disaster risk reduction measures, cost-benefit

analyses and ecosystem services analysis tools) **supports better integration and layering of programs;**

Tenet 2: **Systems thinking enables application of win-win CEDRR nexus strategies** that support addressing systemic **root causes of risk**, and **have impact assessment measures that ensure programs will not increase risk**, whilst supporting **resilience capacity-building for immediate coping and longer-term adaptation to risks and achievement of development outcomes;**

Tenet 3: **Community mobilization and transboundary, cross-sector governance** over longer time periods are both required to foster sustainable CEDRR at landscape scales and across boundaries; and,

Tenet 4: **Investments in operational resilience** (awareness, knowledge, skills and risk reduction measures of operations to support diversity, redundancy and continuity of services in the face of shocks and stresses) are critical for integration of CEDRR into humanitarian and development programs to achieve resilience and wellbeing gains.

These tenets are captured in Table 1 and explored in the following section, which offers examples of potential CEDRR practices that can be executed through each question of the framework (Fig. 1).

Table I. Best practices for operationalizing win-win CEDRR resilience strategies

Win-Win Development Outcomes <i>Resilience to What End?</i>	Systemic Risk Challenge <i>Resilience of What? Addressing Root Causes & Impacts of Risk</i>	Climate & Ecosystem Services Support <i>Resilience to What? Reducing Exposure</i>	DRR & Governance Measures <i>Resilience to What & For Whom? Reducing Vulnerability</i>	Resilience Capacities Strengthened <i>Resilience through What?</i>
Livelihood security & income generation	Natural hazards recurrently impact livelihood & income-generation access and resources; many livelihood strategies are not designed with DRR & resilience in mind.	Intergenerational and gender inclusive traditional ecological knowledge sharing for development of climate & environment-resilient livelihood strategies	Diversified livelihood/ economic risk strategies support diverse income and resource streams	Increased abilities to generate income despite exposure to multiple hazards. Improved capacity to meet / exceed basic needs with stable income. Supports economic recovery post-shock.
Natural resource management & ecosystem services sustainability	The built environment & human actions caused environmental degradation and depletion of ecosystem services and associated risk mitigation functions Impacts include increasing exposure and severity of natural hazards and associated impacts on the human activities dependent upon the ecosystem.	Restoration of productivity of degraded land offers opportunities to start or improve productive agricultural practices Agricultural strategies (e.g. improved water resource management practices) and inputs e.g. drought- and pest-resistant seed varieties) are climate-resistant.	Community & cross-sector CEDRR Planning (integrated Climate & Vulnerability Assessments, systemic resilience assessments & Action Plans) Focus on differential vulnerability & engagement Improved local governance & integrated management	With an alternative source of income, households can better absorb shocks/stresses that threaten one source. Households have more income and are thus more financially stable. Access, use and understanding of Climate Information Services (early warning systems + longer-term climate trends) Increased coping & adaptive capacity of communities to anticipate, prepare, respond to and recovery from shocks and stresses
Human security & wellbeing	The built environment/human actions places homes and services in hazard zones, increasing their exposure and vulnerability.	Adequate zoning and integrated management mechanisms for sensitive ecosystems and enabling restoration of ecosystem services	Moving homes out of hazard zones, reduced loss of life, injury, assets & reduced loss of basic services & infrastructure	Improved transformation of systems to promote resilience vs. negative cycles of undermining resilience and increasing risk

Changes to Program Scoping, Assessment and Design

As evidenced in the case studies, Figure 1, and Table 1, program design to support resilience-building through CEDRR requires understanding of a place's systems dynamics relative to the environment and climate change, knowledge of the relevant shocks and stresses, and the core resilience capacities needed to deal with them.²³ This can be gleaned through comprehensive risk and resilience assessment tools (Tenet 1), which should support a resilience strategy or theory of change for integration and layering of programs to support a broader resilience-building mission (Tenet 2).

Critical to the success of program design and adaptive management (Tenet 4) are true community mobilization and transboundary, cross-sector governance engagement (Tenet 3) that extend beyond the program life cycle. Risk and resilience assessment information is used to inform and prioritize actions that can be done through doubling down on community mobilization to support local-to-transboundary resilience to particular shocks and stresses. For example, as seen with TRANSFORM, it is important to access and analyze environmental and urban planning information in order to best determine the most cost- and environmentally-effective nexus CEDRR interventions. By investing in a nexus CEDRR approach supporting cross-sector transboundary partnership forums and collective decision-making, TRANSFORM addressed both flood resilience and environmental management at the watershed landscape scale. In addition, with sufficiently longer time periods to pilot new interventions, TRANSFORM was able to support cross-sector, multi-stakeholder partnership awareness-raising

and decision-making on a CEDRR vision for building resilience to hazards whilst supporting development outcomes. In M-RED, nexus interventions were designed through the Integrated Disaster and Economic Analysis (IDEA) process, incorporating a multi-systems approach utilizing a range of social, ecological and economic assessment processes. Partnerships with private sector actors to support market systems development, linked to CEDRR and government planning processes, supported the transformation of previous riverine risk areas into economically productive croplands. These croplands provided livelihood and economic security as well as a way to reduce risk to flooding and erosion. As seen in the third case study, the framework (Fig. 1) was operationalized for Scoping, Assessment and Design question-by-question in this participatory rapid strategic resilience assessment, across all of the participatory learning activities. This approach not only improves understanding of key climate, environment and social risk drivers and impacts, as well as current and potential resilience capacities, but it also raises awareness and learning within and across humanitarian and refugee actors, bridging power differentials, supporting human agency and untapping critical human capital. This assessment toolkit, findings, and the transformed learning and perspectives of the actors, will inform the development and adaptive management of current and future humanitarian interventions. This will achieve improved humanitarian standards and development outcomes through better integration of community mobilization, CEDRR, and resilience-building over time.

Changes to Adaptive Management

Operational resilience is essentially the enabling environment needed to successfully, adaptively

²³ USAID REAL Guidance Note 1, 2017

integrate CEDRR into humanitarian and development initiatives and achieve resilience and development gains. The first three thematic tenets (i.e. the CEDRR mechanisms, relationships and knowledge) are critical for fostering and achieving Tenet 4, adaptive management for strengthened resilience capacities in support of the development outcomes desired (Fig 1, Table 1). Adaptive management of programs to promote resilience through CEDRR necessitates resilience of the programs themselves. This is due to the uncertain and unstable context in which most humanitarian and development programs exist. This also necessitates resilience of operating systems and staff. Programs must be longer-term, promote diverse partnerships and stakeholder engagement experimental testing, evaluation and adaptive management of CEDRR nexus interventions to build an evidence base for what builds resilience over time and through what processes.

As such, this operational environment requires financial, human resource, logistical and technological systems that possess the same inherent qualities of socio-ecological systems resilience, such as flexibility in adaptive program management and a culture of learning. Programs by design and implementation must incorporate consideration for shocks and stresses. Staff must be able to anticipate and respond effectively to them so as to ensure program continuity. Finally, CEDRR programs must be able to track if, how and how well they are contributing to reducing risk and improving resilience capacities through interventions and measure it through an integrated monitoring and evaluation system. Necessary to this institutional sea change of operational resilience, is the commitment to program staff having baseline understanding of systems thinking, resilience and CEDRR concepts and applications. This is achieved through institutional prioritization of human resources

and capacity-strengthening platforms. This includes support of stakeholders and staff to conduct regular monitoring of shocks and stresses (e.g. community DRR committees that report on and respond to emergencies) that may be impacting program activities, goals, wellbeing outcomes among other factors. Program activities, and the funding mechanisms and donors that support them, must be designed and implemented flexibly (e.g. adjusting the timeline, activities, staffing, partnerships, geographical and target population focuses, etc.). This is what will allow programs to better anticipate and respond proactively to the changing context (e.g. political regime changes or a major acute disaster) and dynamics (e.g. social tensions or environmental degradation). Crisis modifiers are one example of supporting immediate wellbeing and protection of populations to avert negative coping during a shock or a stress.

Second, programs must promote and leverage systemic diversity, through diverse staffing and stakeholder engagement. People have inherent diversity, and as a result have diverse roles within their households and communities with respect to natural resource management, development, risk reduction and governance opportunities. Building resilience requires addressing the root cause of inequity, vulnerability and risk, including gender and diversity inequity. Engaging in a gender and diversity-inclusive approach to CEDRR has the potential to reverse negative cycles of vulnerability and catalyze resilience-building within households and across communities. Finally, practitioners must better understand and plan for the inherent uncertainty within the complex systems in which we work, including social, climate, hazard and other changes. This can be better understood and planned for through participatory scenario-based planning. In this process, practitioners brainstorm how programs would need to be adaptively managed to deal with different shock

or stress scenarios, and how the operational systems that support these programs would also need to change to be more risk tolerant and resilient to them without degradation of critical services and functions.

Conclusions

Amidst dynamic systemic change, uncertainty and complex risks, in order to achieve development and wellbeing outcomes, communities, governance structures, implementing and thought partners must engage in integrating a resilience approach to applying CEDRR in humanitarian and development programs. This approach to promoting climate and environmental sensitivity, risk reduction and resilience capacity-building must be applied equally to operations, staffing, partnership, as a precursor enabling environment. This approach supports adaptive program design, implementation, monitoring and evaluation amidst shocks and stresses impacting the communities we work with and the way we are able to work with them. This action brief has offered a new Framework (Fig. 1), three CEDRR case studies and example best practices for applying CEDRR (Table 1) to inform and shift how we design and adaptively manage development and humanitarian programs and policies. This process cultivates the tenets necessary for integration of CEDRR to build resilience and improve development gains over time and scales.

Annex A. Terminology

CEDRR Policies and Frameworks. International frameworks that acknowledge and address the interdisciplinary nature of ecological degradation and disaster vulnerability to hazards and somewhat to climate change, include: (1) the Strategic Environmental Framework (SEF); (2) the Global Climate Change Initiative (USAID); (3) the Intergovernmental Panel on Climate Change (IPCC) & the United Nations Framework Convention on Climate Change (UNFCCC); (4) the Millennium Ecosystem Assessments (MEA); (5) the Millennium Development Goals (MDG) (6) the UNSFDRR (Sendai Framework) 2015-2030; (7) CEDRIG Climate Environment and Disaster Risk Reduction Integration Guidance (CEDRIG, 2018); and, (8) the United Nations Convention on Biological Diversity Voluntary Guidelines for the Design & Effective Implementation of Ecosystem-based approaches to Climate Change Adaptation and Disaster Risk Reduction (UN CBD, 2018).

Community can be defined in a variety of ways. Here, community is comprised of a heterogeneous, dynamic group of people within a larger natural and physical environmental setting. Communities contribute to overarching social systems, which consist of populations and their characteristics and relationships.²⁴

Disaster recovery can be defined as “the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors”. Recovery includes the activities of transitioning from the more immediate emergency phase disaster relief activities, to the activities of rehabilitation and reconstruction. Recovery efforts should “be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation,” and should ideally integrate disaster

risk reduction and resilience measures (ibid). As disasters affect all aspects of a place, including psychosocial, cultural, economic, ecological, political, and physical or structural characteristics, recovery efforts must include considerations to address each of these components.^{25 26}

Disaster risk reduction is the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events²⁷.

Ecosystem-based disaster risk reduction includes the sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development²⁸ also known as decision-making activities that take into consideration current and future human livelihood needs and bio-physical requirements of ecosystems, and recognize the role of ecosystems in supporting communities to prepare for, cope with and recover from disaster situations. Sustainable ecosystem management for disaster risk reduction is based on equitable stakeholder involvement in land management decisions, land-use trade-offs and long-term goal setting.²⁹

Environmental vulnerability and degradation are defined as “the reduction of the capacity of the environment to meet social and ecological objectives, and needs; potential effects are varied and may contribute to an increase in vulnerability and the frequency and intensity of natural hazards (including) land degradation, deforestation, desertification, wildland fires, and loss of biodiversity, land, water and air pollution, climate change, sea level rise and ozone depletion”.³⁰ In ecological restoration and natural resource management, vulnerability is often seen as a measure of an ecosystem’s capacity to withstand (resistance) and recover from (resilience) natural and human-induced degradation and hazards.³¹ While

²⁴ Abarquez & Murshed, 2004; Chapin III et al., 2009

²⁵ UNISDR, 2007b

²⁶ Wisner et al., 2004

²⁷ UNISDR, 2009

²⁸ Estrella and Saalismaa 2013 from CBD 2018

²⁹ IUCN 2018

³⁰ DeFries & Pagiola, 2005; Kasperson & Dow, 2005; UNISDR, 2004b

³¹ Falk, Palmer, & Zedler, 2006

some ecologists measure ecosystem resilience based on “genetic diversity, biodiversity and heterogeneity of landscape mosaics, they also relate resilience to sustainability and consider it a measurable characteristic of dynamic models”.³² In addition, within an ecosystem, “integrity, stability, resilience and process are mentioned in relation to ecosystems...but again indicators or methodologies to assess these properties are not considered (as) much (as) present attention is focused towards species distributions and abundance patterns and less to their natural temporal relative abundance patterns (regionally or globally) or to species’ functional attributes for responding to disturbances”.³³

Hazard, therefore, is defined as “a potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation”.³⁴ Hazards may be anthropocentric, such as environmental degradation and technological hazards, as well as natural hazards. Natural hazards range from geophysical events (i.e. earthquakes and tsunamis, volcanic eruptions, and dry mass movements including avalanches, landslides, rockfalls and subsidence of geophysical origin), to climatological events (i.e. droughts with associated food insecurities, extreme temperatures and wildfires), hydrological events (i.e. floods including waves and surges, and wet mass movements including avalanches, landslides, rockfalls and subsidence of hydrological origin); and, meteorological hazards or storms (i.e. hurricanes or typhoons, extreme weather, high wind and high surf events, etc.).³⁵ **A socio-natural hazard** is the phenomenon of increased occurrence of natural hazard events due to human practices that lead to overexploited or degraded land and environmental resources.³⁶

Mitigation is “any structural (physical) or non-structural (e.g., land-use planning, public education)

measure undertaken to minimize, lessen or limit the adverse impact of potential natural hazard events”.³⁷

Physical vulnerability includes exposure of people, places and structures to a hazard.

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

Prevention is “the outright avoidance of adverse impacts of hazards and related disasters”.³⁸

Recovery is “the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors”.³⁹

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”.⁴⁰

Risk is often represented as a calculation of the combination of the probability or likelihood of the hazard event (frequency), the exposure (exposed population, ecological systems or built environment), and the underlying vulnerabilities of that place and its inhabitants.⁴¹ This varies dependent upon the framework or conceptual model presented, as discussed later in this section. Risk is often measured as the potential (or actual) losses, including loss of lives, livelihoods, economic losses, and so forth.⁴² Probability of hazard events is often calculated based on historical hazard event records for specific locations, as well as forecasting models.⁴³ Exposure includes elements such as people, property, systems, and ecosystems present in hazard zones that are

³² Lacambra S., Moller, & Spencer, 2008

³³ Lacambra S. et al., 2008; UNEP, 2002

³⁴ UNISDR 2004

³⁵ IFRC, 2011; UNISDR, 2004b

³⁶ UNISDR 2008

³⁷ Benson, C. & J. Twigg 2007

³⁸ UNISDR, 2008a

³⁹ UNISDR, 2007b

⁴⁰ Benson, C. & J. Twigg, 2007

⁴¹ UNISDR, 2004b; Wisner et al., 2004

⁴² UNISDR, 2008a

⁴³ Stallings, 2002; UNISDR, 2008a

thereby subject to potential losses.⁴⁴ Factors that increase risk include the number and density of people exposed, the geographic scale and intensity, the time duration and the frequency of the hazard. Various economic indicators are often used within such larger vulnerability assessments and modeling tools to direct asset risk analyses of probability, magnitude and projected outcome of disasters. Such direct asset risk analyses include: local, regional and national public sector financial resilience; public sector fiscal risk level; and identifying the gap between fiscal assets and needs.⁴⁵ Assessments of various socio-economic indicators such as livelihoods, access to resources and assets and coping and adaptive capacities, can shed light on local economic vulnerability to disasters and inform disaster planning. Livelihood can be defined as “the means by which an individual or household obtains assets for survival and self-development (such that) livelihood assets are the tools (skills, objects, rights, knowledge, social capital) applied to enacting the livelihood”.⁴⁶ Livelihood opportunities include: human capital, social capital, physical capital, financial capital and natural capital.⁴⁷

Social vulnerability includes the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of climate change and natural hazards.⁴⁸ This concept involves a variety of factors that determine the degree to which a person’s security of life, property, assets and livelihood are put at risk by a hazard event (ibid).

STRESS (strategic resilience assessment) is a methodology created by Mercy Corps that helps teams apply resilience thinking in distinct humanitarian or development contexts. Deepening understanding of risk and the systems communities rely on allows practitioners to adjust what they do and how they do it—helping maintain progress toward well-being outcomes even in the face of increasing instability and fragility.

Vulnerability to climate change and natural hazards can be understood as the conditions determined by physical, social, economic, political and environmental factors or processes, which increase the susceptibility of a family, community or system to the impact of hazards or climate change.⁴⁹ Vulnerability includes physical, ecological, social, economic, cultural, and institutional dimensions⁵⁰ and may be attributed to natural factors, anthropogenic factors, or both.⁵¹ Vulnerability is seen as being multi-dimensional, differential, and scale dependent with regard to time, space and level of analysis, and dynamic (Vogel and O’Brien 2004, taken from).⁵² Vulnerability measures and methods must account for vulnerability of what is affected, but also who, and how. Therefore, analysis of vulnerability dimensions is critical to understanding, identifying, measuring and reducing vulnerability, as well as to design and implement strategies that enhance resilience.⁵³

⁴⁴ UNISDR, 2008a

⁴⁵ Birkmann, 2006; Wisner et al., 2004

⁴⁶ UNDP-BCPR 2004 from Birkmann 2006

⁴⁷ Wisner et al., 2004

⁴⁸ Chapin III et al., 2009

⁴⁹ UNISDR, 2004b

⁵⁰ Birkmann, 2006

⁵¹ C. S. Holling, 1986; Ostrom, 2009

⁵² Birkmann, 2006

⁵³ ibid

References & Additional Resources

- Abarquez, Imelda, & Murshed, Zubair. (2004). *Community-Based Disaster Risk Management: Field Practitioner's Handbook*. In ADPC (Ed.): ADPC, The Asian Disaster Preparedness Center, UNESCAP.
- Béné, C. (2018). *Concept Note: Measuring Resilience Across and Between Scales and How to Do It*. Produced by TANGO International as part of the Resilience Evaluation, Analysis and Learning (REAL) Associate Award.
- Benson, C., & Twigg, J. (2007). *Tools for Mainstreaming Disaster Risk Reduction: Guidance Notes for Development Organisations*. Geneva: Provention Consortium Secretariat.
- Birkmann, J. (Ed.). (2006). *Measuring Vulnerability to Natural Hazards—Towards Disaster Resilient Societies*. New York: United Nations University.
- Chapin III, F. Stuart, Kofinas, Gary P., & Folke, Carl (Eds.). (2009). *Principles of Ecosystem Stewardship, Resilience-Based Natural Resource Management in a Changing World*. Springer.
- CEDRIG. (2018). *Climate Environment and Disaster Risk Reduction Integration Guidance*. <https://www.cedrig.org/conceptual-background>. Accessed August 2018.
- DeFries, R., & Pagiola, S. (2005). Chapter 2: Analytical Approaches for Assessing Ecosystem Condition and Human Well-being. In G. Ceballos, S. Lavorel, G. Orians, S. Pacala, J. Supriatna & M. Young (Eds.), *Ecosystems and Human Well-Being: Current State and Trends: Findings of the Condition and Trends Working Group*, (Vol. I., pp. 37-71). Island Press.
- Falk, D. A., Palmer, M. A., & Zedler, J. B. (2006). *Foundations of Restoration Ecology*. Washington, DC: Island Press.
- Holling, C. S. (1986). Resilience of ecosystems; local surprise and global change. In W. C. Clark & R. E. Munn (Eds.), *Sustainable Development of the Biosphere* (pp. 292-317). Cambridge: Cambridge University Press.
- IFRC. (2011). *World Disasters Report*. International Federation of Red Cross and Red Crescent Societies.
- IPCC. (2012). *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* [Field, C.B., V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, K.J. Mach, G.-K. Plattner, S.K. Allen, M. Tignor, and P.M. Midgley (eds.)]. New York: Cambridge University Press.
- IUCN. (2018). *From commitment to action: Transforming disaster risk reduction with ecosystem management*. Global Brief on the CBD/UNEP 2018 Voluntary Guidelines for the Design and Effective Implementation of Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction.
- Kasperson, R.E., & Dow, K. (2005). Chapter 6: Vulnerable People and Places. In R. Norgaard & D. Rapport (Eds.), *Ecosystems and Human Well-being: Current State and Trends, Findings of the Condition and Trends Working Group*, (Vol. I, pp. 143-164). Island Press.
- Lacambra S., C., Moller, I., & Spencer, T. (2008). The Need for an Ecosystem-Inclusive Vulnerability Index for Coastal Areas in Colombia. In H.-G. Bohle & K. Warner (Eds.), *Megacities: Resilience and Social Vulnerability*. UNU-EHS. SOURCE No. 10/2008.
- Ostrom, E. (2009). A General Framework for Analyzing Sustainability of Social-Ecological Systems. *Science*, 325(5939), pp. 419-422.
- Renaud, F. G., Sudmeier-Rieux, K., Estrella, M., & Nehren, U. (2016). *Ecosystem-Based Disaster Risk Reduction and Adaptation in Practice*. Advances in natural and technological hazards research.
- Renaud, F.G., SUDMEIER-RIEUX, K. and ESTRELLA, M., (eds) (2013). *The role of ecosystems in disaster risk reduction*. New York: United Nations University Press.
- Stallings, R. (Ed.). (2002). *Methods of Disaster Research*. USA: International Research Committee on Disasters.

- Sudmeier-Rieux, K., Masundire, H., Rizvi, A., & Rietbergen, S. (Eds.). (2006). *Ecosystems, Livelihoods and Disasters: An integrated approach to disaster risk management*. Gland, Switzerland & Cambridge, UK: The World Conservation Union (IUCN).
- UN. (2010). *The Millennium Development Goals Report*. New York: United Nations.
- UN CBD. (2018). United Nations Convention on Biological Diversity Voluntary Guidelines for the Design & Effective Implementation of Ecosystem-based approaches to Climate Change Adaptation and Disaster Risk Reduction. May 31, 2018. SUBSIDIARY BODY ON SCIENTIFIC, TECHNICAL AND TECHNOLOGICAL ADVICE Twenty-second meeting Montreal, Canada, 2-7 July 2018. Item 9 of the provisional agenda. CBD/SBSTTA/22/INF/1. 22 June 2018.
- UNEP. (2002). *Assessing Human Vulnerability due to Environmental Change: Concepts, Issues, Methods and Case Studies*. Retrieved April 2011, from <http://www.unep.org/geo/GEO3/pdfs/AssessingHumanVulnerabilityC.pdf>. Nairobi, Kenya: UNEP/DEWA/RS.03-5.
- UNISDR. (2004a). *Living with Risk: A Global Review of Disaster Reduction Initiatives, 2004 version*. Geneva: UNISDR-International Strategy for Disaster Reduction.
- UNISDR. (2004b). *Terminology of Disaster Risk Reduction (under revision)*. Taken from the Millennium Ecosystem Assessment, 2005. Retrieved April 2011, from <http://www.unisdr.org/terminology>. Geneva, Switzerland: UNISDR.
- UNISDR. (2005). *Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters* Extract from the final report of the World Conference on Disaster Reduction, Kobe, Hyogo, Japan. Retrieved May 2011, from <http://www.unisdr.org/we/inform/publications/1037>. Geneva, Switzerland: UNISDR/A/CONF.206/6.
- UNISDR. (2007a). *Disaster Risk Reduction (DRR) Global Review*. Retrieved May 2011, from <http://www.unisdr.org/we/inform/publications/1130> (pp. 98). Geneva, Switzerland: UNISDR.
- UNISDR. (2007b). *Learning from Disaster Recovery Guidance for Decision Makers*. A Publication from the International Recovery Platform (IRP) Supported by the Asian Disaster Reduction Center (ADRC), United Nations International Strategy for Disaster Reduction (ISDR) secretariat and United Nations Development Programme (UNDP). Retrieved May 2011, from <http://www.unisdr.org/we/inform/publications/726> (pp. 98). Geneva, Switzerland: UNISDR.
- UNISDR. (2008a). *Environment and Disaster Risk, Emerging Perspectives*. Prepared on behalf of the ISDR Working Group on Environment and Disaster Reduction, 2nd edition. Retrieved May 2011, from <http://www.unisdr.org/we/inform/publications/624> (pp. 50). Geneva, Switzerland: UNISDR.
- UNISDR. (2008b). *Gender Perspectives: Integrating Disaster Risk Reduction into Climate Change Adaptation, Good Practices and Lessons Learned*. Retrieved August 2011, from <http://www.unisdr.org/we/inform/publications/3391> (pp. 76). Geneva, Switzerland: UNISDR.
- USAID. 2018. USAID REAL Resilience Measurement Practical Guidance Note Series. <http://www.fsnnetwork.org/REAL>. Accessed June 2018.
- Wisner, Ben, Blaikie, P., Cannon, T., & Davis, I. (2004). *At Risk: Natural Hazards, People's Vulnerability and Disasters* (2nd ed.). London & New York: Routledge.



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The *Resilience in Action Series* aims to bring development and humanitarian practitioners one step closer to bridging the gap between theory and practice for integrating a resilience lens in programming, answering questions such as: How does a resilience lens change the design of interventions in key sectors or crosscutting themes? How should we shift the design and implementation of sectoral interventions to promote resilience-building within programs? Focal areas covered in this series include Gender Equity and Social Inclusion, Financial Services, and Climate & Ecosystem-Inclusive Disaster Risk Reduction, among others.

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