HOW RESILIENT IS YOUR COASTAL COMMUNITY?

A GUIDE FOR EVALUATING COASTAL COMMUNITY RESILIENCE TO TSUNAMIS AND OTHER HAZARDS

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FROM THE AMERICAN PEOPLE

NOAA
National Oceanic and Atmospheric Administration
U.S. Department of Commerce

U.S. Contribution to the Indian Ocean Tsunami Warning System

Coastal Resources Center
University of Rhode Island

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U.S. Indian Ocean Tsunami Warning System Program

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The U.S. Indian Ocean Tsunami Warning System (IOTWS) Program is part of the international effort to develop tsunami warning system capabilities in the Indian Ocean following the December 2004 tsunami disaster. The U.S. program adopted an "end-to-end" approach—addressing regional, national, and local aspects of a truly functional warning system—along with multiple other hazards that threaten communities in the region. In partnership with the international community, national governments, and other partners, the U.S. program offers technology transfer, training, and information resources to strengthen the tsunami warning and preparedness capabilities of national and local stakeholders in the region.

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DKI - Ministry of Home Affairs
DKP - Ministry of Marine Affairs and Fisheries
DPR - The People's Representative Assembly
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GTZ - German Technical Cooperation
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Tempo
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UNESCO - United Nations Education, Scientific, and Cultural Organization
UNICEF - United Nations Children's Fund
UNOCHA - United Nations Office for Coordination of Humanitarian Affairs
WHO - World Health Organization

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Thailand

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Thai Red Cross - HQ
UNDP - Regional Centre, United Nations Development Program
UNISDR - United Nations International Strategy for Disaster Reduction
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Acronyms

ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
CBAT	Community Based Action Team
CCR	coastal community resilience
CERT	Community Emergency Response Team
CRM	coastal resource management
EAS	Emergency Alert System
GIS	geographic information system
GPS	Global Positioning System
IBC	International Building Code
ICS	Incident Command System (ICS)
IOC	Intergovernmental Oceanographic Commission
IOTWS	Indian Ocean Tsunami Warning System
ISDR	International Strategy for Disaster Reduction
km	kilometer
m	meter
MIND	Munasinghe Institute for Development
MOU	memorandum of understanding
MPA	marine protected area
NDWC	National Disaster Warning Center
NGO	nongovernment organization
NOAA	National Oceanic and Atmospheric Administration
PRiMO	Pacific Risk Management ‘Ohana
PTWC	Pacific Tsunami Warning Center
SEEDS	Sustainable Environment and Ecological Development Society
TARNS	Tsunami Alert Rapid Notification System
UBC	Uniform Building Code
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
US IOTWS	US Indian Ocean Tsunami Warning System Program
WB	World Bank

Chapter 1

Introduction to the Coastal Community Resilience Guide

The Indian Ocean tsunami of December 2004, which exacted a devastating toll in human suffering and destruction in affected coastal areas, was a painful reminder that coastal communities are vulnerable to unforeseen events that can bring about massive changes. Coastal communities today, around the world, are experiencing an unprecedented rate of change due to population growth in coastal areas, human-induced vulnerability, and global climate change. The effects of this change are placing communities at increasing risk from coastal hazards such as tsunamis, severe storms, and shoreline erosion.

It also has become evident that even without a major catastrophe such as a large tsunami, most coastal communities are not resilient to normally recurring hazards. This fact has raised the question of how to increase community resilience. The wide range of hazards taking their toll on coastal communities requires that the response to these various issues must be holistic, integrated, and long lasting.

What Is the Purpose of this Guide?

This Coastal Community Resilience (CCR) Guide was developed, building on lessons learned and experience gained in the Indian Ocean region after the 2004 tsunami, to address coastal hazards and reduce risk to vulnerable communities. The framework described in this CCR guide was developed in partnership with institutions throughout the Indian Ocean region, and is already beginning to guide development along Asian coasts most in need of building resilience. This guide attempts to broaden the perspective of sector plans so that a more holistic and robust planning framework evolves to truly elevate the potential for community resilience. The results of the CCR assessment process outlined in this guide can fit easily into and enhance development plans for any given coastal area, and can thereby complement traditional planning processes used by local and national governments.

How Was the Guide Developed?

The U.S. Indian Ocean Tsunami Warning System (US IOTWS) Program developed this CCR guide in collaboration with partner agencies and organizations. The development of this guide followed a participatory process in which key national government agencies, nongovernmental organizations, and individuals participated

Events that Helped Shape the CCR Guide

- The 1st Indian Ocean Regional CCR Workshop (May 2006) defined resilience concepts and identified eight essential elements of CCR.
- National workshops on CCR in Sri Lanka (October 2006) and Indonesia (September 2006) provided insights on resilience based on country-specific contexts and applications.
- A small grants activity of the U.S. IOTWS Program provided opportunities for organizations throughout the region to work with communities to enhance CCR.
- National training courses on CCR in Sri Lanka (February 2007), Indonesia (April 2007), and Thailand (June 2007) developed skills for conducting CCR assessments.
- Trained organizations conducted CCR assessments in a range of communities, including rural, urban, and tourism areas of Sri Lanka, Thailand, Indonesia, India, and the Maldives.
- The 2nd Indian Ocean Regional CCR Workshop (August 2007) provided a forum for partner agencies and organizations to share experiences and lessons learned.

in a series of national and regional workshops to determine what constitutes "coastal community resilience" in each country. As a result of this participation, the threats to coastal communities in India, Indonesia, Maldives, Sri Lanka, and Thailand in particular are represented and addressed in the framework developed and portrayed in this guide.

A key theme in the development of this guide is that integration of efforts across sectors and with various organizations is a prerequisite to building community resilience. One of the main lessons in the aftermath of the tsunami of 2004—and seen in other coastal hazards stemming from poorly planned development—is that single-sector development planning cannot solve the complexity of problems posed by natural hazards nor build resilience to them. Resilience requires the spreading of risk and the development of integrated and holistic prevention and management programs. In this manner, unexpected changes can be absorbed more easily, so that disaster scenarios can be avoided whenever possible.

Single-sector development planning cannot solve the complexity of problems posed by natural hazard, nor build resilience to them.

Who Is the Audience?

This CCR guide is intended for use by a broad cross section of government agencies and nongovernmental organization practitioners involved in planning and implementing community development, coastal management, and disaster management programs. This varied audience and their roles in CCR assessment and enhancement may include the following:

- Practitioners working directly with coastal communities may incorporate elements of resilience discussed in this guide into a wide range of activities, including livelihood development, siting and construction of housing and settlements, health and sanitation, and food security.
- National and local government agencies may adopt the resilience framework described in this guide to promote collaboration among different government

agencies and sectors, to develop plans and provide the enabling conditions for communities to implement good practices for enhancing resilience.

- International aid agencies, banks, and private donors may design and fund programs to enhance CCR based on the assessment approach and elements of resilience described in this guide to help sustain investments in these programs.

Collaboration and partnerships among these different stakeholder groups are essential in sustaining long-term, consistent efforts to build CCR.

How Is this Guide Intended to Be Used?

The CCR guide is intended to serve as a framework to highlight strengths and identify weaknesses and gaps in resilience that can be addressed by the community together with government agencies, nongovernmental organizations (NGOs), private sector, and other stakeholders. It focuses largely on how to assess CCR as a first step in defining actions to reduce risk, accelerate recovery, and adapt to change. The guide is intended to complement other planning tools and approaches. It is important that local government planning processes are used and enhanced through community participation and input, since often the only mechanism to build sustainability is through the locally legitimate planning and implementation mechanisms.

The CCR assessment described in this guide is intended to serve as a rapid assessment approach conducted as a collaborative and participatory undertaking by coastal communities, national and local government agencies, NGOs, the private sector, and other key stakeholders to identify strengths, weaknesses, and opportunities to enhance resilience at local and national levels. It can be used in a systematic manner to assess a CCR program in a region or for a particular development program.

The guide may also be used to provide input to the design of single-sector development projects that must be integrated, whenever possible, with other ongoing development projects in an area. It may also be used to assist in coordination among field programs that have similar and possibly overlapping objectives. Or it can simply be used as a reference to enhance other planning processes, procedures, and outputs. The range

of uses of this guide will be as varied as the number of potential users. Make the most of this resilience guide for your needs—whatever they may be!

Value of the CCR Approach Described in this Guide

- Provides a framework to integrate the goals of community development, coastal management, and disaster management
- Promotes a proactive approach to both chronic and episodic hazards rather than a reactive focus on response to disaster events
- Utilizes a broad assessment of community capacity and vulnerability to tsunami and other coastal hazards
- Merges goals of environmental sustainability and humanitarian assistance

What Is in this Guide?

This guide is organized into six chapters, including this introduction. A brief snapshot of each chapter is provided below.

Chapter 1 describes the purpose, uses, and organization of the guide and provides background on the participatory process used to develop the guide. Over 25 agencies and organizations working in the Indian Ocean region have contributed to the development of this guide.

Chapter 2 introduces the risks associated with coastal hazards and the concepts and framework for CCR.

Chapter 3 introduces that CCR framework. The framework for CCR is defined as the convergence of community development, coastal management, and disaster management. Eight essential elements of CCR emerged as a result of this convergence and are introduced along with benchmarks that characterize the desired conditions for each resilience element.

Uses of the CCR Assessment Tool Described in this Guide

Previous applications and potential uses of the CCR assessment tool include the following:

- Raise awareness of communities on the risks from coastal hazards and the need for community planning and preparedness
- Broadly assess community capacity and vulnerability to coastal hazards
- Help integrate and prioritize the contributions of different stakeholders in community development, coastal and environmental management, and disaster management
- Provide a guideline and checklist for community development for hazard mitigation
- Guide community and organizational capacity-building gap analysis
- Facilitate community issue identification and profile development
- Evaluate projects to establish a resilience baseline and monitor change as a result of project implementation
- Conduct surveys to compare community and government perceptions of preparedness

Chapter 4 describes the process and steps for conducting a CCR assessment. The assessment process includes preparation, data and information collection, analysis, and evaluation of the findings against the resilience benchmarks for each element. This chapter also highlights the need to train the assessment team.

Chapter 5 provides detailed descriptions of the importance of and relationship of the resilience elements. This chapter also serves as a reference to the benchmarks.

Chapter 6 provides an overview, benchmarks, and examples of resilience in action for each of the eight essential elements of CCR. The benchmarks for each element are described, and illustrative assessment questions are provided at the end of each section. These sections serve as a reference for understanding each element and the benchmarks used to conduct a CCR assessment.

Appendices include worksheets that can be used to analyze and summarize the results of a CCR assessment (Appendix A). References and additional resources are provided in Appendix B. Finally, a sample training session guide that can be used to prepare and train the CCR assessment team is provided in Appendix C.

Chapter 2

Why Are Communities at Risk from Coastal Hazards?

The Indian Ocean Tsunami of December 2004 raised awareness worldwide of the potentially devastating impacts of tsunamis. Coastal communities around the world, big and small, are increasingly at risk from tsunamis and many other coastal hazards including severe storms, floods, and shoreline erosion. Risk is a function of the hazard and vulnerability of a population to that hazard. Risks from coastal hazards are defined by the type and severity of the hazard and its frequency of occurrence. Vulnerability to coastal hazards is expressed as the degree of exposure of the population and its capacity to prepare for and respond to the hazard (UN International Strategy for Disaster Reduction [ISDR] 2004). An important outcome of increasing the resilience of coastal communities is to reduce or avoid disasters by reducing hazard risk and vulnerability. Understanding and assessing risk is fundamental to enhancing the resilience of coastal communities.

Risk = Hazard (frequency and severity) **x Vulnerability** (Exposure/Capacity)

Source: UN ISDR 2004

Global climate change is predicted to cause an increase in sea level and the frequency and power of storms and storm surge. This will cause increased shoreline erosion; flood and storm damage; inundation of land; saltwater intrusion into the freshwater lens aquifer; increased levels of land-based pollutants to coastal waters, including sediments, nutrients, and contaminants; and more frequent, longer, and more powerful El Niño and La Niña events. In addition, ocean acidification and increased sea surface temperature resulting from global climate change are expected to significantly alter the function and structure of marine ecosystems (Lewin and Pershing 2006).

Risks from Coastal Hazards

Coastal communities are increasingly at risk from tsunamis and many other coastal hazards. Coastal hazards are those natural and manmade hazards that occur at the interface between the ocean and the shoreline. These chronic and episodic hazards include human-caused actions and natural events that threaten the health and stability of coastal ecosystems and communities.

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Shoreline erosion can be caused by a combination of hazards including sea level rise, storm surge, coastal resource degradation, and coastal development

The risk from coastal hazards is characterized by the frequency of occurrence and severity of the hazard (Figure 2-1). Tsunamis are typically infrequent events with moderate to severe consequences. Mild flooding may occur frequently, while severe flooding may be an infrequent event. Coastal erosion may be a chronic event with mild consequences or, coupled with other hazards, may result in severe impacts on the shoreline. Infrequent events with limited predictability pose the greatest risk of disaster and the longest time needed for disaster recovery. Frequent or ongoing hazards such as resource or environmental degradation processes can be monitored to reduce risk.

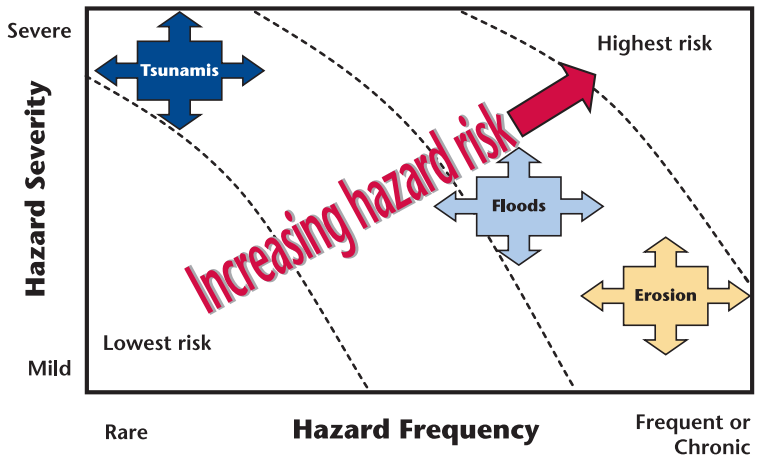

Figure 2-1. Risks from Coastal Hazards as a Function of Hazard Frequency and Severity

Tsunamis. A tsunami is a series of ocean waves typically generated by an underwater earthquake. Landslides, volcanic activity, and meteor strikes may also generate a tsunami. A tsunami wave may be very small in the deep ocean, but as it approaches land can increase to more than 10 meters in height and reach shore as a fast-moving wall of turbulent water. Tsunamis can inundate low-lying coastal areas with multiple waves that can penetrate and cause destruction far inland. There are two types of tsunamis: distant and local. A distant tsunami travels long distances from the event that triggers it to impact the coast hours later. A local tsunami can impact the coast within minutes after the triggering event, allowing little to no time for warning and evacuation. The frequency of damaging tsunamis throughout the Indian Ocean region has been low compared with other natural hazards such as tropical cyclones, earthquakes, and floods.

Earthquakes. Earthquakes are geologic events that involve movement or shaking of the earth's crust. Earthquakes are usually caused by the release of stresses accumulated as a result of the rupture of rocks along opposing fault planes in the earth's outer crust. Fault planes are typically found along borders of the earth's ten tectonic plates; these plate borders generally follow the outlines of the continents. The areas of greatest tectonic instability occur at the perimeters of the slowly moving plates, as these locations are subjected to the greatest strains from plates traveling in opposite directions and at different speeds. Deformation along plate boundaries causes strain in the rock and the consequent buildup of stored energy. When the built-up stress exceeds the rocks' strength, a rupture occurs. The rock on both sides of the fracture is snapped, releasing the stored energy and producing seismic waves, thereby generating an earthquake. Earthquakes can cause significant damage due to intense ground shaking and liquefaction. In addition, the secondary impacts of earthquakes, such as tsunamis and fires, can also cause significant damage.

Storms. Numerous meteorological events can impact the coast, including, very commonly, storms. Various types of storms impact coastal communities, such as severe thunderstorms, tropical cyclones, and extra tropical cyclones.

Storm Surge. Storm surge is simply water that is pushed toward the shore by the force of the winds swirling around a storm. This advancing surge combines with the normal tides to create the storm

NOAA LIBRARY

Storm frequency and severity is increasing as result of global climate change

tide. Tropical cyclone-induced storm tides can increase the mean water level 5 meters or more. In addition, wind waves are superimposed on the storm tide. This rise in water level can cause severe flooding in coastal areas, particularly when the storm surge coincides with the normal high tides. The greatest potential for loss of life related to a tropical cyclone is from the storm surge, which historically has claimed nine out of ten victims of these events.

Flooding. Flooding is a localized hazard that is generally the result of excessive precipitation. The primary types of flooding are riverine flooding, coastal flooding, and urban flooding. Floods can be generally classified as flash floods—the product of heavy localized precipitation in a short time period over a given location—or general floods, caused by precipitation over a longer time period and over a given river basin. Historically, flooding is the most common environmental hazard, due to the widespread geographical distribution of river valleys and coastal areas and the attraction of human settlements to these areas. The severity of a flooding event is determined by a number of local factors, including river basin physiography, precipitation patterns, and recent soil moisture conditions and vegetative state. While flash floods occur within hours of a rain event, general flooding is a longer-term event, and may last for several days.

A. WHITE

Sea level rise causes chronic flooding in coastal areas

Landslides. Landslides occur when masses of rock, earth, or debris move down a slope. Landslides may be very small or very large, and can move at slow to very high speeds. They are activated by storms and fires and by human modification of the land. Landslides pose serious threats to highways and structures that support fisheries, tourism, timber harvesting, mining, and energy production as well as general transportation. Landslides are especially troubling because they often occur with other natural hazards, such as earthquakes and floods. Landslides can also trigger other hazards, such as tsunamis. Areas that are generally prone to landslide hazards include existing old landslides; the bases of steep slopes; the bases of drainage channels; and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past; relatively flat-lying areas away from sudden changes in slope; and areas at the top or along ridges, set back from the tops of slopes.

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Oil spills are infrequent but often severe events

A. WHITE

Water quality degradation is a chronic hazard that affects ecosystem health and resilience

Spills and Chronic Pollution. There are various ways in which pollution can impact coastal areas. Spills can be in the form of oil spills from ships, toxic materials released from storage tanks, petroleum releases from severed pipelines, etc. These events can have devastating effects on coastal environments. In some cases these episodic pollution events are caused by other coastal hazards such as tsunamis, tropical cyclones, and storm surge.

Chronic pollution can be caused by numerous sources. Improper disposal of garbage in coastal communities can be a cause of pollution. Improper treatment of human waste prior to discharge in rivers and coastal waters can also be a cause of pollution. Polluted surface water runoff from land-based sources can be a significant source of pollution to coastal areas. Regardless of the source of pollution, the impacts on coastal resources can be devastating. Many coastal communities rely on coastal resources for their survival.

Shoreline Erosion. Shoreline erosion is the wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes. Wind, waves, and long shore currents are the driving forces behind coastal erosion. This removal and deposition of sand permanently changes beach shape and structure. Additional factors involved in coastal erosion include human activity, sea-level rise, seasonal fluctuations, and climate change. Shoreline erosion is typically a chronic hazard, but severe shoreline erosion may be induced by a single storm event.

A. WHITE

Shorelines and beaches are vulnerable to erosion as sea level rises and during storm events

A.WHITE

Island nations are at increasing risk from sea level rise and shoreline erosion

Sea Level Rise. Sea level rise can be defined as an increase in the mean sea level. Throughout history, the earth has gone through periods of sea level rise and decline, which are directly tied to climate change and global warming and cooling trends over geologic and recent time. Sea level fluctuations are a part of the natural processes on earth that are determined by many factors, but largely are influenced by climate and global warming. In comparison to other disasters that affect the coastal zone, such as tropical cyclones, tsunamis, floods, and earthquakes, sea level rise is on a much more gradual time scale. The impacts of a tsunami can be seen immediately, whereas the effects of sea level rise take a longer period of time to realize. A major potential impact of sea level rise on the natural environment in the coastal zone is that of habitat loss due to wetland inundation, coastal erosion, salt water intrusion, or shift in climate limits on vegetation.

Climate Variability and Change. Short- and long-term climate variability can significantly impact coastal environments. Climate variability refers to temporal variations of the atmosphere and ocean system around a mean state. Climate variability can cause abrupt disruptions, such as floods, droughts, or tropical storms (IRG 2007). Over the past decade, scientists have improved prediction capabilities for some climate variability events such as El Niño and La Niña. Climate variability can have huge impacts on coastal environments by causing an increase or decrease in storm activity, which in turn could lead to water supply issues, drought, or increased flooding and erosion.

A.WHITE

Coral reef ecosystems are threatened by increasing sea surface temperatures resulting from global climate change and other hazards

Climate change resulting from increased anthropogenic inputs of greenhouse gases is a key development issue of our time (World Bank 2007). The direct impacts of climate change, higher

temperatures, followed by changes in the patterns of precipitation, increased intensity and frequency of extreme weather events, rising sea level, and ocean acidification are expected to result in cascading environmental, economic, and social impacts.

Coastal Resource Degradation. Many of the Earth's most complex, diverse, and productive ecological systems are located in coastal zones. Coastal resources are very productive in both a biological and economic sense. Reefs, mangroves, wetlands, and tidelands provide nursery and feeding areas for many marine species. In addition, these coastal resources also provide important buffer areas for storm protection and to control erosion. Frequently, human activities within coastal areas can contribute to the degradation of these crucial resources.

Community Vulnerability to Coastal Hazards

The increased vulnerability of coastal communities to potential hazards is partly due to the constantly increasing coastal population (Adger et al., 2005). Currently, an estimated 23 percent of the world's population (1.2 billion people) lives within 100 kilometers (km) of a shoreline and 100 meters (m) of sea level (Small and Nicholls 2003). By the year 2030, an estimated 50 percent of the world's population will live in the coastal zone.

A. WHITE

Coastal populations around the world are increasing in size and vulnerability to coastal hazards

Human activities are degrading the quality of the coastal environment and integrity of coastal ecosystems on a daily basis, making coastal populations more vulnerable. Coastal habitats such as reefs, mangroves, wetlands, and tidelands provide nursery and feeding areas for many marine species and serve as buffer areas for storm

protection and to control erosion. These coastal habitats are being destroyed by a wide range of human uses, including shoreline development, land reclamation, mining, and aquaculture. Runoff, wastewater discharges, and oil spills pollute coastal waters and endanger marine life. Overfishing and the use of destructive fishing practices are causing the decline of fishery resources and changes in marine ecosystem structure and function. The degradation of the coastal environment from chronic human-induced actions threatens food security, livelihoods, and the overall economic development and well being of coastal communities.

Most of the coastal population lives in relatively densely populated rural areas and small to medium cities, rather than in large cities. In these relatively rural communities, basic services and disaster warning and response mechanisms are limited (Figure 2-2). Limited capacity of a community to plan for and respond to coastal hazards makes coastal populations increasingly vulnerable and increases disaster risk.

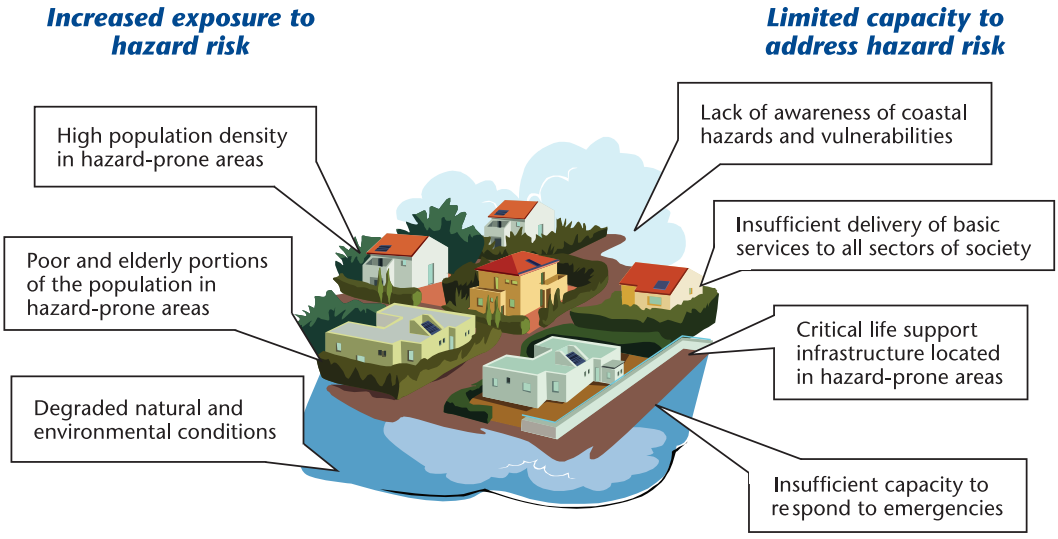


Figure 2-2. Factors that Contribute to Vulnerability in Coastal Populations

Economic development pressures along the coast, population density and distribution, and human-induced vulnerabilities, coupled with increasing frequency and duration of storms, sea level rise, and other chronic coastal hazards, increase risk. These conditions set the stage for more frequent and severe disasters and reduced time and capacity to recover. The time period between disaster event and recovery is becoming shorter, and some coastal communities find themselves in a state of perpetual response to and recovery from one disaster event after another. The assessment of risk is an important element of CCR. Communities must identify their exposure to hazard impacts to proactively address emergency planning, response, and recovery and implement hazard mitigation measures (Figures 2-2 and 2-3).

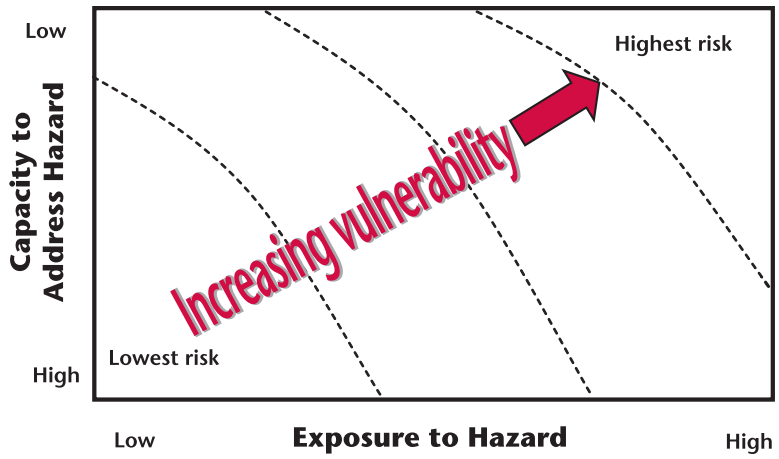
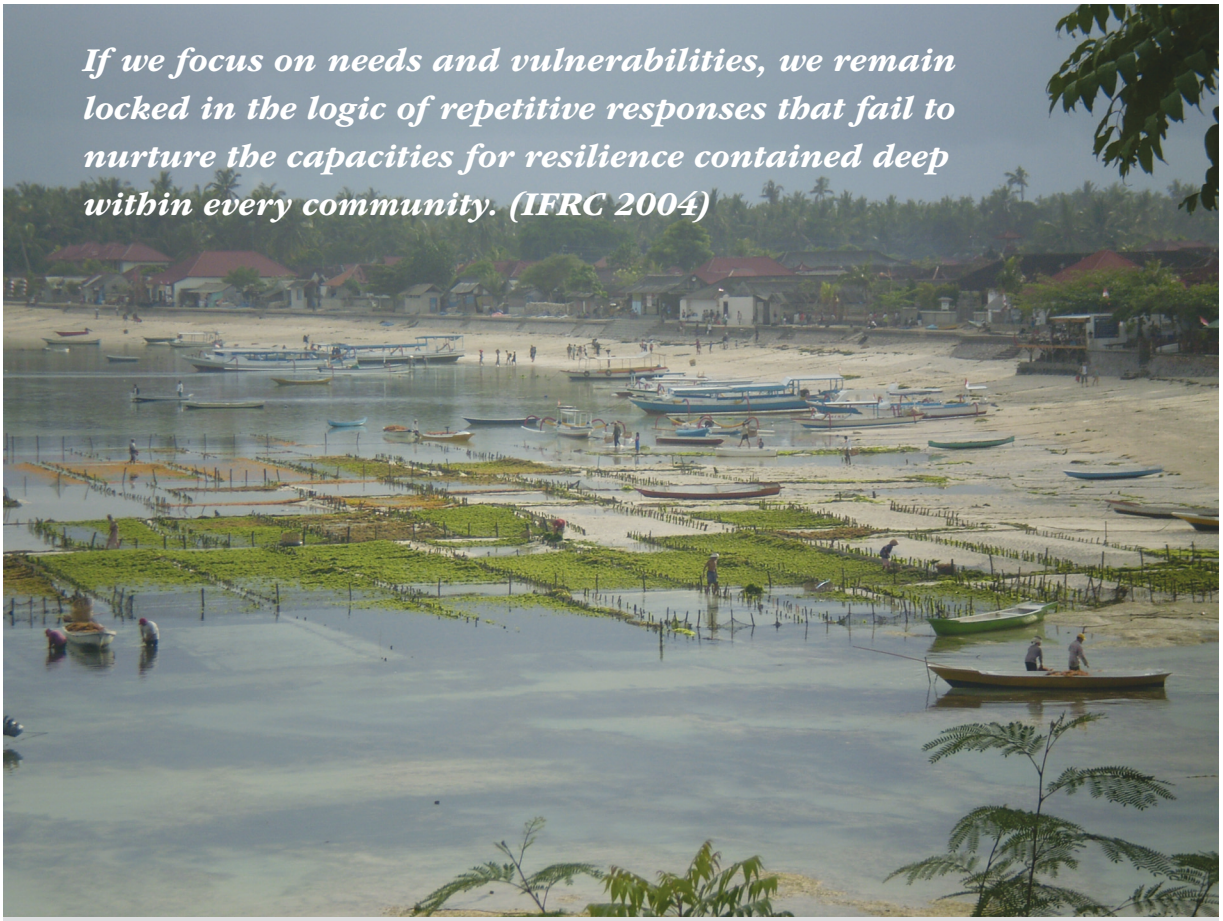


Figure 2-3. Community Vulnerability as a Function of the Degree of Exposure and the Capacity to Address Hazard Risks



A. STEIN

Coastal communities, dependent on the sea for food and livelihood, are at increasing risk from coastal hazards

Chapter 3

Why Is Resilience Critical to Coastal Communities?

Community resilience is the capacity of a community to adapt to and influence the course of environmental, social, and economic change. The resilience of social-ecological systems is often described as a combination of three characteristics: the magnitude of shock that the system can absorb and remain within a given state; the degree to which the system is capable of self-organization; and the degree to which the system can build capacity for learning and adaptation (Folke et al. 2002). Common characteristics of resilient systems include redundancy, diversity, efficiency, autonomy, strength, interdependence, adaptability, and collaboration (Godschalk 2003). Resilience provides the capacity to absorb shocks while maintaining function. When change occurs, resilience provides the components for renewal and reorganization (Gunderson and Holling 2002, Berkes and Folke 2002). Vulnerability is the flip side of resilience: When a social or ecological system loses resilience, it becomes vulnerable to change that previously could be absorbed (Kasperson and Kasperson 2001). In a resilient system, change has the potential to create opportunity for development, novelty, and innovation. In a vulnerable system, even small changes may be devastating.

Some Definitions of Resilience

"Resilience determines the persistence of relationships within a system and is a measure of the ability of these systems to absorb change of state….and still persist." (Holling 1973)

"…Resilience for social-ecological systems is often referred to as related to three different characteristics: (a) the magnitude of shock that the system can absorb and remain within a given state; (b) the degree to which the system is capable of self-organization, and (c) the degree to which the system can build capacity for learning and adaptation." (Folke et al. 2002)

"The capacity of a system to absorb disturbance and re-organize while undergoing change so as to still retain essentially the same function, structure, identity and feedback." (Walker et al. 2004)

Characteristics of Resilient Coastal Communities

Resilient coastal communities take deliberate action to reduce risk from coastal hazards with the goal of avoiding disaster and accelerating recovery in the event of a disaster. They adapt to changes through experience and applying lessons learned (Figure 3-1).

CCR serves as a unifying framework for community-based plans and programs. Enhancing CCR requires integrating and maintaining an optimal balance of three

community-based frameworks typically viewed as independent and separate domains: community development, coastal management, and disaster management (Figure 3-2). Community development provides the enabling governance, socioeconomic, and cultural conditions for resilience (IMM; CED 2000). Coastal management provides the framework for managing human uses of coastal resources and the coastal zone in order to maintain environmental and ecosystem resilience (White et al., 2005; Chua 1998; DENR 2001). Disaster management focuses on preparedness, response, recovery and mitigation to reduce human and structural losses from disaster events (ADPC 2005; 2004).

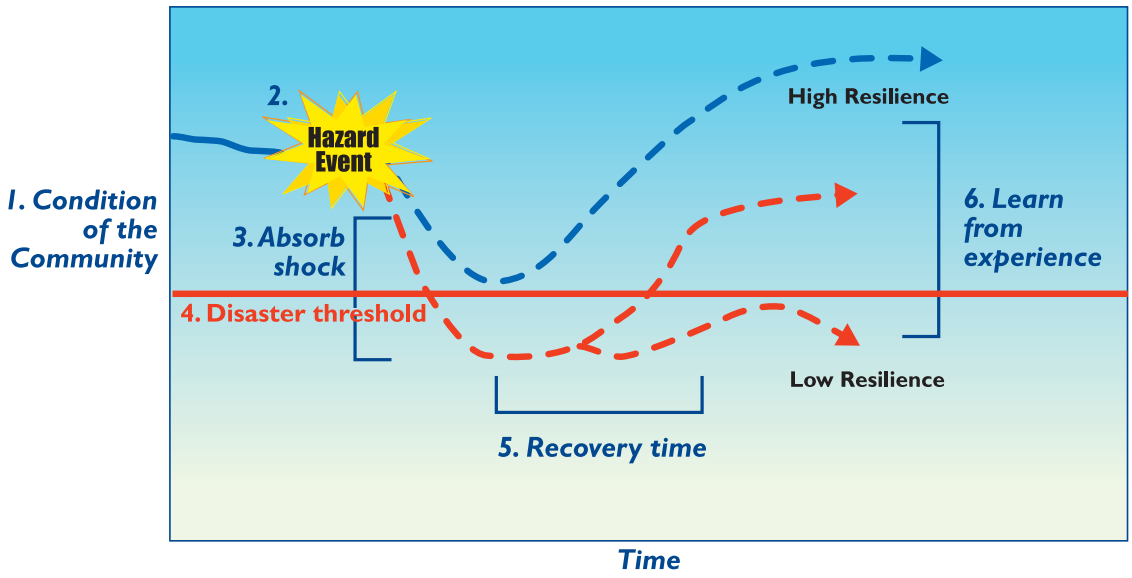


Figure 3-1. Role of Resilience in Determining Community Response to a Hazard Event

Notes:

1. The y-axis represents the condition or state of the community's economy, society, and environment.
2. Hazard events can be either episodic, such as cyclones and tsunamis, or more chronic, such as erosion or sea level rise.
3. Resilient coastal communities are able to absorb or avoid impacts of hazard events. Enhancing resilience decreases the magnitude of impacts of hazard events on the community.
4. A community crosses the threshold between a hazard event and a disaster when it cannot function without considerable outside assistance.
5. Resilient coastal communities are able to recover from hazard events quickly. Enhancing resilience accelerates recovery time.
6. Resilient coastal communities are able to adapt to changing conditions. Enhancing resilience builds the capacity of communities to learn from experience.

Figure 3-2. Resilience as an Integrating Framework for Community Development, Coastal Management, and Disaster Management Domains

Resilience Elements and Benchmarks

The CCR framework presented in this guide was developed through a series of workshops and discussions with community development, coastal management, and disaster management practitioners and specialists from government agencies and nongovernmental organizations throughout the Indian Ocean region. Through this participatory process, eight elements of resilience were identified as essential for CCR (Figure 3-3). These elements incorporate long-term planning and implementation such as society and economy, coastal management, and land use and structural design. Hazard event-oriented resilience elements focus on contingency planning and preparedness for warning and evacuation, emergency response, and disaster recovery. Governance as a resilience element provides the enabling framework for resilience in all other elements. Risk knowledge is a cross-cutting requirement within each resilience element. Enhancing resilience in all of these elements is considered essential to reduce risk from coastal hazards, accelerate recovery from disaster events, and adapt to changing conditions in manner that is consistent with community goals.

Figure 3-3. Elements of Coastal Community Resilience

The desired outcome or overarching vision for each element of CCR can be described as follows:

A. **Governance:** Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.

B. **Society and Economy:** Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.

C. **Coastal Resource Management:** Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.

D. **Land Use and Structural Design:** Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.

E. **Risk Knowledge:** Leadership and community members are aware of hazards and risk information is utilized when making decisions.

F. **Warning and Evacuation:** Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and individuals acting on the alert.

G. **Emergency Response:** Mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.

H. **Disaster Recovery:** Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.

Benchmarks for each resilience element were identified to evaluate the resilience condition or status of a community (Table 3-1). Each benchmark represents desired conditions against which to evaluate the resilience status of a coastal community. The benchmarks for each resilience element characterize desired conditions in four core capacities: policy and planning, physical and natural resources, social and cultural, and technical and financial. These core capacities were adapted from the TOSE dimensions (technical, organizational, societal, and economic) outlined in Bruneau et al. (2003) and the Sustainable Coastal Livelihood Framework assets (human, natural, social, and financial) described by IMM.

Benchmarks on policies and plans describe enabling conditions for community resilience. Physical and natural resource benchmarks describe infrastructure or coastal resource capacity to support resilience. Benchmarks on social and cultural capacity highlight self reliance of the community achieved through networks, cultural norms, and education and outreach. Finally, the technical and financial resource benchmarks characterize the support needed to sustain resilience efforts. The benchmarks provided in Table 3-1 are the foundation of the CCR assessment tool, which will help identify the strengths, weaknesses, and gaps in community resilience.

Some benchmarks may need to be adapted to better reflect the local context in which they are used. Chapter 4 provides an approach for reviewing and adapting the benchmarks, as needed, to reflect the local context. Chapter 6 provides detailed descriptions of the elements and benchmarks of CCR.

Table 3-1. Benchmarks for Each Resilience Element by Core Capacities

Resilience Element	Benchmarks			
	Policy and Planning Capacity	**Physical and Natural Capacity**	**Social and Cultural Capacity**	**Technical and Financial Capacity**
Governance	A1. Community development policies, plans, and programs are implemented and monitored in a participatory and transparent manner.	A2. Basic services (i.e. water, transportation, security, etc.) are accessible to all sectors of society.	A3. Participatory collaboration mechanisms among different sectors and various levels of government are established and used to manage for resilience.	A4. Technical and financial support mechanisms are transparent, accountable, and available to support planned community actions.
Society and Economy	B1. Development policies and plans build social capital and skills for economic diversity and self reliance.	B2. Local economies are characterized by diverse and environmentally sustainable livelihoods.	B3. Social and cultural networks promote self-reliant communities and have the capacity to provide support to disaster-stricken areas.	B4. Technical and financial resources are available to promote stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery.
Coastal Resource Management	C1. Policies and plans are implemented and monitored to effectively manage natural coastal resources.	C2. Sensitive coastal habitats, ecosystems, and natural features are protected and maintained to reduce risk from coastal hazards.	C3. Communities are actively engaged in planning and implementing coastal resource management activities.	C4. Communities and local governments value and invest in management and conservation to sustain their natural resources.
Land Use and Structural Design	D1. Land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced.	D2. Critical infrastructure are located outside high-risk areas and constructed to address risks from priority hazards.	D3. Developers and communities incorporate risk reduction into the location and design of structures.	D4. Education, outreach, and training programs are established to improve compliance with land use policies and building standards.

Table 3-1. Benchmarks for Each Resilience Element by Core Capacities *(continued)*

Resilience Element	Benchmarks			
	Policy and Planning Capacity	**Physical and Natural Capacity**	**Social and Cultural Capacity**	**Technical and Financial Capacity**
Risk Knowledge	E1. Coastal hazard risk assessments are completed at a scale appropriate to the community and routinely updated.	E2. Coastal hazard risk assessments are comprehensive and incorporate risks to all elements of resilience (e.g. livelihoods, coastal resources, land use, etc.).	E3. Community participates in the hazard risk assessment process.	E4. Information from risk assessment is accessible and utilized by the community and government.
Warning and Evacuation	F1. Community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner.	F2. Community warning and evacuation infrastructure is in place and maintained.	F3. Community is prepared to respond to hazard warnings with appropriate actions.	F4. Technical and financial resources are available to maintain and improve warning and evacuation systems.
Emergency Response	G1. Predefined roles and responsibilities are established for immediate action at all levels.	G2. Basic emergency and relief services are available.	G3. Preparedness activities (drills and simulations) are ongoing to train and educate responders.	G4. Organizations and volunteers are in place with technical and financial resources to support emergency response activities.
Disaster Recovery	H1. Disaster recovery plan is pre-established that addresses economic, environmental, and social concerns of the community.	H2. Disaster recovery process is monitored, evaluated, and improved at periodic intervals.	H3. Coordination mechanisms at international, national, and local levels are pre-established for disaster recovery.	H4. Technical and financial resources are available to support the recovery process.

Resilience at National and Local Levels

Many opportunities exist to enhance resilience at national and local levels. The generic planning and implementation cycle provides a framework for identifying these opportunities (Figure 3-4).

Information and data sharing is fundamental to preparing national and local plans that incorporate resilience. Information and data needed to address coastal hazards is typically managed by multiple entities including government, nongovernmental, and

academic institutions. Data-sharing agreements and protocols need to be developed to make information and data accessible for plan development

Multi-agency review of national disaster management and coastal management plans and programs can provide valuable insights for enhancing resilience by ensuring risk mitigation measures are comprehensive. Typically, different national and local government agencies are responsible for addressing coastal hazards, managing coastal resources, issuing hazard warnings and evacuation notices, and responding to emergencies. Government agencies together with partner organizations need to meet regularly and work together to develop long-term and contingency plans that address all elements of resilience. Plans need to address both chronic hazards and potential hazard events. Reducing risks from chronic coastal hazards, such as sea level rise and shoreline erosion, should be integrated into medium- and long-term development plans and programs.

National and local programs need to reinforce good practices and build capacity to avoid disaster. Disasters, although marked by human suffering and loss, provide special opportunities to enhance resilience, such as rebuilding to reduce exposure of the population to hazard prone areas.

Monitoring and evaluation provides the insight and lessons learned to adapt plans and programs for enhanced resilience. Monitoring and evaluation of plans and programs provides information and data to measure progress and enhance resilience.

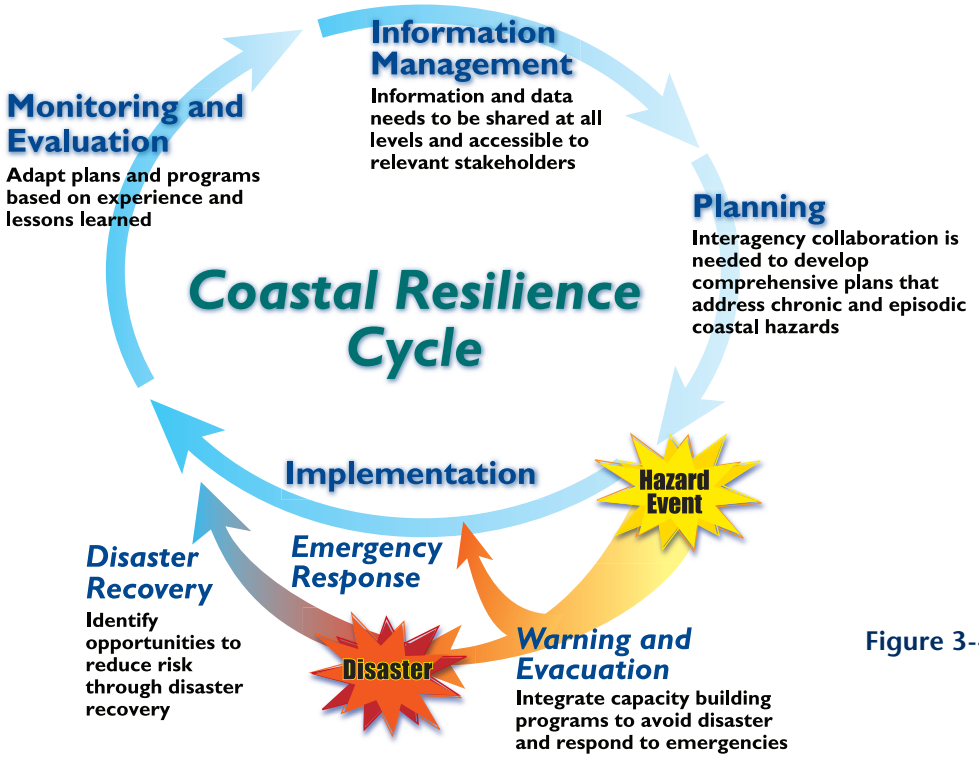


Figure 3-4. Coastal Resilience Cycle

Pacific Risk Management 'Ohana (PRiMO)—Working Together to Address Natural Hazards

The U.S. Pacific Islands (Hawaii, American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands) are susceptible to a wide variety of coastal hazards including tsunamis, typhoons, hurricanes, flooding, coastal erosion, volcanic eruptions, earthquakes, and drought. Throughout history, the islands have been impacted by numerous events and, due to their isolation, have had to respond to and recover from these events with minimal outside assistance. The original inhabitants of the islands had developed traditional knowledge and practices to build resilience toward coastal hazards. In more recent times, many of these islands have experienced significant changes culturally and demographically that have resulted in a loss of some of the traditional knowledge and practices, and thus a reduction in resilience.

In 2002, the U.S. National Oceanic and Atmospheric Administration (NOAA), Pacific Services Center, initiated activities to help lessen the impacts of coastal disasters in the islands. Recognizing the limitations of any one organization or institution to properly address the issue, the NOAA Pacific Services Center looked to build upon existing partnerships and establish new partnerships. From the outset, efforts focused on building a collaboration network across the three domains: community development planning, coastal resource management, and disaster management. Through these efforts, a new interagency working group, the Pacific Risk Management 'Ohana (PRiMO), evolved to help enhance collaboration among numerous federal, state, county, private, academic, and NGO representatives and stakeholders that play a role in disaster risk management. The foundation of PRiMO is based on the Hawaiian word "`ohana," or "family," reflecting the concept of working for the benefit of the collective and not the individual.

PRiMO can be compared to the ancient Hawaiian voyaging canoes and the spirit and determination of its navigators, steersman, and paddlers to reach their destination. Through interagency coordination and collaboration PRiMO, as a voyaging canoe, has charted a course to reach its destination, hazards resilience. A destination that is based on the value that the needs of the collective, the 'ohana (family) outweigh those of the individual. With this guiding principle, PRiMO has already made significant contributions to the Pacific Region.

Linkages between community development, coastal management, and disaster management processes and activities are needed to build CCR to both chronic and episodic coastal hazards. These linkages need to be explicit and driven by community members themselves, working in concert with national and local government programs and NGOs. Community-based planning and assessment of coastal hazards and risks is a fundamental first step in building CCR. Plans must be regularly reviewed and updated based on new information and experiences and lesson learned from implementation and monitoring. Some of the efforts undertaken by governments in the Indian Ocean Region to incorporate elements of resilience into their development are summarized in Table 3-2.

Table 3-2. Enhancing Resilience in National Development Plans and Actions of Indian Ocean Countries

Governance: In Sri Lanka and Thailand in 2005, new national disaster management organizations were formed and supported, and their efforts coordinated with those of existing government agencies. Other countries strengthened existing organizations to provide warnings, disaster management, and disaster recovery services to build resilience.
Society and Economy: Community development programs to develop alternative livelihoods, both post-tsunami and for long-term resilience, were initiated and are ongoing in Indonesia, Sri Lanka, and Thailand.
Coastal Resource Management: National coastal management agencies in Indonesia and Sri Lanka have actively incorporated resilience measures into their programs, including mapping of hazards, coastal setbacks, protection of vulnerable habitats, and other measures. India has revitalized its coastal management legislation to address coastal issues in relation to hazards and development.
Land Use and Structural Design: Thailand undertook an analysis of structural design and land use practices that would minimize tsunami impacts. Sri Lanka and India revised their national setback laws to be more sensitive to inundation along coasts.
Risk Knowledge: Maldives and most other Indian Ocean countries have undertaken major programs to enhance their collective national and local knowledge about risk from multiple hazards. Risk knowledge has increased across all countries in relation to primary hazards such as tsunamis, flooding, and earthquakes as well as more chronic hazards.
Warning and Evacuation: National disaster and warning centers in Thailand, Sri Lanka, India, Indonesia, and Maldives have all been striving to make national warning systems functional from the national to the local level. In Thailand, a sophisticated warning and evacuation system has been tested several times with local participation.
Emergency Response: Incident command systems have been initiated in India, Sri Lanka, Indonesia, and Thailand in response to the need for effective response and coordination among national and local agencies.
Disaster Recovery: Thailand has strengthened its national disaster management organization to address recovery from any disaster.

Need for Conducting an Assessment of Coastal Community Resilience

This guide provides an approach to CCR assessment to highlight strengths and address weaknesses in each resilience element. A CCR assessment can serve as a powerful tool that allows the stakeholders of a given community, together with government, NGOs, and other stakeholders, to begin the process of enhancing resilience. Assessment is the first step in providing inputs to planning decisions to address primary issues of concern in a community. Keeping the eight elements of resilience in the forefront during the assessment and planning process ensures that a balanced approach for program implementation. For example, if a community is primarily concerned about minimizing the impacts of storm surge to which it is

vulnerable, assessing the eight CCR elements will ensure that all the factors that can minimize the impact of storm surge are brought into the planning discussion.

A CCR assessment provides an opportunity to initiate dialogue among key stakeholders in the area. Dialogue is crucial to encourage the stakeholder community to recognize the need for better resilience and to better understand what forces need to be addressed to lessen the community's vulnerability through planning. Such dialogue is also an educational process, in which the various stakeholders can learn together through a guided assessment of CCR.

Reasons to Conduct an Assessment of CCR

- Initiate a dialogue between the community, government and nongovernmental institutions, and other stakeholders on the goals and key elements of CCR
- Increase awareness and understanding of the risks associated with both episodic and chronic coastal hazards and the need to build resilience capacity at the community level
- Characterize the resilience status and trends at the community level
- Determine the capacity of an organization to provide assistance in each resilience element
- Provide input to local and national planning for community development, coastal management, and disaster management measures to enhance CCR
- Identify strengths, weakness, and gaps in resilience capacity that need to be addressed to achieve the long-term desired outcome of CCR

Chapter 4

What Are the Steps to Assess Coastal Community Resilience?

Resilient communities learn from experience and adapt to change. An assessment of CCR provides vital information and data needed to adapt plans and programs for enhanced resilience. The assessment process uses benchmarks to evaluate the capacity of a community to reduce risk, accelerate disaster recovery, and adapt to change from coastal hazards.

The CCR assessment described in this guide is intended as a rapid assessment, to be conducted as a collaborative and participatory undertaking by coastal communities, national and local government agencies, nongovernmental organizations, private sector groups, and other key stakeholders to identify strengths, weaknesses, and opportunities to enhance resilience at local and national levels. The assessment should be conducted by a multidisciplinary team that includes members experienced in community development, coastal management, and disaster management. The steps for conducting a CCR assessment including the following:

- Define the purpose, scope, and participants of the assessment
- Review CCR benchmarks
- Prepare for the assessment
- Collect information and data
- Compile and analyze results
- Validate and communicate results
- Provide recommendations to adapt plans and programs for enhanced resilience

The CCR assessment approach described in this guide is intended as a rapid assessment, to be conducted as a multisectoral collaborative and participatory undertaking to identify strengths, weaknesses, and opportunities to enhance resilience at local and national levels.

Define the Purpose, Scope, and Participants of the Assessment

A CCR assessment is first and foremost a valuable process for initiating a dialogue among community leaders, coastal managers, and disaster managers on ways to collaborate and enhance the capacity of a community to minimize risks from coastal hazards. A CCR assessment may be conducted as a self assessment or as an external assessment. The purpose of conducting a CCR assessment should be clearly defined for both the assessment team and stakeholders.

The assessment process can be used throughout a project development cycle to evaluate the project design and to monitor and evaluate project implementation to address resilience gaps and capacity-building needs. The assessment can be used to evaluate the capacity of an organization to assist communities with enhancing resilience, and in the process, to identify partners needed to assist in some areas where the organization is weak.

Practitioners working directly with coastal communities can use resilience benchmarks to assess ongoing activities such as livelihood development, emergency response, and siting and construction of housing and settlements. National and local government agencies may utilize CCR assessments to identify gaps in policies, plans, and programs to enhance resilience. CCR assessments can be used by international aid agencies, banks, and the private sector to identify ways to sustain investments by designing and funding programs and development activities to increase community resilience. The assessment team should be able to clearly communicate the purpose of the CCR assessment to the stakeholders involved. The purpose of the assessment can be defined by answering key question such as those provided in Table 4-1.

Table 4-1. Defining the Purpose of the CCR Assessment

Guiding Questions	Assessment Team Response
What institutions or organizations are proposing the assessment? Who is the lead institution?	*Example: National disaster committee working group*
What is the purpose of conducting this assessment and what are the desired outcomes?	*Example: To help the provincial government identify priority actions and funding requests for next year.*
Who are the key stakeholders (target audience) that may have an interest in using the findings of this assessment?	*Example: The National Disaster Commission and the Provincial Planning Department have a partnership to facilitate local hazard plans and grants to mitigate impacts from priority hazards.*
How does the target audience anticipate using the results of the assessment?	*Example: Prioritize funding for hazard mitigation and training for community committees.*
What is the level of commitment of the community to engage in the assessment and follow-up actions?	*Example: There is a new mayor who campaigned for change; the community is developing a 5-year strategic action plan.*

The scope of a CCR assessment also needs to be clearly defined to ensure results are meaningful at the community level and to facilitate action to enhance resilience. In defining the scope of the assessment, a number of factors should be considered, including:

- Coastal hazards and other hazard features
- Natural resources of the area
- Demographic and socioeconomic attributes
- Cultural attributes
- Political boundaries
- Stakeholders or target audience

The scale of the assessment should be limited to a manageable unit defined by human communities in relation to their general area of habitation and resource uses, and in consideration of local political jurisdictions. It should be noted that the assessment will range in scale from political jurisdictions, in the case of governance, to natural resource use areas for coastal resource management and land use, and to areas particularly vulnerable to potential hazards.

Define the Scope of the Assessment

- Use maps to limit boundaries and for reference to important geographic, demographic, natural resource, and hazard features of a given area.
- Limit scale to manageable units, as defined by human communities in relation to their general area of habitation and resource uses, and in consideration of local political jurisdictions.
- Identify stakeholders both within and outside the physical boundaries of the assessment.
- Consider that the scope will vary for different elements of resilience, ranging from political jurisdictions (in the case of governance) to natural resource use areas (for coastal resource management and land use).

A potential major outcome of a CCR assessment is improved collaboration and information sharing between a broad base of stakeholders at national, subnational, and local levels. The involvement of a broad base of stakeholders will build commitment to implementing recommendations that emanate from the assessment. Stakeholders essential to the CCR assessment process are:

- Local and/or national government officials (planning, police, disaster, environment)
- Heads of community-based organizations
- Business leaders
- School administrators and teachers
- Representatives of NGOs working in the area but external to the community
- Representatives from externally funded programs working in the area

An analysis of key stakeholders and their interest in CCR should be conducted to ensure that the purpose of the assessment is aligned with the interests and motivation of key stakeholders.

An analysis of key stakeholders and their interest in CCR should be conducted to ensure that the purpose of the assessment is aligned with the interests and motivation of key stakeholders.

Review CCR Benchmarks

The resilience elements and their benchmarks guide the CCR assessment. These benchmarks represent a generic list of desired conditions against which to evaluate the resilience status of a coastal community. Chapter 6 provides detailed descriptions of the elements and associated benchmarks of CCR. The benchmarks for each element may require some level of adaptation to address the local context in which they are used. In addition, it is useful to determine the need for a rating system to compare, either qualitatively or quantitatively, the resilience status of the community with the desired condition described by the benchmark.

Adapt benchmarks as needed to local context. The benchmarks for each element should be reviewed to determine the need to adapt them to the national, subnational, or local context in which they are being used. Benchmarks can be adapted to make them more easily understood given the context and location of the assessment. A process to determine the need to adapt a particular benchmark is provided in Figure 4-1. If it is difficult to identify the type or source of data needed to evaluate the condition described in the benchmark, the benchmark may need to be changed to more closely reflect the national, subnational, or local context. An example of how the benchmarks in this guide may be modified to be communicated clearly in Sri Lanka is provided in Table 4-2.

Table 4-2. Example of a Benchmark Adapted to a Local Context

Benchmark from this Guide	Adapted Benchmark
D1. Land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored, and enforced.	National organizations (Urban Development Authority, Coast Conservation Department, Reconstruction and Development Authority, and Ministry of Lands) and local mayors and councils consider both coastal hazards and natural resources when developing policies and standards and making land use decisions. These same or other organizations monitor these policies and standards to make sure they are being followed and, if not, have mechanisms to enforce them.

The resilience benchmarks can also be adapted into a series of questions that can be used as a survey instrument to gage the level of community awareness and capacity to enhance resilience. If used as a survey instrument, the sample size and profile and distribution of survey respondents will need to be considered.

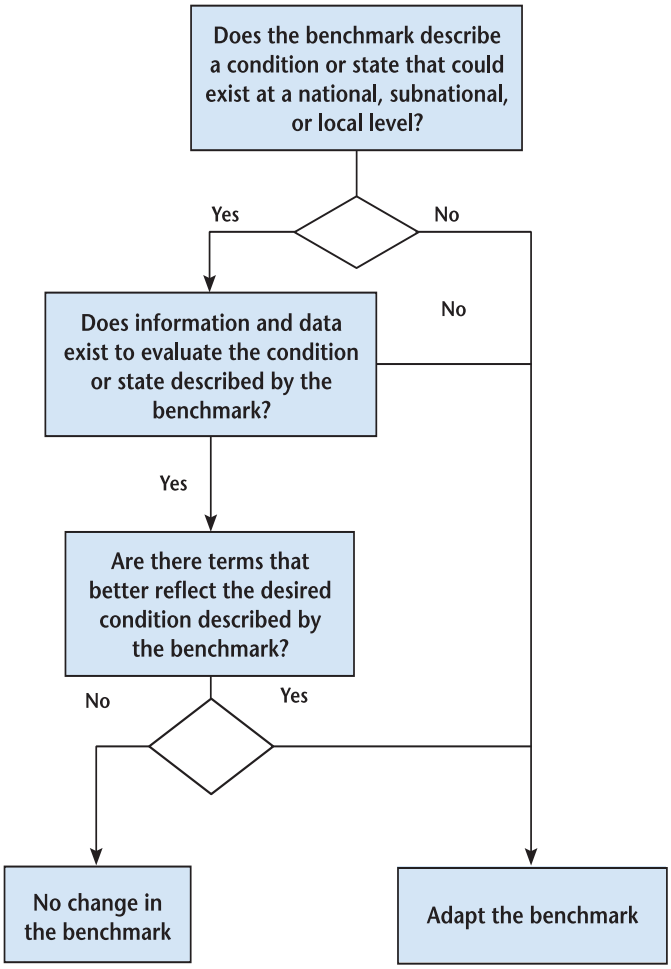
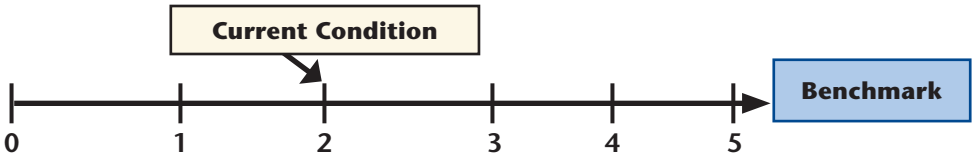


Figure 4-1. Process to Adapt Resilience Benchmarks to Address Local Context

Consider establishing a rating system for benchmark evaluation. A rating system can serve as a useful tool to compare the current condition described by the CCR assessment results with the desired condition described for each benchmark. The benchmarks for each resilience element describe desired conditions of CCR. The CCR assessment provides information and data to compare, either qualitatively or quantitatively, the resilience status of the community with the desired condition described by the benchmark (Figure 4-2). It is recommended that the rating system used be simple and easy to communicate to stakeholders.

Scoring (numerical rating) can be a useful approach to evaluate progress toward or achievement of each benchmark. Scores of 0 to 5 can be assigned to each benchmark based on an analysis of the assessment results. The scores for each reliance element are averaged to give an overall indication of resilience for a given area and to make



5 Excellent (81 to 100 percent fulfilled, sustainable)
4 Very Good (61 to 80 percent fulfilled)
3 Good (41 to 60 percent fulfilled)
2 Fair (21 to 40 percent fulfilled)
1 Poor (1 to 20 percent fulfilled)
0 Condition absent

Figure 4-2. Rating as a Tool to Evaluate Assessment Results

comparisons among areas (Table 4-3). Although scoring is not required to evaluate the level of resilience, it is a useful method because it sets a baseline for future comparison and provides a cross comparison among elements to aid in defining priorities for action.

Information and data collected for each benchmark can be disaggregated into strengths, weaknesses, and gaps for each resilience element. The relative number of strengths, weaknesses, and gaps for a given benchmark provides an indication of overall resilience status compared to the desired condition for a particular benchmark (Figure 4-3).

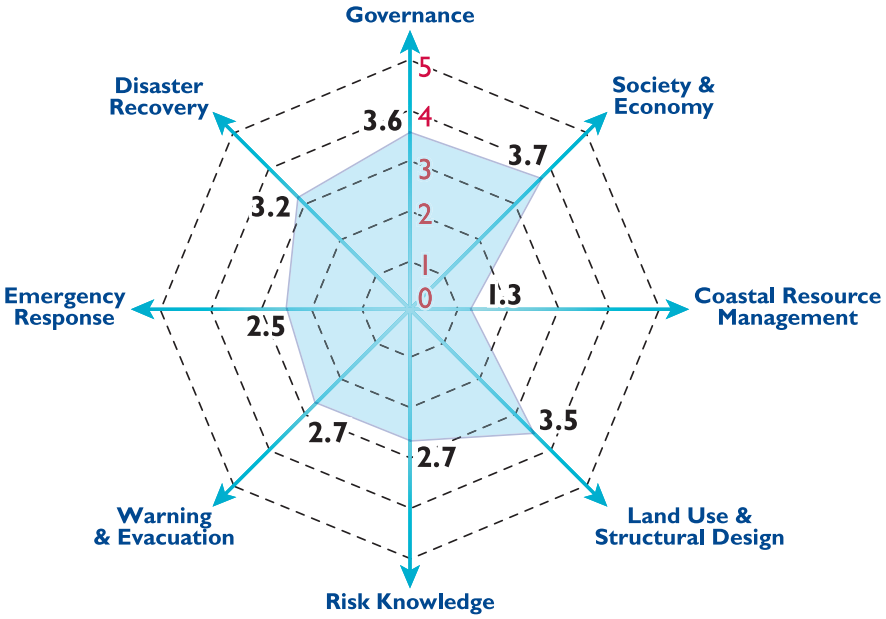


Figure 4-3. Graphic Representation of Rating

Table 4-3. Numerical Rating System for Each Benchmark

Governance Benchmarks	Rating
A1. Community development policies, plans, and programs are implemented and monitored in a participatory and transparent manner.	4
A2. Basic services (i.e. water, transportation, security, etc.) are accessible to all sectors of society.	2
A3. Participatory collaboration mechanisms among different sectors and various levels of government are established and used to manage for resilience.	3
A4. Technical and financial support mechanisms are transparent, accountable, and available to support planned community actions.	1
Average	2.5

5 Excellent (81 to 100 percent fulfilled, sustainable)
4 Very Good (61 to 80 percent fulfilled)
3 Good (41 to 60 percent fulfilled)
2 Fair (21 to 40 percent fulfilled)
1 Poor (1 to 20 percent fulfilled)
0 Condition absent

Another example of a rating system characterizes the resilience status and trends for each benchmark (Table 4-4). The assessment results may reveal that resilience status for a particular benchmark is poor as indicated by major weaknesses or gaps, but that a number of actions are under way that will likely improve the status over time. This evaluation method characterizes both the current and potential future conditions compared to the desired condition described by the benchmark.

Table 4-4. Status and Trends Rating System for Each Benchmarkk

Governance Benchmarks	Rating
A1. Community development policies, plans, and programs are implemented and monitored in a participatory and transparent manner.	■
A2. Basic services (i.e. water, transportation, security, etc.) are accessible to all sectors of society.	▼
A3. Participatory collaboration mechanisms among different sectors and various levels of government are established and used to manage for resilience.	▲
A4. Technical and financial support mechanisms are transparent, accountable, and available to support planned community actions.	■

■/▲/▼ = Good/Good and improving/Good but declining

■/▲/▼ = Fair/Fair but improving/Fair and declining

■/▲/▼= Poor/Poor but improving/Poor and declining

O = Absent

Regardless of the rating system used, a participatory process with the stakeholders as well as the CCR assessment team is recommended to evaluate status against the benchmarks. A comparison of ratings given by community leaders, NGOs, and government agencies interviewed separately as part of the CCR assessment can provide useful information about the perceptions of different sectors of society.

Any rating undertaken by the assessment team should be conducted as a group effort involving all members of the team. All information and data collected by the team from interviews, focus group discussions, participatory mapping, and secondary data sources needs to be considered and discussed as part of the rating process. The rationale for rating each benchmark should be summarized in order to capture the consensus reached by the assessment team. All such data should also be summarized in a report for future reference.

While numerical rating systems can serve as a useful tool for promoting dialogue and comparing the resilience status of a community, numerical ratings can be misinterpreted and misused (Table 4-5).

Table 4-5. Positive and Negative Features of Numerical Rating Systems

Positive Features	Negative Features
• Provides a qualitative rating that helps prioritize key issues that need to be addressed • Enhances assessment results by promoting discussion among the team in assigning a score • Useful in summarizing and communicating assessment results to stakeholders	• Numerical rating may tend to oversimplify status • Ratings can be subjective unless designed as a rigorous quantification tool • Scores may be misinterpreted or used improperly to guide funding

Prepare for the Assessment

Once the purpose and scope of the CCR assessment are clearly defined, a number of preparatory steps are necessary. Taking the time to properly prepare for the assessment will increase the likelihood that stakeholders will be interested in the results and act upon the information.

Identify sources of information. A broad cross section of individuals from national, subnational, and local government agencies, NGOs, community groups, and other stakeholder groups will be participants in the assessment. The CCR assessment requires information gathering and interviews at different levels of governance, from community to national levels. As a first step, it is useful to review the benchmarks for each element and identify sources of information at local, subnational, and national

levels for each benchmark. Some factors to consider in identifying organizations and individuals to interview and obtain information for the assessment include:

- Broad cross section of stakeholders: Community leaders, private sector, NGOs, and national and local government agencies
- Multidisciplinary technical expertise: Coastal managers, regional planners, hazards specialists, disaster managers, livelihood (such as industry or agricultural) representatives, social and cultural leaders

Determine assessment method by benchmark. The assessment method describes the mode in which information on each benchmark will be collected. A combination of assessment methods are needed to evaluate each benchmark. These methods may include:

- Secondary data and information compilation and review
- Participatory mapping
- Interviews with key informants
- Focus group discussions

Before collecting any new information and data, relevant secondary data and information should be used to conduct a preliminary assessment of community resilience for each benchmark. Participatory mapping is a powerful assessment method that provides spatial data, solicits local and traditional knowledge, and engages stakeholders in the assessment process. Interviews and focus group discussions are essential methods needed to assess most of the resilience benchmarks.

Participatory mapping is a powerful assessment method that provides spatial data, solicits local and traditional knowledge, and engages stakeholders in the assessment process. Interviews and focus group discussions are essential methods needed to assess most of the resilience benchmarks.

Organize and train the CCR assessment team. The eight elements of CCR represent a broad range of assessment topics. A multisectoral assessment team composed of community leaders, NGOs, private-sector representatives, and local and national government entities would represent the highest level of participation and achieve the greatest likelihood for implementing follow-on actions needed to enhance resilience.

Conducting the assessment will require skills appropriate to a wide variety of tasks: project management, conducting research, developing interview questions,

CCR Assessment: An opportunity to develop new partnerships

The national CCR workshop conducted in Sri Lanka in October 2006 resulted in new partnerships of the Disaster Management Agency (DMC), Coastal Management (CCD), and community development NGOs. They came together to perform many of the field assessments, which provided the assessment team members with a complement of expertise within each domain. An added benefit of this partnership was sharing information and experiences between the institutions.

conducting interviews and meetings, mapping, performing coastal hazards analysis, and writing clear reports. A multidisciplinary assessment team composed of individuals with specific technical expertise is essential for conducting a comprehensive CCR assessment. A more focused assessment team may be used if the purpose and scope of the assessment is limited to specific resilience elements.

The assessment team should be organized with clear roles and responsibilities for collecting information and data on the resilience status for specific benchmarks. An assessment team leader should have overall responsibility for all aspects of the assessment. The roles and responsibilities of the assessment team should be defined and understood.

The assessment team should have a common understanding of the CCR elements and benchmarks, the assessment methods to be used, and specialized skills depending on the roles and responsibilities of individual members of the team. Members of the assessment team may require specialized training on interviewing skills, focus group discussions, and participatory mapping. A training session guide for conducting a CCR assessment is provided in Appendix C.

Develop assessment work plan and schedule. A work plan is a simple tool to consolidate all the preparation steps for a CCR assessment. The work plan organizes information about the assessment to help give the team a complete understanding of the objectives, geographic scope, data collection and analysis, schedule, and roles and responsibilities for conducting the assessment. The assessment team should be involved in developing and reviewing the work plan and schedule for the assessment. Data collection should be well coordinated and scheduled in advance to ensure participants involved in the assessment are available.

Collect Information and Data

The CCR assessment requires information gathering and field data collection at the national, subnational, and community levels. This section of the guide outlines a few useful and common field data collection methods for conducting a CCR assessment. This is not intended to be a comprehensive list. Other data collection methods, such as surveys or facilitated workshops, may be more appropriate and are encouraged to be used based on the scope and purpose of the assessment.

The preparation activities discussed in the previous section provide the foundation for successful field data collection. The assessment team should have a clear

understanding of the purpose and scope of the assessment and of the strategy for completing the assessment before going into the field.

The elements and benchmarks of resilience should be placed into a local context and adapted where necessary to facilitate understanding in the community. In addition, secondary information such as maps and reports should have been synthesized into summaries for each element and each benchmark. This crucial step provides the assessment team an opportunity to identify the critical information gaps, which in turn ensures that the gaps are addressed in the field through interview questions and group activities.

Data collection activities such as interviews, focus groups, and participatory mapping activities should be well documented. In addition to handwritten and typed notes, photographs and video can be effective media for conveying results of the assessment. Images from the community and of the people who participated in the assessment can help when communicating results of the assessment.

CCR assessment team members should also be flexible and take time while in the field to make additional observations regarding the elements and benchmarks. For example, they may want to informally ask some community members about information they obtained in the field, or inquire about perceived hazard risks and resources. These types of field observations may help to paint a more complete picture of the community.

Conducting Interviews

Interviews can be an effective way to collect information for assessing CCR. Interviews are primarily used during the assessment process for validating information gathered from secondary sources (maps, reports, etc.), deepening the understanding of existing information, and addressing information gaps.

It is important to have a clear understanding of how each interview should contribute to the assessment (validation, deepen understanding, or fill a gap) to ensure their effectiveness. This will make the task of developing interview and discussion questions much easier.

Interview Do's and Don'ts

Avoid giving mixed messages and making promises you cannot keep.

Avoid misleading questions and/or sharing personal opinions. Rather, ask open-ended questions and be neutral in your questioning.

Do not make the interview rigid; think on your feet and be flexible.

BE SENSITIVE. Do not cause fear or upset people. Phrase questions appropriately and be conscious of everything you are communicating.

Ensure that the conditions and environment are comfortable for your interviewees. Dress appropriately and always sit at the same level as your subject.

Use the local language.

Preplanning is essential. Pilot-test the interviews to ensure final interview questions are appropriate and will address the objectives of the interview.

Prepare the interviewees for the interview. Give them a standard introduction that covers the purpose, objectives, and intentions of the assessment.

Structure questions in a way that makes effective use of time. Make the questionnaire short and succinct.

Validate information, especially with important information and in cases where you suspect the participants are not telling the complete truth. If in doubt, check with another member of the community.

Develop a standard introduction for the assessment before going to the field. This helps kick off interviews and group activities and allows participants to understand the purpose of the assessment and how the information they provide will be used. Providing a standard introduction also provides participants an opportunity to ask questions and helps them feel comfortable. Major points to cover in the introduction include:

- Who you are, your organization, and your partners
- The anticipated length of the interview, discussion, or mapping exercise
- Process and purpose of the assessment
- Intended use of information

After the introduction, always allow for questions before proceeding.

Suggested National and Subnational Interviews

Upper-level staff from national government agencies with programs related to disaster management, coastal resource management, and community development.

Upper-level staff from provincial or district-level government departments involved in disaster management, coastal resource management, and community development.

Staff from large NGOs or not-for-profit organizations involved in disaster management, coastal resource management, and community development.

Suggested Community-Level Interviews

Local officials involved in community-based activities related to disaster management, coastal resource management, and community development.

Community volunteers involved in disaster management, coastal resource management, and community development.

Trusted information sources such as teachers, coaches, religious leaders, and business owners.

Cross section of community members of different ages, gender, ethnicity, and livelihood.

National and Subnational Level Interviews

National and subnational level interviews are critical for determining the conditions that exist within large governmental agencies and NGOs that support or possibly limit CCR. Interviews with agencies and organizations involved in disaster management, coastal resource management, and community development should provide a more complete picture of factors at the national, provincial, or district levels that contribute to or limit CCR.

Learning the initiatives and assistance programs of these agencies and organizations can also provide a strong indication of governmental and organizational priorities. This information is critical. Aligning community-level actions with national and subnational priorities can greatly increase the effectiveness of any identified actions for enhancing community resilience. For example, if national and/or subnational programs for mitigating flood impacts do not identify habitat restoration as an effective mitigation strategy, it is much less likely to be sustainable when compared to other strategies for which technical assistance is available through such programs.

Community-Level Interviews

Community-level interviews are critical for understanding individual perceptions, beliefs, and values related to resilience. Understanding how regular people feel about resilience elements in their

community is important. This knowledge will ensure identified actions for resilience are in line with community values and make them likely to be accepted and sustained.

When conducting community-level interviews it is best to try and capture a representative cross section of the community. Interviewing both men and women of different ages, religions, races, and with different livelihoods will ensure the responses reflect the range of perceptions and values in the community. Use all tools at your disposal such as worksheets, maps, and figures to support the interview.

Focus Group Discussions

Focus group discussions are facilitated group discussions in which open-ended questions are asked in a way to trigger discussion amongst participants. Attention is given to reducing structure so that the information is gained from the participants rather than being determined by the questions asked.

Focus groups are well suited for preliminary data collection, especially when time is limited or when a more structured approach is being considered, such as a workshop or survey. Like community-level interviews, focus group discussions are critical for understanding a community's perceptions, beliefs, and values related to resilience.

A. STEIN

Focus group discussions can be used to collect information and data for the assessment

Additional Do's and Don'ts for Focus Group Discussions

Follow local customs and protocols.

Allow for all participants to properly introduce themselves.

Use language that can be understood by the entire group—avoid the use of technical terms.

Be diplomatic, familiar with the discussion topics, and adjust the situation when necessary.

Encourage all members of the group to participate. Asking questions in a way that encourages descriptions or personal accounts helps to create dialogue.

Avoid controversial and sensitive subjects. There must not be any problems among the participants after the discussion.

CRMP PHOTO (COMMUNITY DRAWING MAPS IN PARTICIPATORY ASSESSMENT)

Mapping is a powerful planning tool and can promote community involvement

Participatory Mapping

Participatory mapping is a facilitated process in which small groups work to identify, locate, and classify significant physical features in a community. This information is then transferred into a map or represented in some other visual way such as a diagram or picture. The goal of most participatory mapping exercises is to simply create concrete opportunities for discussion about social, economic, and/or environmental resources and for individuals to learn about their own and others' perceptions surrounding these resources. Participatory mapping is an effective way for discussing elements of resilience and contributes greatly to the CCR assessment process. The process described in this section is adapted from Walters et al., 1998.

Define the scope and purpose. The first step in getting started is to define the scope and purpose of the mapping exercise. This should be done with all partners involved in conducting the CCR assessment. This step will allow the group to decide on specific information that may be needed to assess a particular element of resilience, and whether to limit the exercise to one or more specific elements (Table 4-6).

Identify facilitators and note takers. The CCR assessment team should also identify a lead facilitator, cofacilitator, and note taker. These individuals should have rapport established with the community. It will be the role of these individuals to contact participants and schedule the mapping exercise.

Table 4-6. Community Features to Consider for Mapping by Resilience Element

A. **Governance:** Basic services (roads, bridges, ports and harbors, electrical supply, potable water, etc.), critical facilities (hospitals, schools, etc.), government offices

B. **Society and Economy:** Religious institutions (churches, mosques, temples, etc.), cultural resources (shrines, historical landmarks, etc.), commercial centers (markets, malls, supply centers), livelihood resources (fishing grounds, cold storage)

C. **Coastal Resource Management:** Protected areas, conservation areas, management zones, critical habitat (coral reefs, wetlands, etc.), resources of special concern (endangered species, spawning grounds, etc.), protective resources (sand dunes, mangroves, etc.)

D. **Land Use Management and Structural Design:** Current and planned land uses (agricultural, residential, industrial, conservation, etc.)

E. **Risk Knowledge:** Hazard areas (tsunami zones, flooding zones, landslide zones, erosion zones), at-risk populations, individuals with special needs

F. **Warning and Evacuation:** Warning towers, warning flags, warning centers, evacuation zones, evacuation routes, evacuation towers, evacuation shelters, safe areas

G. **Emergency Response:** Emergency centers, police stations, community center

H. **Disaster Recovery:** Emergency supplies, redevelopment areas, coastal setbacks

Identify key informants. Once the scope and purpose has been defined, identify key individuals who can provide information and perspectives that will contribute to the purpose of the exercise. In selecting individuals, consider whether there is a need to divide the participant group by gender, age, religion, ethnicity, or other categories. If time and resources permit, more than one exercise may be helpful. Stratifying participant groups may help to provide insight into differences in perceptions, access to resources, and social dynamics. In some cases, individuals are simply unlikely to share information openly if a member of another category is present.

Gather materials. Once individuals have agreed to participate in the mapping exercise, materials such as paper, pencils and/or markers, and masking tape can be acquired. If possible it is useful to have paper that is large enough for many participants to work on together. If paper and writing utensils are not readily available, maps can be drawn on the ground using sticks and features can be represented by rocks, leaves, and shells, the point being to provide a concrete representation of the community to help drive the discussion. Supplemental maps such as topographical maps are often helpful for navigating or identifying names of features such as rivers or streets, but should not be used to influence the participants during the exercise. A compass, Global Positioning System (GPS) unit, and camera can also be useful if available.

Create a checklist. Begin the mapping exercise by creating a checklist of features to be mapped. This checklist can be compiled by the CCR assessment team or members of the participant group. The selected features should reflect the purpose of the exercise and may include items such as those listed in Table 4-6. Avoid having too many (>10) features in the checklist as it often clutters the map and makes interpretation by others difficult.

Prepare a base map. The preparation of a base map is useful and provides the participant group with common understanding of the orientation and scale of the area to be mapped. This can be accomplished by having the participants first draw features such as coastlines, rivers, islands, mountains, and other recognizable landmarks. To get people comfortable with sharing information, it is often helpful to have participants provide the names of the landmarks or reference points in the base map.

The use of a Geographic Information System (GIS) can be quite helpful for creating simple base maps. However, caution should be used if using satellite imagery or aerial photographs in the base maps. Many individuals are not familiar with such views of their community, and they can be confusing and distracting. If a large-format printer or plotter is not available to print large maps, a projector can be used to display the map on a wall and then drawn by hand onto paper.

Begin mapping. Use the base map to begin identifying features from the checklist. Encourage all participants to contribute to the map. One or two individuals should not dominate the process. The use of colored pencils or pens to classify features, the use of labels, and the generation of a legend can make the map easier to interpret later.

Next steps. Once the mapping is complete, allow the information to be shared with others in the community to provide some validation to the information collected. The facilitators and note takers may want to work together to synthesize the mapping exercise into a report to contribute to the CCR assessment or other activities. A copy of this report may also be left behind with the community along with the original map. Depending on the intended use(s) of the map, it may be necessary to transpose the information onto another map.

For example, if the community is dealing with formal institutions and the exercise resulted in a rough sketch map, the information could be transferred into a more formal map. This can be done with the use of a GIS if a more precise map is desired; if the presentation just needs to be improved, simply photographing the map and using a computer graphics program may suffice. This process is often referred to as two-stage mapping and can be an effective way for distributing the maps among organizations.

Additional Do's and Don'ts for Participatory Mapping

Participatory mapping should be initiated after baseline information about the community has been collected, reviewed, and synthesized by all parties conducting the CCR assessment

Participatory mapping should be conducted after rapport with the community has been established

Knowledge of the social structure of the community should be clear to all facilitators

Compile and Analyze Data

The compilation and analysis stage of the CCR assessment process is intended to provide the assessment team with a number of outputs, including (1) an assessment and/or score for each benchmark, (2) community strengths and weaknesses for resilience, and (3) summary statements for each resilient element.

This section of the CCR Guide describes in more detail the steps to developing these outputs and introduces two worksheets that will help make the process easier. It is suggested that this stage of the assessment process include the entire assessment team. Active participation of the entire team will provide the group an opportunity to identify any contradictory information and ensure the collected information is well understood by all.

Before getting started with the analysis, be sure all the secondary information (maps, reports, etc.) and field data (from interviews and group activities) are organized by element and benchmark. Identify any missing information, one benchmark at a time, and determine how the assessment team will fill in the gaps.

After compiling and organizing information, use Worksheet 1 – Benchmark Summary (Appendix A) to discuss the information gathered through the assessment for each benchmark. Try to identify key findings for each benchmark and organize them into strengths and weaknesses. If using a rating system as part of the assessment, discuss and assign the appropriate score for each benchmark. An illustrative example of assessment results using Worksheet I is provided in Table 4-7.

Table 4-7. Illustrative Assessment Findings and Analysis (Using Worksheet 1 from Appendix A)

Benchmark	Findings/Key Points Related to Community Resilience	Strengths	Weaknesses	Data Gaps	Rating
D1. Land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced.	• Local land use policies and plans exist, however, are focused on urban areas and not rural communities • Land use plans were revised after the tsunami in coordination with national and provincial authorities and included maps of sensitive areas and tsunami inundation areas • Revised land use plans were not systematically used in recovery efforts to guide redevelopment in tsunami-affected communities • Nested system of plan development, national, provincial, local, is set up well on paper, but the implementation lacks human, technical and financial capacity.	S S S S	W W	Need to review building standards	2
D2. Critical infrastructure are located outside high risk areas and constructed to address risks from priority hazards.	• All critical infrastructure, including hospitals, police stations, fire stations, are located within tsunami inundation zones • Several schools were relocated post-tsunami outside the tsunami zone	S	W		2
D3. Developers and communities incorporate risk reduction into the location and design of structures.	• Some developers are incorporating earthquake-resistant standards to commercial buildings post-tsuanmi • Some parts of the community have reverted to traditional housing design to address chronic flooding and potential tsunami	S S		Unclear what portion of the community is incorporating these measures	3
D4. Education, outreach, and training programs are established to improve compliance with land use policies and building standards.	• No education, outreach, or training programs available • Lack of awareness of land use policies and plans by the public and developers, construction companies		W W		0

Note: In the above example, the assessment team met to discuss key findings and disaggregate the data into strengths and weaknesses. A finding statement may indicate both strengths and weaknesses (e.g. a plan developed but not implemented). Data gaps were noted and additional primary and secondary data collection was conducted to fill these gaps. Using a rating system of 0 (absent) to 5 (75–100% fulfilled), the entire team discussed the results of the assessment and achieved a consensus of the score for each resilience element.

Once each benchmark has been analyzed, begin to summarize each element using Worksheet 2 – Element Summary (Appendix A). Use this worksheet to develop summary statements for each element and discuss any opportunities for increasing resilience the group identified through the course of the assessment. In addition, discuss and list the existing good practices in the community that are contributing to resilience. Be sure to pay special attention to any linkages between the elements and opportunities. Note these linkages so they can be addressed in the summary statements discussed in the following section. If using a rating or scoring system, assign an overall classification or average score for each element.

Depending on the purpose of the assessment, information and data can also be analyzed across the elements by category of benchmark (Table 4-8). For instance, it may be useful to look at the technical and financial resource capacity needed by the community in all resilience elements, to identify needs that can be more efficiently addressed by a common approach.

Table 4-8. Analysis of CCR Assessment Results by Element and Benchmark Category

Resilience Element	Benchmark by Core Capacities				
	Policy and Planning	Physical and Natural	Social	Technical and Financial	**Element Summary and Rating**
A. Governance					
B. Society and Economy					
C. Coastal Resource Management					
D. Land Use and Structural Design					
E. Risk Knowledge					
F. Warning and Evacuation					
G. Emergency Response					
H. Disaster Recovery					
Benchmark Category Summary and Rating					

Note: CCR assessment results can be summarized by resilience elements or by core capacities, depending on the purpose of the assessment. In some cases, it may be useful to summarize the results across all resilience elements for a particular core capacity. An evaluation of benchmarks on technical and financial capacity may highlight common needs.

Validate and Communicate Results

Validating and communicating results is a critical stage of the assessment process. During this stage, the conclusions, summaries, identified opportunities for increasing resilience, and identified best practices are reviewed by all stakeholders of the assessment. Once the information has been reviewed, updated, and agreed upon, the results of the assessment can be communicated. The format for communicating the assessment results should have been determined early in the assessment process in the preparation stages. The format (written report, website, video, etc.) should be appropriate for the intended audiences; oftentimes multiple formats may be needed to reach different target audiences. In all cases, consider developing a short summary document in addition to more detailed reports of the assessment for outreach purposes.

CCR Assessment Report: Key Sections

- Background and Purpose
- Stakeholders and Audience
- CCR Assessment Process
- Summary of Findings by Element
- Opportunities to Enhance Resilience
- Existing Good Practices
- Links Between Issues
- Conclusions and Next Steps

The first step is to develop a draft of the assessment results. Begin with an outline and include sections on the purpose and objectives, background information, assessment process, results, and conclusions. Once a draft of has been developed, create a review panel to validate the assessment. The review panel should consist of people from within the assessment team and not on the assessment team but from one of the participating agencies or organizations. Once all review comments have been discussed and addressed, finalize the draft.

Chapter 5

How Can Resilience Initiatives Be Sustained Over the Long Term?

The purpose of CCR is to reduce the vulnerability of coastal communities to the multitude of risks to which they are exposed. The long-term nature of this undertaking requires planning for sustainability of the interventions. It requires building constituencies among communities and their governments so that CCR is internalized within their planning and budgeting and within their overall way of transacting business at the community and local government level.

Sustaining interest and support to address risks from natural hazards is a significant challenge in the effort to enhance CCR. Using the results of CCR assessments to develop local actions or enhance local and national plans is one way to sustain support for CCR. Effective practices should be documented, evaluated, and shared with other communities.

Develop Action Plans to Enhance Resilience and Address Gaps

Resilient coastal communities plan for and take deliberate action to reduce risks from coastal hazards, accelerate recovery from disaster events, and adapt to changing conditions. The results of a CCR assessment will highlight many opportunities to enhance resilience. These opportunities may be addressed at national, subnational, and local levels.

Develop action plans to address resilience weaknesses and gaps. The most immediate use of the assessment results is to develop an action plan with strategies to fill gaps, address weaknesses, and sustain or replicate effective practices. The CCR assessment can serve as a focal point to engage the community and government and nongovernmental

J. PREMATILIKE (SRI LANKAN COMMUNITY IN OFFICIALS OFFICE)

Community members and local authorities must work together to plan for disaster prevention, mitigation and recovery

entities to develop a plan to address a range of capacity-building needs. Needs may include technical and financial assistance, training, and other priority actions. Key steps in development of an action plan are summarized in Table 5-1.

Table 5-1. Action Planning Steps

Steps	Activities	Outputs
Stakeholder Engagement	• Initiate formal planning with leaders and stakeholders to develop action plans	Core planning group established
	• Develop core working group (multisectoral) to develop action plan	Memorandum of understanding between stakeholders
	• Review CCR assessment results and recommendations	
Prioritization	• Identify priorities and gaps based on CCR assessment recommendations	Priorities identified
	• Identify resources and opportunities for implementation	Financial and technical resources identified
Plan Development and Adoption	• Develop actions (short-, medium-, and long-term) based on priorities and resources	Phased action plan
	• Develop buy-in from leadership	Financial and technical resources allocated for implementation

Adapt Plans and Programs to Enhance Resilience

The assessment results will identify opportunities to improve the enabling conditions for CCR. These enabling conditions may include the need for legal and policy reforms, institutional capacity building, multisectoral collaborative mechanisms, and adaptation of plans and programs at national, subnational, and local levels.

CCR must be integrated into the annual, medium-term, and long-term plans and programs of government, to provide the enabling conditions for resilience and to build the capacity for community preparedness and self-reliance. Local development plans must be informed by risks from coastal hazards. Improved coordination between coastal managers and disaster managers is needed to develop contingency plans and implement preparedness and mitigation activities for different types of coastal hazards. Integration of plans that addresses basic needs, environmental management, economic alternatives, and disaster preparedness will automatically sustain resilience efforts.

Regular collaboration between government (national, subnational, and local government agencies) and nongovernmental entities responsible for hazard evaluation and early warning systems, coastal management, disaster management, and socioeconomic development is needed to address both chronic and episodic

hazards faced by coastal communities. Information and data sharing among national government agencies is essential for planning and monitoring risks from coastal hazards. Interagency and multisectoral resilience reviews provide opportunities to adapt national plans and programs for enhanced resilience. Coordinated education and outreach programs provide consistent information to the public.

Another key to sustaining resilience efforts is to secure funding for programs at all levels of government and through the nongovernment sector. A key means of obtaining funding is to design well planned local programs that can attract funding for implementation. Donors are attracted to local projects that are designed and implemented by local entities.

Legislation and policy support are ultimately needed to sustain resilience planning and implementation in the long term. Once governments incorporate the need for resilience into basic laws, then support will flow more easily to the level required for effective community resilience.

Conduct Public Education Outreach to Improve Awareness

The CCR assessment results can be used to develop a public outreach program to help educate different audiences on what they can do to improve and maintain their resilience to natural hazards. There are six steps to develop and implement a CCR outreach program, with each step building on the previous ones:

Step 1: Define the goals and objectives of your CCR outreach program

Step 2: Identify your target audiences

Step 3: Create messages to get your audiences to respond

Step 4: Package your message into various formats

Step 5: Distribute your message to the audiences

Step 6: Evaluate the progress of your efforts

An effective CCR outreach campaign is essential to help gain the support and compliance of stakeholders to ensure the success of the CCR program. Outreach will also help integrate the CCR program into other community activities to enhance its sustainability over the long term.

Document, Evaluate, and Share Resilience Good Practices

Effective practices in CCR need to be documented, evaluated, and shared. These practices may be based on traditional knowledge, technological advancements, scientific study, or on direct experience in addressing coastal hazards. The context and use of these good practices need to be documented and monitored to determine the effectiveness of the practices and to reinforce the benefits derived

from their adoption. Good practices may need to be adapted or refined based on the environmental, socioeconomic, and historical context in which they are used. The documentation and evaluation of good practices will provide opportunities to adapt and improve these practices over time and facilitate their replication by other communities.

The successful adoption and implementation of good practices to build resilience by communities and their governments is a long term and iterative process. It may take years since this type of change must be accepted by communities and blended into local culture, traditions and governance systems. Small changes can lead to bigger changes and lasting resilience.

Chapter 6

Reference Guide to Resilience Elements and Benchmarks

The eight basic elements of CCR represent desired conditions that must exist to support resilient communities. Each element also has four benchmarks associated with it that can help determine to what extent the element is addressed or operating to enhance resilience. In this section, each element is described in detail along with the benchmarks that evaluate the element. Field examples are also provided to connect the elements and their benchmarks to real situations.

A. Governance: Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.

B. Society and Economy: Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.

C. Coastal Resource Management: Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.

D. Land Use and Structural Design: Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.

E. Risk Knowledge: Leadership and community members are aware of hazards and risk information is utilized when making decisions.

F. Warning and Evacuation: Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and individuals acting on the alert.

G. Emergency Response: Mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.

H. Disaster Recovery: Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.

Enhancing Coastal Community Resilience in Hilo, Hawaii: Overview

The Hawaiian Islands of the United States have experienced numerous tsunamis in their history. The location of the Hawaiian Islands, in the middle of the Pacific Rim, makes them susceptible to distant tsunamis generated from earthquakes thousands of miles away. Since 1837, the Island of Hawaii, the largest of the Hawaiian islands, has experienced over 20 damaging tsunamis generated from tectonically active regions along the Pacific Rim, including Alaska, the Aleutian Islands, Chile, Japan, and Tonga. In addition, the Hawaiian Islands are located on a "hot spot" of earthquake activity caused by the local volcanic conditions that generated the island chain. This local earthquake and volcanic activity makes the Hawaiian Islands susceptible to local tsunamis in addition to the distant tsunamis. Based on historical data, on average, a damaging tsunami reaches the shores of the Island of Hawaii every 7 years (Fletcher et al 2002).

The Town of Hilo, pronounced (hee-low), is located on the windward (eastern) coast of the Island of Hawaii, situated between the flanks of the volcanic peaks Mauna Kea and Mauna Loa. Hilo was impacted by 17 tsunamis during the period from 1837 to 1975. The tsunamis impacting Hilo ranged from minor tsunamis of 1.5 feet to devastating tsunamis of 35 feet (Fletcher et al 2002). The Town of Hilo was devastated by a 26-foot tsunami in 1946, generated by a 7.8 earthquake in the northern Pacific near the Aleutian Islands. Following the devastation, the town recovered and rebuilt without taking tsunami resilience into consideration and without incorporating any lessons learned from its experiences into its redevelopment plan. Catastrophe again struck Hilo in 1960, when a 9.5 earthquake in Chile resulted in tsunami run-ups of 35 feet. The 1960 tsunami caused 61 deaths and over $26.5 million in damages. Following the 1960 tsunami, Hilo undertook a concerted effort to enhance its resilience to the impacts of tsunamis.

Throughout this guide, you will learn more about the actions taken by the town of Hilo to enhance resilience in each element to tsunamis.

Governance

The desired outcome of this element of resilience is that leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.

What Is Governance?

Governance is a process through which government institutions, organizations, communities, or any group of people with a mandate or with a common purpose make decisions that direct their collective efforts. Local governance is governing at the local level, viewed broadly to include not only the machinery of government, but also the community at large and its interaction with local authorities. Good governance is about achieving desired results and achieving them in the right way, in compliance with laws and policies and shaped by cultural norms and values of an institution, organization, or community.

Why Is Governance an Essential Element of CCR?

Governance provides the enabling conditions for coastal communities to absorb or resist perturbations, bounce back from disturbances, and adapt to change. Governance provides the connection whereby community resilience is guided and nurtured over time through the various interventions of government, civil society, and the private sector in community development, coastal management, and disaster management. Governance benchmarks of resilience are described in Tables 6-1 to 6-4.

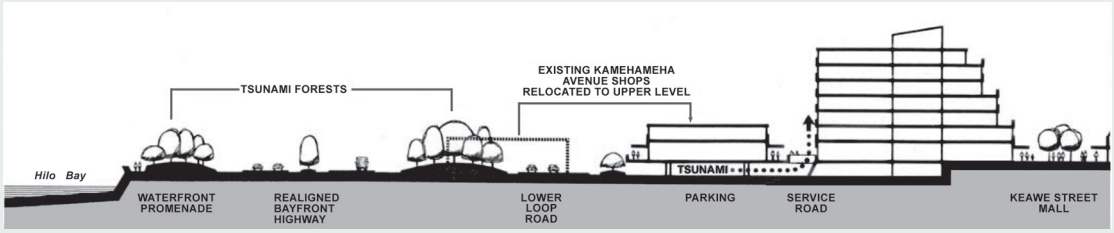
A necessary trait of governance for building resilience is to provide an integrating framework for institutions at all levels and various scales, to address the management needs within and surrounding a coastal community. A second essential trait of governance is that it be participatory and encourage engagement of multiple stakeholders, both public and private, within a democratic process for planning. Such participation strengthens community resilience and engenders ownership of processes and outcomes.

A cyclical planning process must be encouraged and maintained that is iterative and allows for learning and improvement over time. Such "adaptive management" addresses the needs of a particular place in time, with its unique circumstances; it can develop a useful management system and plan that is periodically updated. Such an adaptive planning and management process incorporates risk and vulnerability assessments, coastal environment and resource management, land and site use, and disaster management or emergency plans. It will consider the needs for infrastructure (such as a warning system) and critical emergency response facilities among other needs of a community and its setting.

The final essential trait of governance is that it be strong and efficient, and provide effective coordination of the various coastal environment and disaster management tools to build resilience. It needs to constantly promote education and apply appropriate forms of law enforcement. It must support implementation of integrated programs that cut across normal boundaries of authority. Lastly, it needs to ensure that legal, political and financial frameworks are aligned to support broad outcomes.

Enhancing Resilience in Hilo, Hawaii: Good Governance Practices

The redevelopment of Hilo, Hawaii, after two devastating tsunamis was guided by a strategic vision to mitigate future tsunami hazards. After the 1960 tsunami hit, a Hilo Downtown Development Plan was developed that called for major changes in the recovery of the area. The plan identified safe areas to build based on both the 1946 and 1960 tsunamis that affected the downtown area. All new buildings were required to conform to the newly adopted urban design and building design standards.



Governance: Good Practices to Enhance Resilience

Strategic Vision: Leaders and stakeholders develop and share a long-term and common vision for sustainable development informed by the historical, cultural, environmental, and socio-economic complexities of the community.

Participation: Opportunities exist for all men and women to have a voice in decision-making. Participation may be direct or indirect through legitimate intermediate organizations or institutions. Participation also means freedom of association and expression, on the one hand, and an organized civil society on the other hand.

Consensus Orientation: Differing interests of stakeholder groups are mediated to reach a broad consensus on what is in the best interest of the whole community and how this can be achieved. Consensus building is needed to establish a long-term perspective for sustainable human development and how to achieve the goals of such development.

Equity and Inclusiveness: All members of society must believe that they have a stake in the governance processes and systems and not feel excluded from them.

Rule of Law: Fair legal and policy frameworks that are enforced impartially protect human rights, particularly those of minorities. An independent judiciary and impartial and incorruptible police provide the enabling environment for communities to prosper.

Transparency: Decisions taken and their enforcement are done in a manner that follows rules and regulations. Information is freely available and directly accessible to those who will be affected by such decisions and their enforcement.

Responsiveness: Institutions and processes are responsive to stakeholders. Institutions and processes try to serve all stakeholders within a reasonable timeframe.

Effectiveness and Efficiency: Processes and institutions produce results that meet needs while making the best use of financial, human, and natural resources.

Accountability: Governmental institutions as well as the private sector and civil society organizations are accountable to the public and to their institutional stakeholders.

Source: Asian Development Bank, *http://adb.org/Governance/gov_toolkits.asp*

How Does Governance Relate to the Other Elements of CCR?

Good governance provides the enabling conditions for all other resilience elements. Leadership, policies and programs, and capable institutions and organizations are needed to enable community involvement and self-reliance. National and local government must have the legal mandate, systems, and institutional capacity to make decisions to warn communities at risk to coastal hazards. Without a legal mandate, standard operating procedures, and clear lines of authority and communication, communities might not receive hazard warnings in time to evacuate. International and local NGOs are instrumental in providing emergency response and disaster recovery services to communities during and after disaster events. These organizations must ensure delivery systems are well coordinated with government entities and appropriate to social norms and cultural values.

Governance: Challenges and Lessons Learned to Enhance Resilience

Reforms should be appropriately sized and sequenced: Governments need to focus reform efforts on what is feasible. Reform programs should be carefully tailored to implementation capacity and available human and financial resources.

Providing basic services is a challenge: Financial, technical, and human resource capacity of local government authorities to deliver basic services to all sectors of society is often the single greatest challenge to coastal community resilience. Without a full range of services (e.g. adequate water, sanitation, education, etc.), communities, especially marginalized sectors, are vulnerable to coastal hazards.

Improving governance requires commitment: Governments need to build constituencies and engender a commonality of support for reforms. To ensure the necessary support for change, it is necessary for governments to appoint individuals with vision and the ability to spearhead efforts. Governance reforms require shared commitments and ownership across the political spectrum.

Decision makers often lack sound information and data: Informed decisions require open processes of data collection and information exchange to support adaptive planning and management processes.

Changes in political or organizational leadership present a major challenge: Guidelines, standard operating procedures, and plans that are accessible to the public are needed to ensure that institutions sustain good governance practices in times of change.

Importing recommended practices should be done cautiously: The lead organizations' readiness for change needs to be assessed. Organizational culture, management style, staff and systems capacities, internal processes, and external linkages all require careful analysis before embarking on redesign.

Capacity building requires broad-based interventions: Effective capacity building needs to be based on in-depth, sound institutional analysis, and requires training that acknowledges the complex factors influencing institutional development. Organizational re-engineering must include an assessment of the capacity of staff and their senior management to learn new ideas, behaviors, and rule systems and adapt them to the existing culture of the institution.

Source: Asian Development Bank, *http://adb.org/Governance/gov_practices.asp*

Benchmarks for Resilience in Governance

Table 6-1. Governance Benchmark on Policy and Planning Capacity

A1. Community development policies, plans, and programs are implemented and monitored in a participatory and transparent manner.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities plan for and take deliberate action to incorporate resilience practices in all aspects of community development. Community development plans and programs need to be based on knowledge of hazards and consider all elements of resilience. National and local government policies, plans, and programs need to support community development goals.	Are coastal hazards and associated risks routinely assessed and evaluated by a cross section of the coastal community? Has the community been engaged in identifying measures to reduce risks from coastal hazards and learn from experience? Are there community goals for livelihoods, natural resources, and hazard resilience? Is there a shared vision for resilience in the community? Are specific actions to enhance resilience incorporated in community plans and programs? Do local decisions on development, infrastructure investment, social programs, and other activities consider potential risks from natural hazards? Do programs support long-term sustainability and resilience?

Resilience in Action: Governance Support in Southern Thailand

A tambon district government and several villages in Ranong Province of southern Thailand have fully endorsed the process of providing governance support for building resilience by facilitating village-level planning for evacuation procedures, improved land use management, and maintenance of warning towers. They have endorsed a donor-assisted program for alternative income development that relieves dependence on near-shore fisheries and mangroves. Such governance practices are being shared with and adopted by other local governments and villages in Thailand.

Table 6-2. Governance Benchmark on Physical and Natural Resource Capacity

A2. Basic services (i.e. water, transportation, security, etc.) are accessible to all sectors of society.	
Benchmark Description	***Potential Assessment Questions***
The delivery of basic services to all sectors of society is an enabling condition for CCR. Basic services may include water, sanitation, health, education, security, transportation, and other services that support the health and welfare of a community. Such basic services need to be responsive to the needs of a community and provide means for participatory planning in their development.	Has an assessment of basic service needs been conducted? Are needed basic services provided efficiently and reliably? Are all sectors of society reached by these basic services? Has institutional capacity for basic service delivery been assessed? Are risk reduction measures incorporated into basic service delivery mechanisms? Are critical facilities and infrastructure sited outside of hazard areas and capable of operating during hazard events? Do critical facilities and services have backup (redundant) systems in place to provide basic services, such as health and water during hazard events? Are contingency plans in place to address disruptions in basic service delivery based on various hazard scenarios? Do budgets incorporate maintenance and upgrade of facilities and infrastructure for basic service delivery and mitigation of future damage?

Resilience in Action: Basic Services Enhanced in Southern Thailand

Local governments in southern coastal Thailand have focused in recent years on providing key basic services to improve the social and economic status of rural towns and villages through improvements to roads, schools, health services, and electrical service, as well as governance support for localized planning and development. The Thai Central and Provincial governments have invested heavily in these efforts so that rural basic services have improved substantially.

Table 6-3. Governance Benchmark on Social and Cultural Capacity

A3. Participatory planning and collaboration mechanisms among different sectors and various levels of government are established and used to manage for resilience.	
Benchmark Description	***Potential Assessment Questions***
CCR is characterized as the intersection of three domains: community development, coastal management, and disaster management. Collaboration among the various stakeholder groups from these domains is needed to share information, plan for resilience, and implement actions that enhance resilience. Collaboration mechanisms may include councils, coordination bodies, working groups, or committees composed of members from each domain that meet and review policies, plans, and programs at national and local levels. The expected outcome is that data and information, lessons, and good practices are shared and used to adapt policies, plans, and programs for enhanced resilience in each domain.	Are there interagency (national and local) and multisectoral coordination bodies that meet to review policies, plans, and programs? Have resilience strategies and activities been developed that require several agencies to work together? Do socioeconomic development programs incorporate hazards issues? Do coastal resource management programs incorporate hazards issues? Do disaster management programs consider community cultural and natural resource elements and goals? Are programs in place that link sectors and institutions?

Resilience in Action: Coordination and Participation Working in Sri Lanka

After the 2004 tsunami, the national government in Sri Lanka established its national disaster management agency together with a coordination body comprising national agencies, national NGOs, and major donor organizations such as the United Nations Development Programme (UNDP), USAID, Canadian International Development Agency, Australian Aid, and a few others. This body, working with the national disaster management organizations was able to coordinate the development of a "road map" for disaster preparedness and recovery that also engaged the local governments in the country. The disaster road map has been distributed to local governments in an effort to encourage them to set up their own coordination bodies that can assist in strengthening resilience at the local level.

Table 6-4. Governance Benchmark on Technical and Financial Capacity

A4. Technical and financial support mechanisms are transparent, accountable, and available to support planned community actions.	
Benchmark Description	***Potential Assessment Questions***
Technical and financial resources are needed to enable communities to plan and implement actions to build resilience. Technical resources are needed to provide guidance on basic services, natural resource management, and coastal hazard mitigation. Financial resources are needed to enable communities to implement planned actions.	Are there regular budget allocations and grants to support activities that reduce risks to future damage from natural hazards? Do community leaders have resources and tools available to build resilience for day-to-day activities? Does community budget incorporate priorities for management, upgrade, or mitigation of critical facilities and infrastructure? Have local governments identified options to supplement these funds? Do community projects include those that mitigate future damage from natural hazards? What resources, tools, and technical assistance are available to build community resilience? Are these resources geared toward a proactive planning and preparedness mode or disaster recovery mode?

Resilience in Action: Indonesian Devolution Supports Local Resilience

Indonesian local governments have very recently been given increased jurisdiction over their coastal areas and resources. The central government is now in the process of providing budget through a devolution process so that local governments will have financial resources to address community needs and to provide for basic services. Although this will take time, it will eventually encourage the local government planning processes to be participatory together with the community. Plans can be responsive to local needs, which will allow for public participation. As local government budgets become transparent, they can support community-level projects. Such a system will be more efficient at providing basic human services and in building community resilience to the extent that resources are available.

Society and Economy

The desired outcome of this element of resilience is that communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.

What Is Society and Economy?

Changes in the economy and people's quality of life are often the main criteria upon which a community's resilience is judged after a disaster. The strength of the economy and the diversity of livelihoods greatly influence the community's ability to prepare for disasters, quicken the recovery process, and adapt to changes that make them less vulnerable in the future. Despite changes in coastal ecology, health, laws, governance frameworks, or hazard response programs, it is the improvement or decline in a person's livelihood that directly affects resilience.

Why Are Society and Economy an Essential Element to CCR?

Society and economy serve as an essential element of resilience because of the direct relationship between economic activity (markets and commerce) and social life (culture, family, recreation). Changes in the local and regional economy such as new industries, specific jobs, or manufacturing technology have positive and negative impacts on individuals and communities through life expectancies, employment, wealth, and quality-of-life issues. Similarly, the culture of the community, family structure, and gender roles influence economic activities. Social, cultural, and economic conditions provide the enabling environment for self reliance in a community. Society and economy benchmarks of resilience are described in Tables 6-5 to 6-8.

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Resilient coastal communities are employed by diverse economic sectors not dependent totally on coastal resources

Every community is different with regard to factors that are most important in determining vulnerability and resilience. Diversity affects how resilient a community is. If an entire fishing community uses the same fishing gear and catches the same species, its vulnerability is likely to be higher. By diversifying the types of fish caught and gear technology, or even diversifying beyond fishing as the sole livelihood, the community increases its resilience to hazards. Communities that have a mix of fishers, farmers, manufacturing, and tourism are less likely to suffer broad impacts, since each industry depends on different clients, resources, and markets. Communities and industries can work together to diversify the local economy.

Factors that can predetermine a community's vulnerability as well as future resilience based on economic and social factors are shown in the table below.

Society and Economy: Good Practices to Enhance Resilience

Good Practices	Absorbing Shock	Bouncing Back	Adapting to Change
Society			
Establish programs that assist livelihood development for the poor and other vulnerable groups.	Help families create informal businesses to spread risks; focusing on the most vulnerable community members reduces vulnerability.	Help families be self-reliant during the recovery process.	Create new business opportunities that the poorest sector is well positioned to act on.
Develop community-driven planning activities.	Build support, trust and volunteerism to implement a plan; more likely to address the needs of all vulnerable groups.	Recovery will occur quicker with less conflict; meet the needs of the most vulnerable.	Community development that addresses the core needs of vulnerable populations for future hazards.
Establish financial services for families that need access to savings accounts, payment services, insurance, and small loans.	Encourage families to store fewer assets in homes located in vulnerable areas.	Extended family can send payments to those in need, Proivide insurance coverage to rebuild and loans to rebuild personal property.	Small loans restart and change livelihoods; place savings in interest accounts for next hazard or emergency.
Form community volunteer groups to increase awareness and response.	Make more of the community, including the most vulnerable, aware of and ready to react to hazards.	Enable community to become self reliant to respond and recover using core volunteer community groups; outside aid is well managed.	Learn from experience of everyone and from the different livelihoods in the community.
Resolve conflicts between segments of the community regarding equity of services and redevelopment focus.	Make hazard warnings and response serve everyone including the most vulnerable.	Less time is spent on disagreements and political fighting; faster transfer toward recovery and rebuilding.	Shared vision for increasing community resilience; all of the community can benefit from changes.
Address the needs of the weaker segments of the public such as elderly, sick, and poor.	Minor hazard events are less likely to impact community since the weakest segments are protected or serviced.	Weaker members of society are in greatest need during recovery process; having plans in place before a hazard creates more effective recoveries.	Future hazards will not be isolated to a few people; these weaker members of society will have a fair chance to get out of poverty.

Society and Economy: Good Practices to Enhance Resilience *(continued)*

Good Practices	Absorbing Shock	Bouncing Back	Adapting to Change
Economy			
Establish social and ecological limits on resource extraction and allowable impacts.	Resources are in a healthier state to absorb the shock to the system and protect community assets and lives.	Community has local resources available to seek food, shelter, and clean water during the recovery phase, and businesses can resume.	Economy and social pressures at levels to allow major political changes to increase sustainable development goals.
Use existing businesses to mitigate current vulnerabilities.	Exposure and vulnerability of assets are reduced.	Less to clean up, replace, fund and close operations.	Expenses for recovery diverted to proper redevelopment and spread good practices to other businesses.
Prepare business response and redevelopment plans.	Vital assets and workers are protected as much as possible.	Less recovery work; faster responses due to coordination, preparations and partnerships.	Knowledge of good practices and options available to act effectively during crises.
Establish microfinance institutions at the local/ regional level to provide financial loan services.	Having institutions offer services prior to disaster increases likelihood that small businesses are prepared for impact.	Existing institutions allow quicker processing of applications, knowledge of local business members.	After donor aid is gone, microfinancing provides the needed capital for long-term redevelopment.
Establish microfinance loans for formal and informal businesses (focus capital to reduce hazards).	Small businesses can make necessary mitigation actions to protect assets.	Access to vital credit that gets them back quickly to production; small businesses recover quickly.	Loans at reasonable rates enable small businesses and families to improve their assets.
Establish startup grants, technical assistance, and loans for new and alternative enterprises.	Diversifies the economy to spread risk vulnerabilities.	Small businesses can recover and service local community as other businesses rebuild.	Technical assistance guides small business owners toward options and new market potential.
Increase community input on economic development strategies.	Businesses develop based on community input; shared vision for development decreases vulnerability of businesses and citizens.	Recovery process can get local support and volunteers to rebuild quickly and appropriately.	Social and environmental criteria included in development plan for community; greater support and trust possible.
Increase awareness of risks to businesses.	Locate and build appropriately based on risks.	Results in less damage to repair and enhanced ability to begin preplanned recovery process.	Adapt business plan and strategy based on known risks.
Change laws, policies, and regulations to facilitate the creation and operation of microenterprises.	Diversification of the formal business sector reduces vulnerability to economy and spreads risks.	Businesses that are registered can get aid; new businesses can form quickly and legally.	Innovative business ideas can be acted upon to build a stronger community.

Enhancing Resilience in Hilo, Hawaii: Good Society and Economy Practices

The devastation caused by the 1960 tsunami in Hilo resulted in destruction and disruption of many businesses along and near the waterfront. In an effort to lessen future impacts to the local economy, the town chose to relocate retail shops to a safer location, further from the coast and at higher elevations. In addition, many of the areas where the former retail shops had been located were converted into public parks, enhancing access to recreational opportunities for society. In recognition of the importance of education, a school located in the tsunami impact zone was relocated outside the zone, to minimize potential deaths as well as avoid the potential disruption of education services.

In an effort to ensure that future generations remember the past and learn from the mistakes of being inadequately prepared for tsunamis, the Pacific Tsunami Museum was created in Hilo. The goal of the Pacific Tsunami Museum is to promote public tsunami education for the people of Hawaii and the Pacific Region. The museum also preserves the social and cultural history of Hawaii and promotes economic development on the island of Hawaii as well as statewide. The museum serves as a living memorial to those who lost their lives in past tsunami events. It provides an enriching experience not only for tourists, but for local residents as well. Approximately 35 percent of museum visitors are residents of Hawaii, and many come to reconnect with their family and community history in Hilo.

How Does Society and Economy Relate to the Other Elements of CCR?

The social and economic characteristics of resilience are often the drivers of change and development in coastal communities linked with planning and governance. The resilience of socio-economies and livelihoods are strongly connected to the governance, land use, and infrastructure elements.

The type and strength of the local economy, as well as the culture, drive the pattern of land use and infrastructure. The type of industry will often dictate where a community must build its infrastructure (e.g. on the waterfront, in the coastal waters, near major ports and road networks). A strong economy can also make the financial investments to upgrade facilities to reduce their exposure and vulnerability to natural hazards. If the local business community is organized and has strong leadership, there may be support services to assist businesses in taking hazard mitigation actions. Thus, the link between business leadership and hazard mitigation actions influences where and how infrastructure is built.

Most coastal communities are highly dependent on natural resources which make them particularly vulnerable to changes in resource conditions (Pomeroy et al., 2006). Livelihoods and business influence how resources are used during normal times as well as during the recovery period. In addition, healthy resource conditions influence the business opportunities and costs of resource extraction. Coastal livelihoods also influence where people live and how they build.

Finally, the strength and type of culture and economy will influence whether a community learns from its hazard experiences and redevelops in a wiser and safer way. If the business community considers hazard issues and is committed to sustainable development, then the community is more likely to implement such programs during the stressful and politically charged times after a disaster.

Society and Economy: Challenges and Lessons Learned in Enhancing Resilience

- Changing a community's culture and economy is very difficult. They are often based on the realities of a place.
- Businesses must compete locally as well as regionally. Therefore, preparing and conducting good practices is not a priority for businesses unless incentives are provided.
- Coastal communities exist in a dynamic environment and have developed their livelihoods based on these conditions. Asking them to change for a potential risk without support and incentives is difficult.
- There are also preexisting power balances within communities, so that advancing approaches that attempt to assist the poor and vulnerable may face significant challenges from the entities that hold power.
- Improvements in the economy and livelihoods depend upon the other resilience elements to create an overall increase in resilience. A strong local economy needs to be supported by linkages to the regional economy, both for customers and for aid.
- A diversified economy depends on key infrastructure services, like roads, electricity, and water, that almost all businesses and livelihoods require. Business opportunities and costs are also affected by the health of natural resources.

Benchmarks for Resilience in Society and Economy

Table 6-5. Society and Economy Benchmark on Policy and Planning Capacity

B1. Development policies and plans build social capital and skills for economic diversity and self reliance.	
Benchmark Description	***Potential Assessment Questions***
Community development policies, plans, and programs are important in building the capacity for economic diversification and self reliance. Community goals identified through a transparent and participatory process are used to guide development policies, plans, and programs that are socially responsible and promote environmentally sustainable livelihoods in a diversified economy.	Do community development plans exist? Are there skills-training programs for alternative livelihoods? What types of social safety nets exist to help vulnerable sectors of society?

Resilience in Action: NGOs in Sri Lanka Capacitate Coastal Communities

Sevelanka Foundation and several other NGOs have taken the lead to develop coastal community social and economic capacity to enhance their level of resilience. Such activities focus on organizing communities into functional groups that enhances their social capital and supports livelihood development to enhance small-scale businesses among community members. Such programs are coordinated through a joint NGO and government coordination body that endorses community level work of local and international NGOs and development projects. The community level NGO led projects also focus on addressing other issues in communities, such as coastal resource management and ensuring that warning and evacuation systems are in place and linked to the national warning system of the country.

Table 6-6. Society and Economy Benchmark on Physical and Natural Resource Capacity

B2. Local economies are characterized by diverse and environmentally sustainable livelihoods.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities have local economies characterized by environmentally sustainable and diverse livelihoods. Sustainable livelihoods are based on sound management of natural resources and the environment and do not result in degradation of the natural resource base upon which the livelihood depends. Local entrepreneurs, businesses, farmers, and fishers are knowledgeable of the risks of coastal hazards that may affect their livelihood and take steps to reduce these risks by planning and preparedness activities. Diverse livelihoods are characterized by employment across a range of economic sectors with multiple sources of external and internal revenues to the community. No one economic sector dominates the local economy and there is a vibrant internally driven economy that is fueled by the regular infusion of external sources of revenue.	Is the local economy dominated by one sector (e.g. tourism)? Are local economies and livelihoods linked to internal and external markets? Are resource-extracting livelihoods based on a managed and sustainable natural resource base? Are the socioeconomic and environmental impacts of planned economic development projects assessed? Do businesses mitigate current vulnerabilities to coastal hazards? Do community development plans promote environment-friendly and diverse livelihoods and incorporate strategies to address risks from natural hazards? Are there pre-established strategies to address economic recovery resulting from a disaster, including loss of employment, loss of services, and products and impact to the tax base?

Resilience in Action: Diversifying Livelihoods in Ranong, Thailand

Rural villages of Ranong, Thailand rely on both agriculture and fisheries, making them accustomed to balancing risks between the two. While post-disaster recovery is not an effective time to diversify, tsunami "bounce-back" actions complemented livelihood recovery. Provincial programs capitalized on marketing value-added fish products. Projects geared toward local women focused on production of soap, batik, and Muslim scarves, and provided the women with supportive networks, new skills, and supplemental family income, all critical in community rebuilding.

Table 6-7. Society and Economy Benchmark on Social and Cultural Capacity

B3. Social and cultural networks promote self-reliant communities and have the capacity to provide support to disaster-stricken areas.	
Benchmark Description	***Potential Assessment Questions***
Social and cultural networks may be formal or informal mechanisms involving community, cultural, private, and nongovernmental groups that support a range of resilience-related activities. These can include poverty alleviation, gender and minority equality, conflict resolution, peace, cultural preservation, livelihood diversification, financial and food assistance, housing, environmental management, health programs, emergency response, disaster management, and other social and cultural needs. These networks promote self-reliant communities through a variety of strategies such as self-help programs, capacity building, and sharing of lessons learned. Social and cultural networks can also serve as safety nets for disaster-stricken communities through emergency medical supplies, shelter, and food.	Is a significant portion of the community economically and/or socially marginalized? Are there social networks that address the needs of the weaker segments of the public such as elderly, sick and poor? Are social networks or organized civic groups established with the capacity to assist communities during or after disaster? Are there conflict resolution mechanisms to support peace and order in the community? Are mechanisms used to increase community participation in community development planning?

Resilience in Action: Promoting Self Reliance and Sustainability in Thailand

Thailand's coastal residents have a strong sense of building self reliance, as demonstrated through the King's leadership. "His Majesty's sufficiency economy philosophy emphasizing moderation, responsible consumption and resilience to external shocks is of great relevance to communities everywhere during these times of rapid globalization. The philosophy's middle path approach strongly reinforces the United Nation's own advocacy of a people-centered and sustainable path towards human development. His Majesty's development agenda and visionary thinking are an inspiration to his subjects, and to people everywhere." *Kofi Annan, UN Secretary—General, May 26, 2006*

Table 6-8. Society and Economy Benchmark on Technical and Financial Capacity

B4. Technical and financial resources are available to promote stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery.	
Benchmark Description	***Potential Assessment Questions***
Resilient local economies require an enabling environment to prosper. Technical resources are needed to provide guidance on natural resource management, coastal hazard mitigation, technological developments, market linkages, and other topics to promote environment-friendly economic diversification. Financial resources, such as grants, credit, and investment capital are needed at various scales from micro- to macrofinance to promote environmentally sustainable economic diversification. Finally, national and local laws, policies, and programs are needed to provide incentives and disincentives that encourage local economies to develop in an environmentally sustainable manner, to incorporate a knowledge of risks and plans to reduce risks from coastal hazards, and to plan for emergencies and disaster recovery.	Are there technical resources, such as local universities, government programs, or donor projects, that provide assistance to communities in developing environment-friendly livelihood diversification? Are startup grants, technical assistance, and loans available for new and alternative enterprises? Are small business development or micro-financing programs or institutions (e.g. assistance, extension, and training) providing support to the community to promote sustainable livelihoods? Are businesses owners and employees aware and informed of coastal hazards (including long-term effects to businesses from erosion and sea level rise)? Are small business loan programs established to recapitalize for disaster recovery? Are there business response and redevelopment plans in case of a disaster? Are there insurance services for production losses in the event of a disaster?

Resilience in Action: Financing Schemes for Economic Diversification in Sri Lanka

Initiated in 2002, the self-funded financial scheme of Shakthi Farmer Organization in Hambantota district, in Southern Sri Lanka, has helped members meet their financial needs, given that no other formal government or private financial schemes were willing to help in good times or bad. Mainly controlled by women, the program generates loans to diversify member livelihoods beyond traditional fishing and agriculture. The money is also utilized to help member families face climate hazards such as floods and droughts, and also climate-related situations like communal diseases. Beyond financial benefits, members have gained a sense of confidence and security that they did not have before.

Provided by Priyangi Jayasinghe, Munasinghe Institute for Development (MIND), Colombo, Sri Lanka. From a Munasinghe Institute for Development (MIND) study. Provided by Priyangi Jayasinghe, MIND, Colombo, Sri Lanka, URL: *http://www.mindlanka.org*

Coastal Resource Management

The desired outcome of this element of resilience is that active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.

What Is Coastal Resource Management?

Coastal resource management (CRM) is a process to develop and implement a coastal management scheme or plan. CRM refers to a formal or informal set of rules, practices, technologies, economies, and interactions between humans and the natural resources (animals, plants, rocks, water, etc.) located both landward and seaward of the coast, that define how resources are utilized and protected. CRM is also a participatory process of planning, implementing, and monitoring sustainable uses of coastal resources through collective action and sound decision making (Philippine Department of Environment and Natural Resources (DENR) et al. 2001). There are generally five phases in the CRM process:

1. Issue identification and baseline assessment
2. CRM plan preparation and adoption
3. Action plan and project implementation
4. Monitoring and evaluation
5. Information management, education, and outreach

Coastal resource management aims to stem overfishing, destructive fishing, pollution, and habitat loss, all of which reduce future fishing or availability of other valuable resources. Good coastal management works with stakeholders and understands the nature of the resources and the impacts of the various ways resources are used on their future availability, and strives to maintain valued resources for future users. Effective CRM ensures that (a) local institutions support coastal management processes, and (b) protection of sensitive coastal habitats is being achieved.

Why Is Coastal Resource Management an Essential Element of CCR?

Coastal resources provide many valuable and sustainable services to communities. These include, among others, a reliable source of food, economic development through the use of renewable resources like mangroves, transportation, protection from coastal hazards (storms, floods, tsunami, erosion, pollution, etc.), biodiversity conservation (a factor in ecological resilience and a source of benefits from nature-based tourism and new potential medicines), and a pleasant lifestyle. CRM protects the source of the "fuel" for the community's resilience in terms of food, economic resources, environmental

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Fisheries need to be managed for sustainable harvests to ensure food security and livelihood for coastal communities

qualities that are central to a culture and lifestyle, and protection from the forces of nature. If managed and protected, coastal resources can continue providing these services. If not managed, many normal events such as storms or fishing can create significant negative, expensive, or tragic consequences on coastal communities. Coastal resource management benchmarks of resilience are described in Tables 6-9 to 6-12.

Potential Results from Unmanaged and Managed Coastal Resources

Resource	Unmanaged Resource (Creates Vulnerability)	Managed Resource (Creates Resilience)
Marine fisheries	Overfishing leads to: ● Food insecurity ● Loss of income to fishers ● Nonlocal communities getting benefits and local community suffering consequences	Marine protected areas (MPAs) and managed fishing, rules (quotas, size limits, etc.) provide: ● Food security ● Sustainable income ● Good distribution of benefits from resource among local community
Coral reefs	Destructive practices lead to: ● Food insecurity ● Loss of marine tourism income ● Loss of habitat for other coral food/ resources ● Loss of adaptability of reef ecosystem for other stresses (pollution, climate change, etc) ● Loss of biodiversity (medicines) ● Loss of coastal protection	MPAs, zoning or managed resource use (pollution control, fishing gear) result in: ● Food security of accessible fish ● Continuity of nursery for fish and attraction for visitors ● Reef ecosystem able to adapt to climate change, recover from a pollution incident ● Continued biodiversity for research into sustainable uses (medicines) ● Continued shoreline protection from storms

Potential Results from Unmanaged and Managed Coastal Resources

Resource	Unmanaged Resource (Creates Vulnerability)	Managed Resource (Creates Resilience)
Mangrove	Loss of mangrove quality or quantity by converted land use (buildings, shrimp ponds) leads to: • Food insecurity through loss of nursery grounds • Food insecurity due to loss of food resource (crabs, clams, fish, etc.) • Lost absorption of soils that leads to flooding and erosion • Loss of wood, fruits, and land animals that inhabit mangroves	Mangroves managed through multiple use zoning for sustainable use and conservation leads to: • Food security of edible organisms • Provision of ecosystem services (e.g. breeding and nursery area for mangrove dependent species and stabilization of shoreline sediments and prevention of erosion etc.) • Buffering from storm surge and flooding • Storage of rich biodiversity
Sea Grass Beds	Destruction of sea grass beds can lead to: • Food insecurity through loss of nursery grounds for fisheries • Loss of ecosystem goods and services and loss of biodiversity	Managed extraction and use, and zoning for protection of sea grass beds leads to: • Grazing habitat for endangered species (green turtles, sea horses, dugong) • Feeding grounds for many reef fishes and other animals
Beaches and Sand Dunes	Destruction of beaches and sand dunes results in: • Loss of buffer zones, nesting habitat for turtles, beaches and scenic vistas important for tourism • Increased shoreline erosion	Protection of beaches and sand dunes results in: • Resistance to storms and wind • Increased numbers and diversity of ecologically key species • Increased values to nature-based tourism and to quality of life

Enhancing Resilience in Hilo, Hawaii: Good Coastal Resource Management Practices

Following the 1960 tsunami, the Town of Hilo took several actions to enhance its resilience through good coastal resource management practices during the recovery and redevelopment process. Prior to the tsunami, a sewage treatment plant had been located in the tsunami runup area. Thus, the potential for having untreated sewage spills into Hilo Bay as a secondary impact of a tsunami were high. This could lead to water quality issues and limit numerous economic, ecotourism, and recreational opportunities. In addition, it could have devastating impacts on the coral reefs located in the offshore waters, which provide critical fishery habitats. To alleviate this potential, the Town of Hilo relocated its sewage treatment facility outside of the tsunami runup area (Dudley 2007).

The town also took other measures to help ensure the vitality of its coastal and environmental resources during the redevelopment process. Hilo created forested areas along the coastline to help lessen the impacts of tsunamis and other coastal flooding. The creation of the forests and other open space along the coast helped to create natural filters for lessening the impacts of non-point source pollution runoff into Hilo Bay.

Coastal Resource Management: Good Practices to Enhance Resilience

Resource assessments: Conducting a community-wide coastal resource assessment to determine the status of resources and what needs to be managed and protected.

Coastal profiles: Developing a coastal environmental profile based on the resource assessment and other sources of information as a precursor to the development of a management plan.

Coastal plans: Developing a coastal resource or an integrated coastal management plan through a participatory process based on available information.

Advisory body: Forming a Coastal Advisory/Management Committee to provide a means for involvement of either scientific experts or the community and stakeholder groups that are essential in the management process.

Zoning: Coastal Zoning (includes marine zones) based on a management plan to minimize conflicts among resource users and to ensure that important resource areas are protected from overuse.

Marine protected areas: Establishing MPAs that encompass defined areas for management and protection within larger CRM or integrated coastal management programs. MPAs may have various zones ranging from no-take and no-entry zones to sustained fishing and use zones or zones designated for tourism and recreation.

Plan refinements: Periodically updating the integrated coastal management plan to address changes in physical, social, environmental, and climate conditions as appropriate for the planning area of concern.

How Does CRM Relate to the Other Elements of CCR?

Coastal management includes the identification of issues and baseline assessment, development of strategies and plans through participation, and implementation of plans guided by best practices. This process is dependent on a functional, efficient, and supportive governance system. CRM is also closely linked to the society and economic element of CCR. To the extent that coastal communities depend on their coastal resources for economic sustenance (e.g. fisheries, marine tourism, and others), they need to protect their coastal resources through a CRM process, and equally, resources that are not managed and protected will erode the socioeconomic base for the community. Finally, coastal resources, such as mangrove forests and coral reefs mitigate potential impacts of certain coastal hazards, such as storm surge, tsunami and other types of flooding, so CRM interfaces with awareness of and planning for mitigation of hazards in many coastal areas.

A. BART

Mangrove areas serve as a natural buffer for waves and a nursery for fisheries

Coastal Resource Management: Challenges and Lessons Learned to Enhance Resilience

Long-term support required: CRM programs are long term and require sufficient buy-in of local and national governments and resources to implement the program.

CRM needs to be considered a basic service of local government: If governments do not adhere to the need for a CRM program and do not incorporate these processes into their normal planning, budgeting, and implementation cycle, the opportunity to build resilience is limited.

Valuation of coastal resources helps build political support: Showing stakeholders and governments the economic and ecosystem services values of coastal resources is necessary to convince governments to adopt CRM as an operating process.

CRM is an opportunity to integrate environmental management with disaster management. CRM presents an opportunity to pursue ecosystem management objectives that are integrated with disaster preparedness through hazard mitigation.

Benchmarks for Resilience in Coastal Resource Management

Table 6-9. Coastal Resource Management Benchmark on Policy and Planning Capacity

C1. Policies and plans are implemented and monitored to effectively manage natural coastal resources.	
Benchmark Description	***Potential Assessment Questions***
The status and condition of coastal resources in relation to threats must be assessed and monitored as a prerequisite to the development of management strategies and plans. Resource assessments and the resulting maps and plans must be appropriate for the community and its local government. Resilient communities need to be aware of their relation with and dependence on coastal resources and to what extent the degradation of coastal resources puts them at risk. They can formulate plans to minimize the loss of resources and to maximize their protection for future uses and benefits. Reconstruction plans need to consider coastal resource issues and include incentives to restore resources to a viable state. Finally, national and local policies and political support must exist to support the planning and implementation processes.	Are coastal resources and priority hazards routinely assessed? Is assessment data used to characterize risks to community and to develop coastal resource management plans? Is the scale of maps and plans appropriate to the local community and government? Are CRM strategies and a CRM plan (e.g., habitats, biodiversity, and hazard mitigation) developed? Is the CRM plan being implemented? Does a community-based or local government forum guide decision making and conflict resolution for CRM? Have local and national governments endorsed policies for CRM? Does a feedback mechanism exist to refine CRM plans as new data is available?

Resilience in Action: National Policies to Support Integrated Coastal Management in Sri Lanka

Sri Lanka has an eroding coastline that has prompted the adoption of coastal management policies that limit development in the shoreline areas. These polices were reinforced in the aftermath of the tsunami by the Coast Conservation Department in coordination with other agencies. The new policies were also part of a more comprehensive "road map" toward building a safer Sri Lanka. The building setback rules were later refined in response to practicalities of implementation and to the clamor of people to allow building in some restricted areas. The decision process for the coastal management plan is institutionalized within national agencies, and a revised plan is formulated and adopted every 5 years to allow adaptation to changing conditions in the coastal areas. Currently, scientific studies are being carried out to revise the existing setback standards to consider all major coastal hazards, including tsunami. Also, the government made a formal policy decision to protect coastal ecosystems as bio-shields against coastal hazards.

Table 6-10. Coastal Resource Management Benchmark on Physical and Natural Resource Capacity

C2. Sensitive coastal habitats, ecosystems, and natural features are protected and maintained to reduce risk from coastal hazards.	
Benchmark Description	***Potential Assessment Questions***
Coastal habitats, ecosystems, and natural features provide protection from coastal hazards and provide various economic benefits to human communities. It is necessary that these important coastal resources are known and mapped, and the threats to them assessed. Use patterns must be determined to develop sustainable use plans. Implementation of the sustainable use plans through MPAs or other approaches is needed to minimize degradation of the resources. Post-disaster pressures from fishing, building, the need for wood, etc., need to be identified and anticipated in plans as possible to minimize degradation. Finally, monitoring provides feedback to management efforts and to assist in identifying additional efforts that may be required for restoration of resources.	Have sensitive coastal habitats been identified and mapped? Have regulations been established for resource extraction based on conservation priorities and risks from hazards? Have management interventions, such as marine protected areas, been established? Does a long-term monitoring program for coastal resource baseline assessment and monitoring exist? Is the monitoring program functional? Have opportunities to reduce risks from coastal hazards through restoration been identified?

Resilience in Action: Marine Protected Areas in Southern Thailand to Protect Vulnerable Coastal Ecosystems

Thailand has several large MPAs along the Indian Ocean coastline and for its offshore islands that help ensure that coral reefs and mangroves are protected and maintained into perpetuity. These MPAs suffered relatively minor damage from the 2004 tsunami and protected human populations living inland from the shoreline areas. At the same time, the government realized that improved management of its MPAs is in order so that they continue to protect the natural benefits accruing from reefs and mangrove areas to fisheries and shoreline protection and to local communities living in the vicinity. Thus, the Joint Management of Protected Areas Project was launched post-tsunami to revitalize 18 MPAs in the southern region. At the same time, these MPAs are increasingly important as tourist destinations that generate income for local businesses and residents to build village-level resilience.

Table 6-11. Coastal Resource Management Benchmark on Social and Cultural Capacity

C3. Communities are actively engaged in planning and implementing coastal resource management activities.	
Benchmark Description	***Potential Assessment Questions***
Stakeholder participation in the coastal management planning and implementation process is important so that communities take ownership of management actions. It is also important that communities and local governments have a good working relationship so that there is an institutional base to support communities once plans are set and being implemented. The participation in implementation is also essential to build sustainable mechanisms for enforcement. Finally, the monitoring and evaluation process also must be highly participatory, so that feedback reflects stakeholder opinions and so that plans can be amended to improve effectiveness.	Have community groups been involved in all aspects of planning for CRM? Do implementation plans call for the participation of community stakeholders in the process? Is the community directly involved in the actual implementation? Are CRM plans responsive to the perceived needs of the communities? Does a process or procedure exist to review plans based on coastal resource issues and community feedback? Do policies and plans have political support for implementation from local government and communities?

Resilience in Action: Post-Tsunami Reef Cleanup and Mangrove Restoration Actions in Thailand

Immediately after the 2004 tsunami in southern Thailand, NGOs working with local government and communities initiated a coral reef and mangrove assessment to determine the damage done to the reefs and mangroves of southern Thailand. This assessment included reef cleanups with local communities that encouraged them to protect their reefs and that informed people that the reefs were important in mitigating the potential impacts of a tsunami. Mangrove replanting was also initiated through community efforts, and a cash-for-work program was facilitated for the replanting activities. The monitoring results were used to educate a broader audience about the importance of coral reefs and mangroves in general. Thailand's business and tourism community was actively engaged in this effort.

Table 6-12. Coastal Resource Management Benchmark on Technical and Financial Capacity

C4. Communities and local governments value and invest in management and conservation to sustain their natural resources.	
Benchmark Description	***Potential Assessment Questions***
The benefits derived from healthy coastal ecosystems are multiple and can often be quantified in monetary terms. It is important that communities and local governments understand the true values of their coastal resources so they will be encouraged to invest in the management and protection of natural resources. Valuation is also important for education to raise awareness about resources, their uses, and their importance. The valuation process may be a precursor to the development of management plans. After plans are developed, valuation is important to justify budget allocation for implementation of management.	Are coastal resources in the area of concern valued by the people? Is there an understanding of the ecological and/or monetary value of the ecosystems and resources? Are communities and their local governments investing in coastal management? Are actions sufficient to protect and management coastal resources? Do management policies and plans have political support for implementation? Do education programs exist that highlight the values of coastal ecosystems and resources?

Resilience in Action: Valuation Studies of Mangroves and Coral Reefs in Indonesia to Justify Protection

In the 1980s and 1990s the Indonesian government, with support from several donors, undertook extensive studies on the valuation of mangroves, coral reefs, and their associated fisheries and tourism benefits. The results of these studies overwhelmingly suggested that the country needed to protect its mangroves and coral reefs. In addition, the results, which showed tremendous economic losses from destroying these important habitats, were used to initiate large national programs in conservation and fisheries management. The studies also highlighted the mitigating role of coral reefs in shoreline erosion. Currently, several NGOs are undertaking the valuation of effectively managed marine protected areas in an effort to increase investment in this conservation strategy.

Land Use and Structural Design

The desired outcome of this element of resilience is effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.

What Is Land Use and Structural Design?

A common characteristic of resilient communities is that they accept that disaster events will occur and they take necessary steps to plan for them. Land use management and structural design are excellent examples of planning activities communities can use to minimize potential impacts of tsunami and other coastal hazards.

Land use management refers to the active use of formal and informal mechanisms for the planning and location of the various land uses, such as agriculture, industry, housing, and tourism in a community. In addition to determining appropriate uses of land, a community can also influence how development, buildings, and infrastructure are designed and built. Structural design refers to how physical structures within a community are engineered and constructed. In order to contribute to a community's overall resilience, both land use management and structural design practices must consider the community's vulnerability to all coastal hazards while minimizing impacts to natural resources. When used in combination, these related risk reduction strategies are very effective mechanisms for enhancing community resilience. Basic indicators for effective land use management and structural design include: (a) Land use plans are prepared and implemented; (b) Structural design minimizes risk; (c) Monitoring and enforcement of policies and codes occurs; and (d) Pre-established redevelopment policies exist.

Why Is Land Use and Structural Design an Essential Element of CCR?

Both land use management and structural design are critical elements of CCR because when implemented effectively, they enable communities to absorb the shock of a tsunami and other coastal hazards. By steering particular land uses away from vulnerable areas and encouraging their development in less hazard-prone locations, a community can reduce the risk to individuals and livelihoods. However, when particular types of development do occur in vulnerable areas, structural design can be an effective way to absorb the shock of coastal hazards. For example, by elevating coastal buildings and using appropriate construction techniques and building materials, a community can greatly reduce the potential impacts from tsunami and other causes of coastal flooding.

Effective land use management and well designed structures also allow communities to recover more quickly after a disaster event. It is clear that well designed and properly constructed buildings and infrastructure lead to less destruction and loss

of life during a disaster event, and thus lead to a quicker recovery. In addition, the existence of land use plans and policies that address critical vulnerabilities identified through hazard risk assessments can expedite recovery. For example, having policies for disposing of debris in place before a disaster event occurs can help prevent secondary impacts to natural resources such as wetlands and mangrove forests.

A. WHITE

Sea level rise causes chronic flooding in coastal areas

The active management of land use and incorporation of best practices for structural design also contributes to community resilience as a means for creating change. Although moving sectors of a community away from vulnerable areas is often politically difficult and cost prohibitive, disaster events present communities with opportunities to learn from their difficult experience. By establishing land use policies and structural design standards that reduce vulnerability, communities can be more resilient during recovery and reconstruction and be empowered to learn and adapt. Land use and structural design benchmarks of resilience are described in Tables 6-13 to 6-16.

What Are Examples of Good Land Use and Structural Design Practices?

Effective land use management empowers communities to realize their development goals while minimizing impacts to natural resources and protecting lives and property. Land use management systems are often established around a land use plan, which represents the social, economic, and environmental goals of a community and addresses risks and vulnerabilities from tsunami and other coastal hazards. In many communities a "land use plan" may be nothing more than a common understanding of where particular land uses should occur. In some communities, this common understanding may be the result of traditional knowledge or practice and may be well engrained in local culture. In communities that are more transient, fragmented, or simply larger, a common understanding may not exist. In these communities a more formal land use plan is necessary that represents shared development goals and has the approval and support of community leaders and institutions. Regardless of community structure, the existence of some type of land use plan is critical to build resilience.

A. WHITE

Coastal land use policies need to incorporate building set-backs and "green" buffer zones to address chronic hazards such as shoreline erosion and sea level rise

Effective land use management systems have plans that are supported by policies that prevent particular land uses from occurring in specific areas and encourage their development in more desirable locations. Regulatory and incentive-based programs are used to encourage compliance with land use policy. Administrative programs are often established to provide oversight to the application and interpretation of land use regulations. In some cases, enforcement programs are also established to ensure compliance. In addition, the most effective land use systems provide multiple opportunities for engaging stakeholders and are characterized by transparency, accountability, and a strong commitment from community leaders and institutions.

An in-depth understanding of the multihazard risk in a community is fundamental for planning, designing, and constructing buildings and infrastructure. Knowledge of the likelihood, magnitude, and frequency of the range of hazard events should contribute toward determining design and construction requirements of infrastructure. Many communities adopt building codes such as the Uniform Building Code (UBC) or International Building Code (IBC), which typically address fire-, wind-, earthquake-, and flood-resistant design and construction practices. The adoption and enforcement of standards and codes is an effective way of developing hazard-resistant buildings and infrastructure.

Unfortunately, many codes and standards (including UBC and IBC) do not address tsunami-resistant design or construction, and it is the responsibility of those communities at risk of tsunami to incorporate additional best practices into local standards. The best practices in the table below are discussed in detail in the United States National Tsunami Hazard Mitigation Program's publication, *Designing for Tsunamis: Seven Principles for Planning and Designing for Tsunami Hazards.*

Seven Principles for Planning and Designing for Tsunami Hazards (J.L. Mintier et al. 2001)

1. Know your community's tsunami risk, hazard, vulnerability, and exposure.
2. Avoid new development in tsunami run-up areas to minimize future tsunami losses.
3. Locate and configure new development that occurs in tsunami run-up areas to minimize future tsunami losses.
4. Design and construct new buildings to minimize tsunami damage.
5. Protect existing development from tsunami loss through redevelopment, retrofit, and land reuse plans and projects.
6. Take special precautions in locating and designing infrastructure and critical facilities to minimize tsunami damage.
7. Plan for evacuation.

Enhancing Resilience in Hilo, Hawaii: Good Land Use and Structural Design Practices

During the redevelopment of Hilo following the 1960 tsunami, the town created a Redevelopment Plan that called for significant changes in the areas impacted by the tsunamis. Many of these changes were guided by land use and structural design practices. The plan called for changes in land uses along the immediate coast to limit the potential for future losses. Through land use practices, many of the areas along the coast were designated as parks, forests, and other open spaces. This action limited the number of buildings located in the areas susceptible to the impacts of tsunamis. Most of these areas area now used for recreational purposes. The town also chose to relocate retail businesses that had been impacted to an area less likely to be impacted in the future, thereby lessening future impacts on the local economy.

The Redevelopment Plan also utilized structural design measures such as building codes and standards to enhance resilience. All new buildings were required to conform to urban design and building design standards. Any building built below the 20-foot elevation contour line had to be able to weather the force of a major tsunami. Parking structures were also designed to block the water from buildings farther inland.

How Does Land Use and Structural Design Relate to the Other Elements of CCR?

The most critical link to land use management and structural design is its connection to risk knowledge. Information regarding hazard risk and vulnerability must be considered and incorporated into land use management practices and structural design to build community resilience. Risk and vulnerability assessments are fundamental to establishing effective land use management strategies and designing and constructing safe structures that can reduce risk. Poor understanding or lack of consideration of community risk limits the effectiveness of land use management and structural design.

Land use management and structural design also have strong linkages with coastal resource management. Both land use management and structural design practices should always consider potential impacts to natural resources and strive to minimize harm to coastal ecosystems. Land use conflicts can be minimized when land use management and coastal management policies align. When land use management and coastal resource management policies do not align, communities

A. WHITE

Shorelines and beaches are vulnerable to erosion as sea level rises and during storm events

may experience the loss of ecosystem services, such as coral reefs and coastal dunes, that actually reduce risk when functioning properly.

Good governance enhances the effectiveness of land use management and structural design and depends on government and private sector institutions. Governance actions such as the establishment of policies, adoption of plans, review of development proposals, and creation of decision-making systems support effective land use management. Government institutions can also support the use of best practices for structural design by creating design and construction standards and adopting building codes. In addition to regulatory mechanisms, government support for incentive-based programs is an effective tool for supporting land use and structural design.

Land Use and Structural Design: Challenges and Lessons Learned in Enhancing Resilience

- Governmental corruption limits the effectiveness of land use management systems, often resulting in the lack of enforcement of land use regulations.
- Poverty and lack of affordable housing contributes to illegal habitation, often in the most hazard risk-prone areas
- The availability of training to build technical capacity of individuals and construction professionals to learn about structural design best practices is critical to successful land use management and structural design programs.

Benchmarks for Resilience in Land Use and Structural Design

Table 6-13. Land Use and Structural Design Benchmark on Policy and Planning Capacity

D1. Land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored, and enforced.	
Benchmark Description	***Potential Assessment Questions***
Land use policies and building standards need to be established that incorporate measures to reduce risks from known coastal hazards. Land use and structural design should be based on comprehensive assessments of the risks posed by chronic coastal hazards, such as coastal erosion, and episodic events such as tsunamis and severe storms. Land use policies and structural design must also incorporate the protection of sensitive coastal habitats including beach dunes, coastal vegetation, mangroves, and coral reef ecosystems; these habitats are critical resilience features of a community that lives near the coast and depends on marine resources for food and livelihood. Compliance with these policies and standards must be monitored and enforced uniformly across all sectors.	Are building safety and hazard risk reduction standards and codes supported by law and enforced? Are there policies that limit investment in vulnerable land areas? Is there institutional capacity to implement land use plans and enforce policies and codes? Is information and data on physical and structural development activities available to the public? Are land use plans (with hazard areas mapped) used to decide where and how structures are built? Have critical facilities been located outside of the hazard area or built to be resistant to the known hazard impacts? Have knowledgeable people on coastal resources and hazard management been involved in building siting and design? Are hazard resistant building practices taught at the secondary and technical schools?

Resilience in Action: Buffer and No Build Zones in Sri Lanka

Following the devastating tsunami of December 26, 2004, the government of Sri Lanka developed national guidelines to minimize risk to public and private investments within the coastal zone. Through amendments to the Coast Conservation Act, new "buffer zones" or "no-build zones" were declared within coastal areas. The new policy incorporates differences in the tsunami risk between locations and is administered through a permitting system by a government agency.

Table 6-14. Land Use and Structural Design Benchmark on Physical and Natural Resource Capacity

D2. Critical infrastructure are located outside high risk areas and constructed to address risks from priority hazards.	
Benchmark Description	***Potential Assessment Questions***
Risks from episodic events such as tsunamis, earthquakes, and severe storms can be substantially reduced or avoided by proper siting, design, and construction of buildings and infrastructure. This is especially important for life-support functions such as hospitals, fire stations, communication infrastructure, airports, and other features that are needed during disaster. The loss of sensitive coastal habitats from land reclamation, shoreline hardening, construction activities, and inappropriate uses such as landfills erodes community resilience over the long term.	Has an assessment of critical infrastructure been conducted to determine vulnerability to various hazards? Are siting and design decisions for housing, hospitals, and other critical infrastructure informed by land use plans and coastal hazard risk assessment? Are coastal engineering structures designed to reduce vulnerability to coastal hazards and minimize impacts to sensitive coastal habitats? Are policies and institutional arrangements for land use planning and implementation in place, communicated, and understood by developers, builders, and the general public? Are there incentives or penalties in place to encourage compliance with land use policies and building standards and codes? Does an information campaign operate to inform the public? Are sensitive coastal habitats protected from development activities and coastal engineering structures?

Resilience in Action: Relocation of Schools Out of Hazard-Prone Areas in Thailand

The December 2004 tsunami completely destroyed the village school in Ban Talae Nork, Thailand (Ranong Province). During reconstruction, the community did not want the school rebuilt in the same location on the beach. The community worked with government ministers and private land owners to acquire land in an alternative location on which to rebuild the school. With the school now located on higher ground, teachers and students are safe from tsunami, and the school can serve additional uses.

Table 6-15. Land Use and Structural Design Benchmark on Social and Cultural Capacity

D3. Developers and communities incorporate risk reduction into the location and design of structures.	
Benchmark Description	***Potential Assessment Questions***
Developers and communities need to be aware of and adopt risk reduction practices in locating and designing structures.	Are builders and architects in the area knowledgeable of and able to apply the building codes and good practices? Do structural engineers factor in risk for designing and constructing safe infrastructure? Have building standards to site, design, and build infrastructure in hazard areas been adopted? Is there a communications outreach program in place to educate the public in hazard-resilient building practices and designs?

Resilience in Action: Tsunami Safe(r) Houses in Sri Lanka

Using high-tech engineering principles, a joint Massachusetts Institute of Technology-Harvard University team developed a low-tech solution to the problem of how to build homes in tsunami-prone areas. The team produced an architectural model for a Sri Lankan house that essentially would allow a powerful ocean wave to go through the house, instead of knocking it flat. The "Tsunami Safe(r) Houses," which will be built for about $1,200 (U.S.) each using materials available locally in Sri Lanka, will have four core columns made of concrete and rebar, each about 3 meters wide. Between these columns, homeowners can build walls of wood or bamboo to individualize the homes. Engineering simulations indicate that the design will help the core and foundation of the homes to withstand water or wind force over five times greater than a traditional concrete-block Sri Lankan home.

Table 6-16. Land Use and Structural Design Benchmark on Technical and Financial Capacity

D4. Education, outreach, and training programs are established to improve compliance with land use polices and building standards.	
Benchmark Description	***Potential Assessment Questions***
Education and training programs are needed to promote compliance with land use policies and building standards. These programs should address capacity building needs of developers, architects, and builders.	Are there regular training programs for developers, architects, and builders? Is there a certification program on hazard mitigation for architects and builders? Do local colleges or trade schools incorporate courses on land use policies, building standards, and hazard mitigation?

Resilience in Action: Teaching Hazard-Resistant Construction Techniques in Indonesia

Researchers from the Center for Disaster Mitigation at the Bandung Institute of Technology in Bandung, Indonesia, are reaching out to builders and construction workers to promote the use of hazard-resistant construction techniques. Professors and researchers from the center deliver education and training courses to professionals and local laborers on implementing structural vulnerability reduction measures. These outreach activities promote hazard-resistant technology for engineered and (especially) nonengineered construction and provide participants with technical understanding and hands-on experience in retrofitting and rehabilitating buildings in hazard areas.

Risk Knowledge

The desired outcome of this element of resilience is that leadership and community members are aware of hazards and risk information is utilized when making decisions.

What Is Risk Knowledge?

Risk knowledge, a cornerstone of CCR, is the awareness a community has about its potential hazards and its susceptibility to experiencing the negative impacts of those hazards. Risk knowledge requires an understanding of all of the chronic and episodic hazards that threaten the community, including the potential geographic extent of impact and the potential frequency of impact. It also involves knowing how each of these hazards threatens various components of the community, such as the local economy, the built environment, terrestrial and marine natural resources, all segments of the population, critical facilities, utilities, infrastructure, etc. It is essential that access to information pertaining to risk knowledge be open and freely shared among the entire community.

Why Is Risk Knowledge an Essential Element of CCR?

Risk knowledge is the cornerstone for building a resilient community. A community cannot map out its path toward resilience if it does not first know what is at risk. Comprehensive knowledge about the risks to multiple hazards that a community faces enables it to make adaptations to eliminate or lessen the impacts of the hazards. It also allows a community to more easily absorb the shocks associated with the hazards and bounce back more quickly after a hazard event.

Risk = Hazard (frequency and severity) **x Vulnerability** (Exposure/Capacity)

Source: UN ISDR 2004

One of the keys to bolstering the resilience of communities to coastal hazards, before they become disasters, is to conduct a comprehensive risk assessment. Communities must identify their exposure to hazard impacts to proactively address emergency planning, response, and recovery, and implement hazard mitigation measures. Hazard mitigation, an important part of resilience, eliminates or minimizes disaster-related damages and empowers communities to respond to and recover more quickly from disasters. Numerous hazards risk assessment methodologies exist and have been applied successfully to communities throughout the world. The key to choosing a methodology is to identify those that have been applied to similar geographies, address similar hazards, and have been successful. Risk knowledge benchmarks of resilience are described in Tables 6-17 to 6-20.

Regardless of whether the risk assessment is performed by the community or an outside organization, agency, or ministry, it is recommended that a steering committee made up of community representatives should be established to provide knowledge, insight, and feedback throughout the risk assessment process. Communities throughout the world have utilized hazard risk assessments as the basis for developing or revising emergency management plans, disaster recovery plans, hazard mitigation strategies, and comprehensive land use plans that foster resilience.

Since many of the other elements of resilience rely on a community's ability to understand its hazard risks, it is essential for a community to be knowledgeable about its risks to episodic and chronic coastal hazards. It is also very important that a community have mechanisms in place to ensure that this hazard risk information is available to all through open access, thereby ensuring that all agencies, officials, decision makers, and individuals will become knowledgeable about the risks. In addition to open access to risk information, it is also important for the community to develop mechanisms to ensure that this risk information is routinely communicated throughout the community. Open access and frequent communication of risk information will encourage the community members to utilize this knowledge when making preparedness, response, recovery, mitigation, and development decisions.

If a community tries to map out a path toward resilience without a comprehensive understanding about all the risks it faces, then it is likely to make decisions that would result in negative impacts from hazards in the future.

Reduce Risk

The identification of hazards risk enables the community to make well informed decisions to lessen the impacts of future hazard events.

Accelerate Recovery

Having access to risk knowledge allows communities to respond more rapidly to the areas at highest risk and thus limit the negative impacts. Risk knowledge also provides the information needed to rebuild properly and in the right locations.

Learn from Experience

As more hazard events occur, communities update their risk analysis to incorporate the impacts of these events. The updated risk information helps to steer new developments away from high risk areas.

Enhancing Resilience in Hilo, Hawaii: Good Use of Risk Knowledge

The town of Hilo, Hawaii, utilized risk knowledge as the foundation for building a more tsunami resilient community following a devastating tsunami in 1960, caused by a 9.5 magnitude earthquake off the coast of Chile. Instead of just rebuilding in the same manner and in the same location, the community chose to base its redevelopment plans on tsunami risk information. Not only did the community rely on the tsunami impacts information from the 1960 tsunami, but it also considered impacts from past events, such as the 1946 tsunami generated by a 7.8 magnitude earthquake in the northern Pacific, near the Aleutian Islands.

Risk Knowledge: Good Practices to Enhance Resilience

Disaster managers, coastal resource managers, and community land use planners all coordinate on the development of community multihazard risk assessments.

In addition, disaster managers, coastal resource managers, and community land use planners all openly share the results of community multihazard risk assessments.

Risk knowledge information is disseminated throughout the community through formal and informal educational programs.

Risk knowledge is used to guide community development plans.

A community-wide comprehensive multihazard risk assessment is conducted.

A committee comprising multiple sectors, disciplines, agencies, and the general public is utilized to ensure that all aspects of the community are considered when conducting a risk assessment.

The community-wide comprehensive multihazard risk assessment incorporates best available scientific data, combined with traditional knowledge and practices that take into account trends in coastal resource and environmental conditions at a scale appropriate to the community.

Risk assessment information is stored and distributed in electronic formats (databases and Internet mapping applications) to allow continuous updates as physical, social, environmental, and climate conditions change.

The risk assessment is updated periodically to address changes in physical, social, environmental, and climate conditions.

How Does Risk Knowledge Relate to the Other Elements of CCR?

Risk knowledge and its understanding serve as the foundation for all other elements of CCR. Without knowledge about the hazards that threaten an area and the vulnerability of its resources, a community cannot begin to map out its path toward resilience.

- **Governance:** Governmental institutions, strong political will, and effective leadership provide the enabling conditions for incorporating risk knowledge into the decision making process.
- **Coastal Resources Management:** The use of risk knowledge enables communities to manage their coastal and environmental resources in ways that lessen the negative impacts of the hazards on the resources. It also enables communities to make decisions to encourage the restoration and conservation of resources that help to mitigate the potential impacts of hazard events.
- **Land Use Planning and Structural Design:** A community must have access to hazard risk information to ensure that structures are developed in safe locations and with design standards sufficient to withstand any potential impacts.
- **Society and Economy:** Risk knowledge enables a community to identify measures to lessen the impacts of hazards on key societal, economic, and cultural resources.

- **Evacuation and Warning:** Risk knowledge ensures that effective evacuation plans and warning systems are developed that address all aspects of the community at risk from hazard events. Risk knowledge provides a mechanism to evaluate the effectiveness of the plans prior to a disaster occurring.
- **Emergency Response:** Risk knowledge allows first responders to focus their immediate actions in the highest risk areas to lessen the impacts.
- **Disaster Recovery:** Risk knowledge enables a community to develop effective disaster recovery plans that mitigate the impacts of future hazards.

Risk Knowledge: Challenges and Lessons Learned in Enhancing Resilience

- Hazard frequency and severity change over time. Climate change, development patterns, population growth, economic factors, and changes in natural resources (shoreline erosion and sea level rise) heavily influence the risks in a community. The dynamic nature of the physical and built environment and demographics require frequent updates of hazard risk assessments.
- Transient populations such as migrants and tourists may be unfamiliar with particular hazards. As a result, changes in demographics require constant and sustained efforts focused on hazards risk awareness campaigns for the general public.
- Risk knowledge becomes meaningless if it is not utilized to develop and periodically update emergency warning, response, recovery, and mitigation plans and systems.

Benchmarks for Resilience in Risk Knowledge

Table 6-17. Risk Knowledge Benchmark on Policy and Planning Capacity

E1. Coastal hazard risk assessments are completed at a scale appropriate to the community and routinely updated.	
Benchmark Description	***Potential Assessment Questions***
The type, frequency, and magnitude of chronic and episodic hazards needs to be routinely assessed and mapped in order to determine the risk to coastal communities. The scale of the assessment should be appropriate for the community. Resilient coastal communities have an understanding of the hazard threats they face and utilize this information to reduce risk. Sources of information may come from historical data, local experience, traditional knowledge, or model predictions.	Has an assessment of coastal hazards been completed? Did the assessment consider historical events, existing hazards, and potential future coastal hazards? Did the assessment cover chronic and episodic hazards? Was there any community participation in the assessment? Are results of the assessment shared with local and national stakeholders?

Resilience in Action: Mapping of Kelurahan Penjaringan Village, North Jakarta, Indonesia

Working with Action Contre la Faim, the Village of Kelurahan Penjaringan utilized a community mapping exercise to conduct a multihazard risk assessment. To accomplish the assessment, the team utilized a two-step process consisting of mapping using integrated GIS, remote sensing, and field surveys, followed up with community participatory mapping. The benefit of utilizing the community mapping process to supplement the GIS analysis was twofold: First, the community members were able to supplement the assessment with first-hand knowledge on hazards risk and exposure based on previous experiences, thus ensuring that the assessment was comprehensive. Second, the process also enabled the assessment team to increase awareness of the hazards risk to the entire community. The Village of Kelurahan Penjaringan is a coastal community and has many newer residents who have migrated to the area for economic reasons. Many of these newer residents were unfamiliar with the risk associated with living in a coastal area.

Table 6-18. Risk Knowledge Benchmark on Physical and Natural Resource Capacity

E2. Coastal hazard risk assessments are comprehensive and incorporate risks to all elements of resilience (e.g. livelihoods, coastal resources, land use, etc.).	
Benchmark Description	***Potential Assessment Questions***
A community should have an understanding of its potential for experiencing negative impacts from coastal hazards. This understanding of vulnerability needs to include the impacts on social and cultural resources, economies and livelihoods, natural resources, and critical facilities of the community. Resilient coastal communities have an understanding of the potential negative impacts of hazard threats they face and utilize this information to reduce risk.	Does the community have an understanding of how coastal hazards could impact its economic and livelihood assets? Has an assessment of social and cultural vulnerability been conducted that identified areas where individual resources for disaster preparation and recovery tend to be minimal (i.e. areas with high concentrations of poverty, elderly, illiteracy, gender issues, etc.)? Has the community identified areas where cultural differences may bring about special needs to build resilience, such as areas with high concentrations of persons who speak a foreign language? Has the vulnerability of natural resources been assessed? Has the community identified all facilities, infrastructure, and utilities that are deemed critical? Has an assessment of the vulnerability of the critical facilities, infrastructure, and utilities is conducted?

Resilience in Action: Comprehensive Risk Assessments in the Maldives

The Maldives, through efforts funded by the United Nations Development Programme, completed a risk assessment to develop a disaster risk profile for the entire country. The risk assessment addressed exposures of physical, environmental, and social aspects separately. The hazard and risk information generated by the study was comprehensive and at a scale appropriate to guide national policy and planning. National government agencies in the Maldives are currently utilizing the risk assessment information to guide the location, planning, and design of "safe islands", proactive measures to lessen the impacts of future disasters (UNDP 2005).

Table 6-19. Risk Knowledge Benchmark on Social and Cultural Capacity

E3. Community participates in the hazard risk assessment process.	
Benchmark Description	***Potential Assessment Questions***
Risk information is one of the keys to building a resilient community. However, to build resilience, risk information must be accessible and understood by all members of the community. It is critical that all risk information be shared among all those who make decisions related to community development, coastal resources, and disaster management. The sharing of risk knowledge helps resilient coastal communities make wiser decisions, thereby helping to reduce risk.	Was the community involved when hazards risks were assessed? Is risk information made accessible to the community? Is risk information shared and used among institutions to better inform policy and action? Do formal or informal education programs exist to promote risk knowledge?

Resilience in Action: Community Mapping in Ranong, Thailand

Following the devastating impacts of the December 2004 tsunami, five communities in the Ranong Province in Thailand utilized a community mapping process to help define hazard risks in the communities. The community mapping process was facilitated by community members and involved members from all sectors of the community, including community leaders, fishermen, business leaders, the elderly, housewives, and children.

Table 6-20. Risk Knowledge Benchmark on Technical and Financial Capacity

E4. Information from risk assessment is accessible and utilized by the community and government.	
Benchmark Description	***Potential Assessment Questions***
For a community to be resilient, all long-term development plans must be developed through processes that include assessing potential impacts from hazards. Hazard risk knowledge should be utilized to guide all community planning efforts, both short term and long term. The utilization of risk knowledge helps to ensure that the plans are sustainable and the goals are attainable. Risk knowledge should also be utilized to identify mechanisms to lessen the risk through mitigation measures. Over time, risk can change due to numerous factors, such as population growth, climate change, deforestation, etc. Resilient communities periodically reassess their risks to account for these changes.	Do community development goals and the plans to achieve them take into account hazard risk? Are hazard risks considered by institutions when making planning and development decisions? Are hazard risks considered when making coastal management decisions? Are risks utilized to prioritize and guide planning and mitigation actions consistent with community development goals? Is risk periodically assessed to address changes in physical, social, cultural, environmental, and climate conditions?

Resilience in Action: Sri Lanka Disaster Risk Information System

As part of its "road map" toward building a safer country, Sri Lanka identified the need for a GIS-based Disaster Risk Management Information System at the national Disaster Management Center, to be made available for the benefit of all involved stakeholders. The information system will house risk and vulnerability information for multiple hazards and help ensure that all government agencies, donors, and NGOs working with communities to enhance resilience have easy access to hazard risk information.

Warning and Evacuation

The desired outcome of this element of resilience is a community that is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and acting on an alert.

What Is Warning and Evacuation?

Warning and evacuation consists of three essential parts: an early warning system, evacuation plans, and a well informed public. Resilient coastal communities possess early warning systems that provide the best available information on potential hazards in a timely manner, implement effective evacuation plans, and have a population that responds appropriately to the information they are given.

An effective early warning system consistently detects potential hazards and communicates the threat in a manner that ensures ample warning is received by the community. Warning messages inform individuals on what is happening, what this means to an individual, and how the individual should take action. Warning messages are delivered in clear, simple language, with enough lead time for recipients to respond. Resilient coastal communities have local early warning systems that are operational at all times and are linked to international or national hazard detection and warning systems. These linkages and other components of the warning system also require backup mechanisms that ensure fail-safe operation during hazard events. This redundancy ensures that if one component of the system is not functioning, then the warning message is still delivered.

Resilient coastal communities also have well publicized evacuation plans in place well in advance of receiving any hazard warning. The development of effective evacuation plans requires expert and local knowledge of the hazard risk, including information on the location of hazard areas and vulnerable populations such as the elderly. Effective evacuation plans also require a high degree of coordination and planning for the development of proper evacuation routes and signs. Regular evacuation drills are needed to ensure that all sectors of society are knowledgeable of the warning and evacuation procedures. Resilient coastal communities also conduct assessments of evacuation drills and post-event warning and evacuation procedures. These assessments provide information to disaster managers and community leaders on how to improve and adapt systems and plans to further reduce or avoid risks from coastal hazards.

A warning system cannot be effective without education and outreach. No matter how expensive or sophisticated the system, if individuals are not able to understand the warning information or do not know how to respond, there is increased risk that lives may be lost. Comprehensive public awareness campaigns should provide constant reminders about hazards risks, warning procedures, and evacuation plans within coastal communities.

Why Is Warning and Evacuation an Essential Element of CCR?

Warning systems and evacuation procedures provide communities an opportunity to significantly reduce risk by taking quick action to mitigate impacts of hazard events. An effective response to an impending hazard event can greatly reduce hazard impacts by removing people from dangerous areas. Warning and evacuation benchmarks of resilience are described in Tables 6-21 to 6-24.

Reduce Risk

Warning systems and evacuation plans reduce risk by empowering communities and individuals to take action to limit hazard impacts.

Accelerate Recovery

Recovery needs are reduced when individuals respond appropriately to warning information.

Learn from Experience

Drills, exercises, and monitoring programs provide opportunities for improvements to warning systems and evacuation plans.

Enhancing Resilience in Hilo, Hawaii: Good Warning and Evacuation Practices

The era of tsunami warnings began in the United States when the founder of the Hawaiian Volcano Observatory, Thomas Jaggar, attempted to warn the Hilo harbormaster of the possibility of a tsunami generated by the 1923 Aleutian Islands earthquake. His warning was not taken seriously, and at least one fisherman was killed.

In response to the 1946 tsunami generated in the Aleutian Islands, official tsunami warning capability in the United States began in 1949. The U.S. federal government established the Tsunami Warning Center in Ewa Beach on the island of Oahu in Hawaii.

In 1960, the Chilean earthquake and tsunami devastated Chile, killed dozens in Hawaii, and perhaps as many as 200 people in Japan. In the aftermath, the nations of the Pacific decided to coordinate their efforts to prevent the recurrence of such loss of life in the Pacific Basin due to destructive ocean-crossing tsunamis. Under the auspices of the United Nations, the Intergovernmental Oceanographic Commission (IOC) established the Intergovernmental Coordination Group for the Pacific Tsunami Warning System in 1968. The United States offered the Ewa Beach center as the operational headquarters for the Pacific Tsunami Warning System, and the facility was renamed the Pacific Tsunami Warning Center (PTWC).

In the aftermath of the 2004 Indian Ocean tsunami, PTWC has taken on additional areas of responsibility, including the Indian Ocean, South China Sea, Caribbean Sea, and Puerto Rico and the U.S. Virgin Islands.

Local officials in the Town of Hilo receive warning notifications directly from PTWC and subsequently utilize an Emergency Alert System (EAS) to notify the community. The EAS includes the use of sirens and warning messages that are broadcast on television and radio networks. Additionally, tsunami signage is utilized to identify tsunami hazard zones and evacuation routes throughout the Town of Hilo.

Warning and Evacuation: Good Practices to Enhance Resilience

Redundant human and technical warning system components

Clearly defined roles and responsibilities for regional, national, and local authorities and media for disseminating warning information

Clear and well publicized standard operating procedures for warning at-risk populations

Appropriate technology to facilitate rapid communication of warning information

Periodic testing and evaluation of all aspects of warning systems and evacuation procedures

Use of clear, simple language in warning messages

Identification and preparation of at-risk segments of the population

How Does Warning and Evacuation Relate to the Other Elements of CCR?

- **Risk Knowledge:** Warning systems and evacuation plans must be based on information about the frequency, magnitude, and location of potential hazard risks. Furthermore, knowledge of the location of critical infrastructure and vulnerable populations ensures evacuation procedures meet the needs of the community as a whole and of individuals.
- **Society and Economy:** Evacuation procedures should be developed with involvement from the local business community to ensure employees are safe, and damage to facilities and loss of supplies are minimized. In addition, evacuation procedures should involve community members in the development of evacuation routes to ensure they are socially acceptable.
- **Governance:** Governance provides the enabling conditions for institutions and organizations to establish clear roles and responsibilities for warning and evacuation, from the national to the local level. Institutional leadership and support can ensure systems and plans are maintained, tested, and improved to enhance community resilience.

Warning and Evacuation: Challenges and Lessons Learned in Enhancing Resilience

- Access to and use of information technology and communication technology is limited in many locations
- Lack of redundancy exists in many warning systems
- Organizational and institutional relationships, arrangements, and protocols for warning systems are generally not well documented
- Warning system standard operating procedures are generally not standardized, may not be well understood by key agencies and organizations, and in some cases do not exist
- Use of information from risk and vulnerability assessments is limited
- Translation of forecast information into warning information is difficult
- Many existing warning systems are hazard specific, and coverage is limited
- Many existing institutional mechanisms for disaster management are largely response driven
- Maintenance of early warning systems is difficult
- Drills and exercises for both warning systems and evacuation plans require political support

Benchmarks for Resilience in Warning and Evacuation

Table 6-21. Warning and Evacuation Benchmark on Policy and Planning Capacity

F1. Community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities possess adequate mechanisms for receiving emergency information from external sources and are able to disseminate messages to the farthest reaches of the community in an appropriate amount of time. Resilient coastal communities also have evacuation plans in place well in advance of receiving any hazard warning. These plans incorporate knowledge of vulnerable populations and input from the community in identifying evacuation routes and developing procedures. Lastly, resilient coastal communities practice responding to hazard events through training exercises and drills. These activities are evaluated for their effectiveness, and mechanisms exist to modify procedures and plans for improvement.	Does the community have a way to receive emergency information from national and/or regional systems? Does the community have a way to disseminate emergency information? Does the community have an evacuation plan in place that is comprehensive and addresses individuals with special needs? Do evacuation procedures address transient populations (tourists or migrants) and local businesses? Is there redundancy in both human and technical components of the warning and evacuation system? Are warning system and evacuation procedures tested regularly and evaluated after exercises or hazard events to improve effectiveness?

Resilience in Action: Plans and Procedures for an Alert System in Southern Thailand

The National Disaster Warning Center (NDWC) of Thailand, working with the southern Provincial governments and selected local tambon governments, has developed a Tsunami Alert Rapid Notification System (TARNS). The policies and plans necessary to implement and support the TARNS have been developed through a series of national and local workshops that provided a venue for all levels of government and community to voice their opinion about what such a system would include and how it would operate. The alert system was tested in 2006 and 2007 and is becoming a regular function of both local and provincial governments in coordination with the NDWC, which provides the overall guidance and coordination for the alert system.

Table 6-22. Warning and Evacuation Benchmark on Physical and Natural Resource Capacity

F2. Community warning and evacuation infrastructure is in place and maintained.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities maintain the infrastructure that is used to warn and evacuate vulnerable populations. This infrastructure may include warning sirens, warning flags, warning towers, evacuation route signs, tsunami zone signs, tsunami shelters, and safe areas. In addition, resilient coastal communities maintain their information technology and communications hardware and ensure critical system components have backups and alternative power supplies.	Are warning system components in place and maintained? Are hazard zones, evacuation routes, shelters, and safe areas clearly marked throughout the community with signs and/or maps? Is there redundancy in the technical and human components required for effective warning and evacuation?

Resilience in Action: Community-Based Evacuation Plan Development in Padang, Indonesia

Following the December 2004 tsunami, several citizens in Padang, Indonesia, formed Kogami, an NGO focused on ensuring that their city is ready for the next tsunami. Since its inception Kogami has worked on behalf of the community with other NGO and government officials to coordinate the development of evacuation zones, develop an evacuation plan, and print tsunami evacuation maps and signs.

Table 6-23. Warning and Evacuation Benchmark on Social and Cultural Capacity

F3. Community is prepared to respond to hazard warnings with appropriate actions.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities actively educate all sectors of the community about coastal hazard risks and warnings. Resilient communities prepare individuals and institutions to respond appropriately to warning information through awareness campaigns and outreach activities. When emergency information is provided, individuals and institutions act accordingly. Resilient communities also take responsibility for visitors in their community and educate them about hazard risks and emergency procedures.	Have outreach programs been established to ensure that community members are aware of hazard risks, warning procedures, and evacuation plans? Do outreach efforts reach transient populations such as tourists and migrants? Do schools teach students about hazard risks, emergency preparedness, hazard warnings, and evacuation plans? Are there trained community volunteers and/or organizations that provide awareness information? Do popular culture and news media outlets participate in raising community awareness?

Resilience in Action: Tsunami Evacuation Drills in Padang, Indonesia

Kogami is an NGO focused on ensuring that Padang, Indonesia is ready for the next tsunami. To accomplish this mission, the organization has coordinated with national and local government officials to conduct tsunami evacuation drills in Padang to ensure the community is aware of evacuation routes and is prepared to act. Tsunami evacuation drills have taken place in many other coastal communities in the Indian Ocean region and have proved to be effective at informing the public about actions they can take to save lives.

Table 6-24. Warning and Evacuation Benchmark on Technical and Financial Capacity

F4. Technical and financial resources are available to maintain and improve warning and evacuation systems.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities identify and allocate the technical and financial resources to maintain and improve warning systems and evacuation plans and procedures. Resilient coastal communities seek out the weakest link in warning systems and evacuation procedures and actively work to address them through fundraising, partnerships, and agreements.	Are warning systems and evacuation procedures supported by government programs? Does the community have the appropriate amount of resources to maintain warning systems? Are evacuation procedures routinely updated to incorporate changes in the community? Has the community established partnerships or agreements with external governments or organizations for funding or technical assistance?

Resilience in Action: Collaborative State Partnership Program in Indonesia

Indonesia and the State of Hawaii have entered a state partnership program to build tsunami preparedness in Indonesia and Hawaii. The partnership involves sharing expertise in preparedness, early warning, and first response to emergencies. The goal of the effort is to learn how civil defense resources and responsibilities in Hawaii and Indonesia are shared between different levels of government and the critical role of the civilian sector. The partnership is expected to result in improvements to local preparedness, warning, and response in Hawaii and Indonesia and create opportunities for collaboration on disaster and response planning, economic partnerships, and other sister-state relationships.

Emergency Response

The desired outcome of this element of resilience is that mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.

What Is Emergency Response?

The emergency response function incorporates a wide range of measures to manage risks to communities and the environment. Emergency response addresses the potential occurrence of major emergency situations requiring a complete government approach to natural and human-induced hazards (e.g. the consequences of acts of terrorism or the release of hazardous materials, etc). All emergencies and crisis events are by definition chaotic and highly dynamic, creating physical, emotional, and social disorder. The establishment of an emergency response system, including all of the institutions that are maintained to respond quickly to disasters, is essential for addressing emergency needs at the community level. Since the first few hours of a disaster are the most crucial, it is important to recognize that the community provides the first response. Thus, community involvement is critical during the development of emergency response plans. Normally, a central entity, such as an Emergency Operations Center, manages the emergency response effort. It should be the central operational, tactical, or strategic point for the lead agency and supporting staff to manage the emergency. Properly developed and implemented emergency response plans help to ensure the availability of shelter, food, transportation, medical services, and search and rescue operations during disaster events.

Why Is Emergency Response an Essential Element of CCR?

Effective emergency response enables a resilient coastal community to better absorb the shock associated with disaster events. Emergency response plans and mechanisms also provide the basis for the community to bounce back quickly from the impacts of disasters. In the event of a disaster, effective emergency response procedures can reduce the loss of life and help to lessen the time and investment needed for a community to recover. Emergency response benchmarks of resilience are described in Tables 6-25 to 6-28.

Reduce Risk

Effective emergency response helps to save lives and property.

Accelerate Recovery

By limiting the loss of life and property, emergency response helps to lessen the recovery efforts.

Learn from Experience

For emergency response to be effective, lessons learned from drills and actual response activities need to be utilized as feedback for improving emergency response plans.

Enhancing Resilience in Hilo, Hawaii: Good Emergency Response Practices

The Hawaii County Civil Defense Agency has worked with various local, county, state, and national agencies and NGOs to develop an effective emergency response plan for Hilo, Hawaii. The emergency response plan for Hilo details how the various agencies and NGOs will work together under the leadership of the County Civil Defense Director. The plan includes details for training and maintaining Community Emergency Response Teams (CERT). Participants of CERT Training learn about emergency response procedures and understand their roles and functions in the event of a major emergency or natural disaster that affects their community. This knowledge is important because a neighborhood may be on its own during the early stages of a major emergency or disaster. Also, after an emergency, citizens will volunteer to help, and without proper training, these people can expose themselves to potential injury or even death. Experience has shown that basic training in emergency response and rescue skills improves the ability of citizens to survive until responders or other assistance arrives.

A trained CERT will provide services that will:

- Increase the community's disaster readiness
- Assess damage after a disaster
- Extinguish small fires and teach fire safety
- Perform basic rescue operations and provide first aid
- Organize procurement of supplies

Emergency Response: Good Practices to Enhance Resilience

Risk knowledge is used to guide the development of emergency response plans.

The Incident Command System (ICS), a proven emergency response system used by many countries in the world (e.g. Australia, Canada, New Zealand, United States, India, etc.) is used to provide a means for multiple government agencies to effectively manage any emergency response.

Materials and supplies for emergency response have been identified and routinely maintained to ensure availability during disaster events.

A command system is established from the outset of incident operations, thereby ensuring a unified command and the efficient coordination of multiagency and multijurisdictional efforts for emergency response.

Redundant back up systems (e.g., generators, communications systems, etc.) are in place and operational to ensure success of response activities.

The command system is structured to integrate any type of resource including police, military, technical experts, international resources, and NGOs, and can be used to manage sudden-onset disasters, long-term relief efforts, or nonemergency events.

Mutual-aid agreements have been established with adjacent communities before events to ensure the availability of resources during a disaster event.

Training, education, and drills are ongoing to exercise, test, and institutionalize the emergency response system.

Capacity-building programs have been established for emergency response to ensure that personnel have the key skills to perform their tasks in an emergency. The training program includes search and rescue, first aid, temporary shelter construction, food distribution, and evacuation management.

Volunteers, a vital resource for effective emergency response, are identified and trained properly prior to disaster events.

Emergency response plans are periodically updated to address changes in physical, social, environmental, and climate conditions.

How Does Emergency Response Relate to Other Elements of CCR?

- **Governance:** Governmental institutions, strong political will, and effective leadership provide the framework for multiple agencies, NGOs, and community groups to work together to respond to emergencies.
- **Risk Knowledge:** Risk knowledge provides the information required to ensure that emergency response plans address all of the potential issues and needs that may arise in a community during a disaster. Risk knowledge also helps first responders quickly identify the most heavily impacted areas, enabling targeted search and rescue efforts to help save lives and property.
- **Warning and Evacuation:** Effective warning systems combined with properly executed evacuations can help to reduce the negative impacts of hazard events. This can help to lessen the need for emergency response activities.
- **Disaster Recovery:** An effective emergency response plan and efficient implementation of the plan in a timely manner can help to save lives and property. Thus, it can also help to reduce the efforts and investments needed for the community to recover from disaster events.

Emergency Response: Challenges and Lessons Learned in Enhancing Resilience

- How to effectively engage the community in emergency response activities.
- In many countries, there is no national center to coordinate the national response and provide situational awareness and a common operating picture for the entire national or provincial government.
- In many situations, there is a lack of communication between national and community response efforts.
- Good management is imperative. There is no denying that emergencies cause a great deal of panic, stress, and chaos. Response must be well coordinated and controlled, and good leadership must command and direct activities and operations.
- Emergency response should first be sought within the national borders of the affected areas.
- The existence of different emergency response organizational structures between various levels of government can be challenging.
- Reliable incident information during disasters is often lacking.
- Inadequate and incompatible communications systems sometimes exist among agencies.
- There must be a mechanism for coordinated planning between agencies, including clear lines of authority.

Benchmarks for Resilience in Emergency Response

Table 6-25. Emergency Response Benchmark on Policy and Planning Capacity

G1. Predefined roles and responsibilities are established for immediate action at all levels.	
Benchmark Description	***Potential Assessment Questions***
Emergency response to disaster events usually requires the involvement of multiple institutions. For the response activities to be effective, there must be a clearly defined system for leading and coordinating the activities of all of the institutions involved. For a community to be resilient, it should have an emergency response plan that includes information detailing how numerous institutions and various levels of government will interact and coordinate during disasters. In addition, resilient communities take steps to ensure that vital response supplies and resources are identified, stored in safe locations, and can be mobilized in a timely manner.	Have disaster-specific emergency response plans been developed? Do emergency response plans clearly define leadership roles and coordination mechanisms (e.g. incident command system)? Have response teams (e.g., damage assessment teams, search and rescue, etc.) or other relevant committees been formed and trained for action? Does the Emergency Operations Center have the capacity to mobilize and implement the emergency response plan? Have protocols and linkages between all response institutions been established for coordination? Have materials and supplies for short-term disaster management and emergency response been identified? Are materials and supplies for short-term disaster management and emergency response stored in locations outside of high risk areas?

Resilience in Action: Tsunami Response in Nagapattinam, Tamil Nadu, India

India established and adopted an Incident Command System (ICS) in 2002. The Ministry of Home Affairs is the focal point, and the Indian Administrative Service Training Institution provides training on ICS. During the December 2004 Indian Ocean Tsunami, the Tamil Nadu Government utilized the ICS to implement its successful emergency response. In the initial response on December 26 and 27, 2004, the local district first responders, police and fire service members, medical staff, and ambulances rushed from neighboring districts to form the ICS team. The ICS team was utilized to oversee the establishment of relief centers, distribution of food, round-the-clock search and rescue, and other immediate response activities. On the third day, a full-scale team was established, including the appointment of the Secretary of Rural Development as Incident Commander. The ICS team oversaw the emergency response activities of 73 affected habitations, divided into 7 contiguous ICS Divisions.

Source: Rajiv Ranjan Mishra, IAS Deputy Director (Sr.) & Coordinator, Centre for Disaster Management, LBS National Academy of Administration, Mussoorie, India.

Table 6-26. Emergency Response Benchmark on Physical and Natural Resource Capacity

G2. Basic emergency and relief services are available.	
Benchmark Description	***Potential Assessment Questions***
During emergency response, some of the most immediate needs relate to the well-being of the community members. Disasters can be very traumatic, and emergency response measures are needed to help save lives, reduce losses, and attend to those in need of assistance. Resilient communities take measures to ensure that community members have access to medical care, food, water, and temporary shelter in the immediate aftermath of disaster events.	Have facilities vital to emergency response activities been identified? Have assessments been done to determine if these vital facilities will withstand the impacts of disasters? Have measures been taken to ensure that these vital facilities will be functional during a disaster? Have measures been taken to ensure that emergency healthcare and life support systems for the community will be functional during a disaster? Are essential emergency food supply systems accessible during disaster events? Have plans been implemented to ensure that psychological and social support is incorporated into healthcare and life support systems during disaster events?

Resilience in Action: Community-Based Disaster Preparedness, Indonesia

Throughout Indonesia, the Indonesian Red Cross has been working with communities to enhance their emergency response capabilities through its Community Based Disaster Preparedness Programme. An essential part of the program involves forming a Community Based Action Team (CBAT) to facilitate a community mapping exercise to identify vital emergency response facilities and resources, as well as hazard risk areas. The CBAT then works with community leaders to develop plans to ensure that these facilities and resources will be available during an event. Subsequently, the CBAT works with the community to develop comprehensive emergency response plans that encompass the following elements: identification and training of volunteers; establishment of early warning systems that are agreed to and understood by the community; procedures to ensure that medical teams are always on standby to assist; protocols for establishing field hospitals; procedures to ensure the community's willingness to work with other agencies and organizations; and procedures to ensure the provision of water and sanitation facilities.

Table 6-27. Emergency Response Benchmark Social and Cultural Capacity

G3. Preparedness activities (drills and simulations) are ongoing to train and educate responders.	
Benchmark Description	***Potential Assessment Questions***
Some communities are forced to deal with hazard events on a routine basis. Others only experience hazard events on rare occasions. In either type of community, it is important to periodically train members of emergency response institutions to ensure that they are ready when their services are needed. It is just as important to ensure that community members are aware of the types of emergency response services available and how to utilize them. This requires an effective education and awareness program. In addition, it is important to conduct drills and exercises on a periodic basis to ensure that the community is ready to respond, they can also help to identify gaps and deficiencies in the response plan. Resilient communities ensure that response institutions and community members are ready to respond to hazard events through training, education, and drills.	Does the community conduct regular training programs for institutions responsible for emergency response activities? Do public awareness and education programs exist to inform all sectors of the community of the emergency response plans? Have volunteers been identified and trained properly prior to disaster events? Does the community conduct periodic "end-to-end" emergency response drills and exercises? Are the results of emergency response drills and exercises utilized to identify gaps or deficiencies in existing response plans? Are emergency response plans updated based on assessments of response drills and exercises?

Resilience in Action: Practicing Preparedness in the Andaman Islands

Sustainable Environment and Ecological Development Society (SEEDS) is a nonprofit voluntary organization working in India to make vulnerable communities resilient to disasters. Through its Tsunami Response Programme, SEEDS has provided emergency response training to communities that were affected by the December 6, 2004, tsunami in the Andaman Islands. SEEDS delivers hands-on training to community task forces that have specific responsibilities following a hazard event. These and other community-based disaster management activities carried out by SEEDS help community members to understand their role during an emergency and identify actions they can take to reduce risk and respond with appropriate actions in the case of emergencies.

Table 6-28. Emergency Response Benchmark on Technical and Financial Capacity

G4. Organizations and volunteers are in place with technical and financial resources to support emergency response activities.	
Benchmark Description	***Potential Assessment Questions***
During the immediate response phase of hazard events, communities often must respond with limited or no resources from outside of the community. For response to be effective at limiting the loss of life and property, a community must have a pre-established network in place to utilize community organizations, volunteers, and resources in a well thought-out manner. These organizations and volunteers will need to be trained periodically to ensure that they are ready to respond when necessary. In addition, mechanisms must be in place to ensure that all resources identified for use during an emergency are readily available and properly maintained.	Have community resources been identified that can be utilized during emergency response activity? Have community volunteers willing to assist during emergencies been identified? Have community organizations willing to assist during emergencies been identified? Have community organizations and volunteers been trained on emergency response activities? Have agreements been established to utilize community resources during emergency response? Are there mechanisms in place to ensure proper maintenance of community resources identified for use during emergency response?

Resilience in Action: Community-Level Management in Hat Yai, Thailand

In the Hat Yai municipality in Songkhla Province, Thailand, the locally based Sammakhi Foundation specializes in emergency response. It trains local volunteers in first aid and search-and-rescue and issues emergency warnings via radio. It is generally first on the scene and works closely with local government in emergency response. Its good track record of emergency response management has gained it trust within the Hat Yai community to take the lead role during disaster events. The Sammakhi Foundation's emergency response leadership role was evident in the successful response to a November 2001 flood that inundated Hat Yai.

Source: Asian Disaster Preparedness Center, 2005

Disaster Recovery

The desired outcome of this element of resilience is that plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.

What Is Disaster Recovery?

Disaster recovery is the process of restoring and improving basic services, natural resources, and livelihoods in a community affected by a hazard event. Resilient coastal communities accept that hazard events will happen in their community and develop plans and procedures before they happen to guide the recovery process. Furthermore, resilient communities seek out and take advantage of opportunities to reduce exposure to potential future hazards and further reduce risk through restoration and reconstruction activities.

Disaster recovery is a comprehensive process that can be broken down into different stages, with each stage having complementary goals.

Early Recovery Process: Damage and Needs Assessment. The damage and needs assessment is the starting point for decision making during the recovery process. In general, a damage and needs assessment will provide detailed information about the affected population and estimates of the damage and losses. Information sharing and coordination among agencies and organizations during this stage is critical to avoid duplication of effort and identify gaps. As this is the first stage of recovery, it is critical that communities be directly involved during the damage assessment process. This early participation sets the scene for community involvement throughout the entire recovery process. Other activities that occur during this stage include providing psychosocial care, debris removal, restoring critical facilities such as hospitals and schools, and construction of transitional shelters.

Medium-Term Recovery Process: Restoring and Promoting Livelihoods. As relief efforts continue, there is the need to revive livelihoods and get the local economy back to normal. Restoring livelihoods in affected communities can also help those coping with loss and recovery to their predisaster condition. Livelihood support is typically provided in the form of asset replacements, provision of new tools, income-generating activities, cash for work, cash grants, and other financial mechanisms. This stage also presents opportunities to reduce risk by diversifying livelihoods. Effective diversification of livelihood activities requires commitment from individuals, significant amounts of technical assistance from supporting organizations, and a long-term commitment to sustainability.

Long-Term Recovery Process: Natural Resource Restoration. Coastal resources are significant sources of economic and social health in many coastal communities. Healthy coastal ecosystems, such as coral reefs and mangroves, may mitigate impacts of coastal hazards and provide critical habitat for fish stocks to recover. During many disasters, these resources become damaged, and excess pressure on strained resources often leads to overuse. The loss of these and other ecosystem services can hamper the recovery process and exacerbate the suffering of people dependent on these resources. However, if short-term solutions can be identified to provide alternative livelihoods and/or food sources, long-term damage may be avoided.

Why Is Disaster Recovery an Essential Element of CCR?

Disaster recovery is an essential element of CCR because it provides an invaluable window of opportunity for communities to learn from the disaster experience and take actions to reduce risk. The period immediately following a disaster provides many opportunities for implementing strategies to mitigate the impacts of potential future disasters, especially while the political will remains strong. If the disaster recovery process is to be successful in building community resilience, it must take a holistic approach by incorporating good practices from the other essential elements of CCR and fully integrate the domains of disaster management, community development, and coastal resource management. Otherwise, if the process is narrowly focused and recovery activities are not coordinated across these three domains, the disaster recovery process can result in a community that is more vulnerable and less resilient than before. Disaster recovery benchmarks of resilience are described in Tables 6-29 to 6-32.

Reduce Risk

Actions taken during the recovery process can reduce risk from future hazard events (i.e., land use change, livelihood diversification, etc.).

Accelerate Recovery

Pre-established disaster recovery plans developed with the community can support rapid recovery.

Learn from Experience

The recovery process provides many opportunities for communities to translate their experience into enhancing resilience.

Enhancing Resilience in Hilo, Hawaii: Good Disaster Recovery Practices

The recovery process in Hilo following the tsunami in 1960 was driven by the goal of creating a tsunami resilient community. This goal was developed through a community participatory process led by strong community leaders. Since Hilo had been impacted by two significant tsunamis in a 14 year timeframe, the community decided to take actions during the recovery process to enhance its resilience to future tsunamis. To guide the recovery process, the Town of Hilo developed the Downtown Development Plan. The plan, which used tsunami risk information as its basis, outlined major changes in the recovery of the area. The plan determined safe areas in which to build based on both the 1946 and 1960 tsunamis that affected the downtown area. It also required all new buildings to conform to urban design and building design standards. In addition, the plan also outlined measures to protect coastal resources.

Disaster Recovery: Good Practices to Enhance Resilience

Community participation is central to disaster recovery and must be ensured at all stages.

Strong coordination of external donors and service organizations supports recovery.

Recovery provides opportunities for diversification of livelihoods.

Risk reduction measures can be easily taken through relocation and reconstruction.

Recovery process can be supported by government through clear policies and strategies.

Transparency and accountability of government programs and officials promotes recovery.

Coordination mechanisms set up prior to the event can accelerate the recovery process.

How Does Disaster Recovery Relate to Other Elements of CCR?

- Governance: Governmental institutions, strong political will, and effective leadership provide the enabling conditions for disaster recovery.
- Society and Economy: The disaster recovery process provides opportunities for diversification of livelihoods and development of new markets.
- Coastal Resource Management: Restoration and protection of coastal resources during the recovery process ensures resources are available in the future for both their social and economic value.
- Emergency Response: Effective emergency response minimizes the severity of hazard impacts and reduces the need for recovery actions.
- Risk Knowledge and Land Use and Structural Design: Risk knowledge and land use management and structures provide the foundation for community-level decisions regarding redevelopment and reconstruction. The disaster recovery process provides tremendous opportunity for communities to reduce their exposure to future coastal hazards through changes in land use, siting of facilities and infrastructure, and building design and construction. By considering risk knowledge in land use and reconstruction decisions during the recovery process, a community can become more resilient.

Disaster Recovery: Challenges and Lessons Learned in Enhancing Resilience

- The disaster recovery process is dependent upon external support from government and humanitarian agencies.
- Coordination is incredibly difficult following a hazard event.
- Immediate needs, such as alleviating homelessness after a disaster, can result in the loss of opportunities to reduce impacts of future disasters.
- Political will to support actions aimed at enhancing resilience can fade quickly.

Benchmarks for Resilience in Disaster Recovery

Table 6-29. Disaster Recovery Benchmark on Policy and Planning Capacity

H1. Disaster recovery plan is pre-established that addresses economic, environmental, and social concerns of the community.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities accept that disasters will impact the community and develop plans and procedures for recovery before they occur. These plans address short-and long-term recovery needs and conform to community values and development goals. They include guidance for reconstruction and outline procedures for a community-driven decision-making process. Resilient communities take advantage of opportunities during the recovery process to implement long-term strategies for advancing prosperity, sustaining natural resources, and reducing future risks.	Does the community have pre-established disaster recovery plans? Do existing plans address short-term needs, such as debris removal and sanitation? Do existing plans address long-term community development goals and values? Do existing plans address restoration, protection, and sustainable use of natural resources? Do policies and procedures exist for guiding reconstruction and redevelopment away from hazard areas and sensitive natural resources? Are multiple hazard scenarios used to consider the range of potential impacts?

Resilience in Action: Establishing a Recovery Process in Ban Nam Khem, Thailand

The fishing village of Ban Nam Khem in southern Thailand was devastated by the December 26, 2004, tsunami. As was the case in many locations, conflicts quickly arose as a result of the influx of donor funds and services. The community quickly recognized the need to build social capital to prevent conflicts and drive the recovery process themselves. The community organized itself into groups while living in relief camps to address issues together regarding sanitation, security, managing donors, coordinating with government agencies, and transportation. This development of social capital carried over into economic development programs. Group savings accounts were created, a revolving fund was established, and micro-credit loans were made available so that people who had nothing to do or no means of earning could start to generate income. Today, many occupation groups are established in Ban Nam Khem, including handicraft production and batik, food vending and coffee shops, boat-building, fishing net-weaving, and motorcycle and taxi services.

Table 6-30. Disaster Recovery Benchmark on Physical and Natural Resource Capacity

H2. Disaster recovery process is monitored, evaluated, and improved at periodic intervals.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities are adaptive and evaluate their actions for effectiveness. In terms of disaster recovery, this entails monitoring and evaluation of the entire recovery process. In addition, resilient coastal communities establish mechanisms to report on progress of the recovery process to the public, receive input from the community, and adapt recovery actions and plans accordingly.	Are there processes established to monitor and report on the progress of recovery efforts? Are there opportunities to revise recovery plans based on assessments, community input, and monitoring? Are post-disaster review and analysis of the recovery process conducted to revise protocols for the future?

Resilience in Action: Monitoring and Evaluating the Recovery Process in Indonesia

Disaster recovery efforts must be monitored and periodically adapted as the conditions of disaster stricken communities change. After the 2004 tsunami, the Government of Indonesia established a new ministerial agency, the Rehabilitation and Reconstruction Agency (BRR) to coordinate, monitor, and evaluate the reconstruction process in Aceh and Nias. The BRR was needed to manage the large volume of work to accelerate disaster recovery. UN ISDR (2007)

Table 6-31. Disaster Recovery Benchmark on Social and Cultural Capacity

H3. Coordination mechanisms at international, national, and local levels are pre-established for disaster recovery.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities have pre-established mechanisms in place for coordinating assistance from external organizations such as donor and service organizations. These mechanisms ensure donors understand and support existing community and government priorities. Resilient coastal communities are able to receive and coordinate the delivery of goods and services in such a way that they do not negatively impact the community.	Have stakeholder coordination mechanisms been pre-established with organizations and agencies responsible for recovery efforts? Have mechanisms been pre-established to coordinate donor and service organization efforts in the community? Are communication mechanisms in place to obtain and share information with the community on the recovery process? Do external organizations understand the process for delivering goods and services?

Resilience in Action: Coordination for Disaster Recovery in Sri Lanka

Coordination between government agencies and donor agencies for disaster recovery was one of the greatest challenges after the December 2004 tsunami disaster. Multi-agency disaster management coordination bodies, such as those established by Sri Lanka, are critical to guiding effective and sustainable disaster recovery, harmonizing the recovery efforts of donor agencies, and minimizing confusion and redundancy. The Sri Lankan coordination body consisted of key government agencies such as the Disaster Management Center, the Coast Conservation Department, the Urban Development Authority and others, together with the development agencies such as UNDP, USAID, AusAid, CIDA, IFRC among others, who all played active roles in post disaster relief and recovery. This same body has continued to serve as a means of coordinating longer-term plans for building coastal community resilience, among other functions.

Table 6-32. Disaster Recovery Benchmark on Technical and Financial Capacity

H4. Technical and financial resources are available to support the recovery process.	
Benchmark Description	***Potential Assessment Questions***
Resilient coastal communities have the technical and financial resources needed to recover. Such resources are tailored to the local needs and are appropriate for the scale and capacity of the community and do not overwhelm the implementing mechanisms. Technical information regarding future hazard risks and related risk reduction strategies provides a foundation for decision making in planning recovery. Resilient coastal communities seek out funds, leverage investments, and establish partnerships to make effective use of all available financial resources for enhancing resilience.	Is technical assistance available to communities after a hazard event? Are there recovery programs or incentives that offer funds for recovery? Are mechanisms in place for communities to solicit and accept external funds? Is assistance available to manage the recovery resources to a useful end? Is the level of support and its means of implementation appropriate for the community and its context?

Resilience in Action: Recovery Support in Southern Thailand

The Government of Thailand mobilized substantial support in the wake of the 2004 tsunami through its national disaster management agency and the provincial governments, working together with the private sector. It also received some external assistance but was careful to channel this assistance to areas most in need and to coordinate such support with existing government organizations so that confusion and corruption were minimized. The national government focused on repairing infrastructure, while the private sector, working with local governments, tended to focus on the immediate needs of people in the initial stages of recovery. Longer-term recovery efforts are being addressed through the local government system together with strategically placed development projects. Models for recovery are seen in Phuket, Ranong, and Phannga Provinces in southern Thailand.

Appendix A

CCR Assessment Worksheets

Worksheet 1. Benchmark Analysis and Summary

1	2	3	4	5	6
Benchmark	**Findings/Key Points Related to Community Resilience**	**Strengths**	**Weaknesses**	**Data Gaps**	**Rating**
A. Governance: Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.					
A1. Community development policies, plans, and programs are implemented and monitored in a participatory and transparent manner.					
A2. Basic services (i.e. water, transportation, security, etc.) are accessible to all sectors of society.					
A3. Participatory collaboration mechanisms among different sectors and various levels of government are established and used to manage for resilience.					
A4. Technical and financial support mechanisms are transparent, accountable, and available to support planned community actions.					
B. Society and Economy: Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.					
B1. Development policies and plans build social capital and skills for economic diversity and self reliance.					
B2. Local economies are characterized by diverse and environmentally sustainable livelihoods.					

Worksheet 1. Benchmark Analysis and Summary *(continued)*

1	2	3	4	5	6
Benchmark	**Findings/Key Points Related to Community Resilience**	**Strengths**	**Weaknesses**	**Data Gaps**	**Rating**
B3. Social and cultural networks promote self-reliant communities and have the capacity to provide support to disaster-stricken areas.					
B4. Technical and financial resources are available to promote stable and robust economies, reduce vulnerability to hazards, and aid in disaster recovery.					
C. Coastal Resource Management: Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.					
C1. Policies and plans are implemented and monitored to effectively manage natural coastal resources.					
C2. Sensitive coastal habitats, ecosystems and natural features are protected and maintained to reduce risk from coastal hazards.					
C3. Communities are actively engaged in planning and implementing coastal resource management activities.					
C4. Communities and local governments value and invest in management and conservation to sustain their natural resources.					

Worksheet 1. Benchmark Analysis and Summary *(continued)*

1	2	3	4	5	6
Benchmark	**Findings/Key Points Related to Community Resilience**	**Strengths**	**Weaknesses**	**Data Gaps**	**Rating**
D. Land Use Management and Structural Design: Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.					
D1. Land use policies and building standards that incorporate measures to reduce risks from hazards and protect sensitive habitats are established, monitored and enforced.					
D2. Critical infrastructure are located outside high risk areas and constructed to address risks from priority hazards.					
D3. Developers and communities incorporate risk reduction into the location and design of structures.					
D4. Education, outreach, and training programs are established to improve compliance with land use policies and building standards.					
E. Risk Knowledge: Leadership and community members are aware of hazards and risk information is utilized when making decisions					
E1. Coastal hazard risk assessments are completed at a scale appropriate to the community and routinely updated.					
E2. Coastal hazard risk assessments are comprehensive and incorporate risks to all elements of resilience (e.g. livelihoods, coastal resources, land use, etc.).					
E3. Community participates in the hazard risk assessment process.					

Worksheet 1. Benchmark Analysis and Summary *(continued)*

1	2	3	4	5	6
Benchmark	**Findings/Key Points Related to Community Resilience**	**Strengths**	**Weaknesses**	**Data Gaps**	**Rating**
E4. Information from risk assessment is accessible and utilized by the community and government.					
F. Warning and Evacuation: Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and individuals acting on the alert.					
F1. Community warning and evacuation systems, policies, plans, and procedures are in place and capable of alerting vulnerable populations in a timely manner.					
F2. Community warning and evacuation infrastructure is in place and maintained.					
F3. Community is prepared to respond to hazard warnings with appropriate actions.					
F4. Technical and financial resources are available to maintain and improve warning and evacuation systems.					
G. Emergency Response: Mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.					
G1. Pre-defined roles and responsibilities are established for immediate action at all levels.					
G2. Basic emergency and relief services are available.					

Worksheet 1. Benchmark Analysis and Summary *(continued)*

1	2	3	4	5	6
Benchmark	**Findings/Key Points Related to Community Resilience**	**Strengths**	**Weaknesses**	**Data Gaps**	**Rating**
G3. Preparedness activities (drills and simulations) are ongoing to train and educate responders.					
G4. Organizations and volunteers are in place with technical and financial resources to support emergency response activities.					
H. Disaster Recovery: Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize negative environmental, social, and economic impacts.					
H1. Disaster recovery plan is pre-established that addresses economic, environmental, and social concerns of the community.					
H2. Disaster recovery process is monitored, evaluated, and improved at periodic intervals.					
H3. Coordination mechanisms at international, national, and local levels are pre-established for disaster recovery.					
H4. Technical and financial resources are available to support the recovery process.					

Worksheet Guidance:

1 – Review all primary and secondary data collected during the assessment and identify findings by benchmark

2 – Prepare summary of key findings for each benchmark

3 – Categorize those findings as strengths or weaknesses

5 – Identify data gaps that could be filled with additional assessment

6 – If using a rating system (see Chapter 4, Establish a rating system for benchmark evaluation), develop a rating or score for each benchmark based on the relative number of strengths and weakness

Worksheet 2. Resilience Element Analysis and Summary

1	2	3	4	5
Element/Desired Outcomes	**Summary Statement**	**Average Score**	**Opportunities for Increased Resilience**	**Existing Good Practices**
A. Governance: Leadership, legal framework, and institutions provide enabling conditions for resilience through community involvement with government.				
B. Society and Economy: Communities are engaged in diverse and environmentally sustainable livelihoods resistant to hazards.				
C. Coastal Resource Management: Active management of coastal resources sustains environmental services and livelihoods and reduces risks from coastal hazards.				
D. Land Use Management and Structural Design: Effective land use and structural design that complement environmental, economic, and community goals and reduce risks from hazards.				
E. Risk Knowledge: Leadership and community members are aware of hazards and risk information is utilized when making decisions.				
F. Warning and Evacuation: Community is capable of receiving notifications and alerts of coastal hazards, warning at-risk populations, and individuals acting on the alert.				

Worksheet 2. Resilience Element Analysis and Summary *(continued)*

1	2	3	4	5
Element/Desired Outcomes	**Summary Statement**	**Average Score**	**Opportunities for Increased Resilience**	**Existing Good Practices**
G. Emergency Response: Mechanisms and networks are established and maintained to respond quickly to coastal disasters and address emergency needs at the community level.				
H. Disaster Recovery: Plans are in place prior to hazard events that accelerate disaster recovery, engage communities in the recovery process, and minimize				

Worksheet Guidance:

1 – Review the summary of findings in Worksheet 1 and identify key findings by resilience element

2 – Prepare summary statement on the status of the community relative to the desired outcome for each resilience element

3 – If using a rating system, (see Chapter 4, Establish a rating system for benchmark evaluation) compute the average score for each element based on the benchmark scores in Worksheet 1.

4 – Identify opportunities to increase resilience based on a review of the assessment results and discussions with assessment team

5 – Identify good practices currently used by the community that were identified during the assessment and should be highlighted and reinforced and shared with other communities

Appendix B

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www.ids.ac.uk

Sustainable Livelihoods Approach: Progress and Possibilities for Change
DFID
www.dfid.gov.uk/

The Group Savings Resource Book: A practical guide to help groups mobilize and manage their savings
FAO
www.fao.org

The Livelihood System Approach in Project Planning, a manual
Centre for Advanced Training in Rural Development (CATAD) Humboldt-University Berlin
http://www.ifsp-srilanka.org/html/catad_2001.html#analysis

Transferring Risk Through Micro-Insurance. Micro-Credit and Livelihood Relief
All India Disaster Mitigation Institute (AIDMI)
www.southasiadisasters.net

Coastal Resources Management

Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems
WWF
www.panda.org/climate/pa_manual

Creating and Managing Marine Protected Areas in the Philippines
Coastal Resources Management Project, USAID
http://www.oneocean.org/

Getting in Step: Engaging and Involving Stakeholders in Your Watershed
US Environmental Protection Agency
http://www.epa.gov/owow/watershed/outreach/documents/

Green Reconstruction Policy Guidelines For Aceh
WWF-Indonesia
www.wwf.or.id

Guidelines for Marine Protected Areas
IUCN
http://www.iucn.org/themes/wcpa/pubs/guidelines.htm#indigenous

How is your MPA doing? A Guidebook of Natural and Social Indicators for Evaluating Marine Protected Area Management Effectiveness
IUCN-NOAA-WWF
http://www.effectivempa.noaa.gov/guidebook/guidebook.html

Indigenous and Traditional Peoples and Protected Areas: Principles, Guidelines and Case Studies.
IUCN
http://www.iucn.org/themes/wcpa/pubs/guidelines.htm#indigenous

Involving Communities in Coastal Management.
Coastal Resources Management Project, USAID
http://www.oneocean.org/

Legal and Jurisdictional Guidebook for Resource Management in the Philippines
Coastal Resources Management Project, USAID
http://www.oneocean.org/

Managing Municipal Fisheries
Coastal Resources Management Progject, USAID
http://www.oneocean.org/

Monitoring and Evaluating City/Municipal Plans and Programs for Coastal Resource Management
Coastal Resources Management Project, USAID
http://www.oneocean.org/

Participatory Coastal Resource Assessment Training Guide
Coastal Resources Management Project, USAID
http://www.oneocean.org/

Philippine Fisheries in Crisis: A Framework for Management
Coastal Resources Management Progject, USAID
http://www.oneocean.org/

The Shore Primer - A cottager's guide to a healthy waterfront
Cottage Life
www.cottagelife.com

UNDP Handbook and Guidelines for Environmental Management and Sustainable Development
UNDP
www.undp.org

Land Use and Structural Design

An Introduction to Better Site Design
www.cwp.org/45-Intro_to_Better_Site_Design.pdf

Designing for Tsunamis
National Tsunami Hazard Mitigation Program
www.pmel.noaa.gov/tsunami-hazard/

Handbook on Design and Construction of Housing for Flood-Prone Rural Areas of Bangladesh
ADPC-CARE
http://www.adpc.net

Housing reconstruction after conflict and disaster
Humanitarian Practice Network (HPN)
www.odihpn.org

Land Use Tools and Techniques: A Handbook for Local Communities
Southeast Michigan Council of Governments
www.semcog.org

Principles of Disaster Mitigation in Health Facilities
World Health Organization
www.who.org

Shoreline Vegetative Buffers
The District of Muskoka Planning and Economic Development Department
www.muskoka.on.ca/planningeconomic/buffers.pdf

Technical Manual for Coastal Land Use Planning
The North Carolina Division of Coastal Management (DCM)
http://dcm2.enr.state.nc.us/Planning/techmanual.pdf

The Shore Primer: a Cottager's Guide to a Healthy Waterfront
Cottage Life
www.cottagelife.com

The Shoreline Stabilization Handbook
Northwest Regional Planning Commission
nrpcvt@nrpcvt.com

Risk Knowledge

A Primer for Integrated Flood Risk Management in Asia
Asian Disaster Preparedness Center
http://www.adpc.net

A Primer for Parliamentarians
National Disaster Management Division, India
www.ndmindia.nic.in

Assessing Resilience and Vulnerability in the Context of Emergencies: Guidelines
Victorian Government
www.dhs.vic.gov.au/emergency

Best practices on indigenous knowledge
UNESCO and NUFFIC
http://www.unesco.org/most/bpindi.htm#_ftn3

CBDRM Field Practitioners' Handbook
Asian Disaster Preparedness Center
http://www.adpc.net

Community Vulnerability Assessment Tool (CVAT)
NOAA
http://www.csc.noaa.gov/products/nchaz/startup.htm

Critical Guidelines: Community-Based Disaster Risk Management
Asian Disaster Preparedness Center
http://www.adpc.net

Education for Disaster Risk Reduction & School Protection
UN/ISDR
www.unisdr.org/knowledge-education

FEWS Current Vulnerability Assessment Guidance Manual
USAID FEWS Project
http://www.fews.net/

Local Hazard Mitigation Planning Manual
North Carolina Division of Emergency Management
www.ncem.org

Participatory Capacities and Vulnerabilities Assessment: Finding the Links Between Disasters and Development
OXFAM

Participatory Vulnerability Analysis: A step–by–step guide for field staff
Actionaid
www.actionaid.org

Rapid appraisal methods for coastal communities: a manual
FAO
www.fao.org

Reducing Disaster Risk: A Challenge for Development
Bureau for Crisis Prevention and Recovery, UNDP
www.undp.org/bcpr

Reducing risk of disaster in our communities
Tearfund
www.tearfund.org/tilz

Risk Management Guidelines
Standards Australia
http://www.riskmanagement.com.au/Products/TheHandbook/tabid/157/Default.aspx

The Programme Manager's Planning, Monitoring and Evaluation Toolkit
UNFPA
http://www.unfpa.org/monitoring/toolkit.htm

Tsunami Ready™
National Weather Service
www.tsunamiready.noaa.gov

Tsunami Resources for Teachers
NOAA
www.tsunami.noaa.gov/teacher-resources.html

TsunamiTeacher
UNESO IOC
http://ioc.unesco.org/TsunamiTeacher

Warning and Evacuation

Developing Early Warning Checklist: A Key Checklist
Third International Conference on Early Warning (EWC III)
http://www.ewc3.org/

Disaster Preparedness Coloring Book
American Red Cross
www.redcross.org/

Disaster Preparedness Handbook: An emergency planning and response guide
Washington Military Department
www.emd.wa.gov

Minimum Standards for Education in Emergencies, Chronic Crises and Early Reconstruction
Inter-Agency Network for Education in Emergencies (INEE), UNESCO
www.ineesite.org

Primer on Natural Disaster Preparedness and Coping Mechanisms
UNESCO
http://www.unesco.org

Surviving Disasters: A Citizen's Emergency Handbook
Illinois Department of Public Health

The Be Ready Book
American Red Cross
www.redcross.org/

Emergency Response

A Primer for Integrated Flood Risk Management in Asia
Asian Disaster Preparedness Center
http://www.adpc.net

Contingency Planning Guidelines: A practical guide for field staff
UNHCR
www.unhcr.org

Disaster Emergency Needs Assessment
International Federation of Red Cross and Red Crescent (IFRC)
http://www.ifrc.org/

Disaster Reduction: A Practitioner's Guide
OFDA, USAID
http://www.usaid.gov/

Emergency Field Handbook: A Guide For UNICEF Staff
The United Nations Children's Fund (UNICEF)
www.unicef.org

Field Operations Guide for Disaster Assessment and Response (FOG)
OFDA, USAID
http://www.usaid.gov/

Guidelines for emergency assessment
International Federation of Red Cross and Red Crescent (IFRC)
http://www.ifrc.org/

Guidelines for planning in the re-building process – Resource pack
Practical Action (ITDG)
www.practicalaction.org/

Handbook for Emergencies
United Nations High Commissioner for Refugees (UNHCR)
www.unhcr.org

Improving Coordination
International Federation of Red Cross and Red Crescent (IFRC)
http://www.ifrc.org/

Inter-Agency Contingency Planning Guidelines for Humanitarian Assistance
United Nations
www.un.org

Manual on Field Practice in Internal Displacement
United Nations
www.un.org

Partnership: An Operations Management Handbook for UNHCR's Partners
United Nations High Commissioner for Refugees (UNHCR)
www.unhcr.org

Post-Disaster Damage Assessment and Need Analysis
ADPC
http://www.adpc.net

Preparedness Planning
International Federation of Red Cross and Red Crescent Societies
http://www.ifrc.org/

Recovery from Emergencies Management Checklists
Victorian Government
http://www.dhs.vic.gov.au/emergency

Recovery from Emergencies Management Guidelines
Victorian Government
http://www.dhs.vic.gov.au/emergency

The Oxfam Handbook of Development and Relief
OXFAM
http://www.oxfam.org/

Disaster Recovery

CBDRM Field Practitioners' Handbook
Southeast Asia
Asian Disaster Preparedness Center
www.adpc.net

Community Based Disaster Management (CBDM) Manual
IDEP Foundation
http://www.idepfoundation.org/cbdm_download.html

Disaster Assessment
Disaster Management Training Programme (DMTP), UNDP
www.undmtp.org/modules_e.htm

Disaster Recovery and Mitigation Handbook
Governors Office of Emergency Services, California
http://www.oes.ca.gov

From Relief to Recovery: The Gujarat Experience
UNDP
www.undp.org

Guidelines for Generating a Disaster Recovery Plan
University of Arizona
http://www.arizona.edu/

Guidelines for planning in the re-building process – Resource pack
Practical Action (ITDG)
www.practicalaction.org

Improving Coordination
International Federation of Red Cross and Red Crescent Societies
www.ifrc.org/

Manual on Field Practice in Internal Displacement
United Nations
www.un.org

Participation by Crisis-Affected Populations in Humanitarian Action: A Handbook for Practitioners
Active Learning Network for Accountability and Performance in Humanitarian Action
www.alnap.org

Post-Disaster Damage Assessment and Need Analysis
ADPC
www.adpc.net

Recovery from Emergencies Management Checklists
Australia Victorian Government
www.dhs.vic.gov.au/emergency

Recovery from Emergencies Management Guidelines
Australia Victorian Government
www.dhs.vic.gov.au/emergency

Appendix C

CCR Assessment Training Course Session Guide

Overview

As part of the process to develop and refine the Coastal Community Resilience (CCR) Guide, the U.S. Indian Ocean Tsunami Warning System (IOTWS) Program conducted three national training courses in Sri Lanka, Indonesia, and Thailand. This Appendix provides a summary of the course goals and objectives and course outline.

Course Goals and Objectives

The goal of the CCR national training courses was to build the participants' capacity to catalyze actions that would increase the resilience of their coastal communities. By the end of each course, the participants were expected to be able to:

a) Identify and distinguish between practices that increase or erode community resilience.

b) Conduct a CCR assessment for small communities (including tourism areas).

c) Develop an action plan to increase community resilience to coastal hazards.

d) Provide feedback to trainers on the applicability and usefulness of the content, approach, and tools.

e) Create a detailed work plan to conduct a CCR assessment and action plan in one or more communities after the training workshop.

Recommendations for Course Designs

The national workshops were each conducted in 4 to 5 days, with one day dedicated to a field practicum. The CCR training materials summarized here were designed as a 5-day program. The 5-day course design results in a very active and fast-paced session.

The training materials can be used as a reference to design courses of varying lengths and focus. The course materials can be adapted to fit the audience, training objectives, and time allocated. In adapting these materials for shorter training courses, be careful not to try to cover more material than is appropriate for the audience and the time available. Advice on adapting the course for shorter formats is presented below, following the summary of the 5-day course design and Table C-1.

Table C-1. Example of a 5-Day Coastal Community Resilience Training Workshop Agenda

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
AM	Opening Ceremony **MODULE 1: What Does Resilience Look Like?** 1.1 Overview of workshop (objectives, expectations) 1.2 Introduction of participants and their images of resilience 1.3 Ice breaker 1.4 Overview of the CCR System 1.5 Resilience – National context – Success and challenges post-tsunami	2.4 Intro to Elements *Society and Economy, Warning and Evacuation, Emergency Response, Disaster Recovery* 2.5 Group Exercise #2 & Report Out: Elements	**MODULE 3: Methods and Tools To Assess Resilience** 3.1 Presentation of Ranong findings and process 3.2 Tools for Sharing Hazard Risk Information 3.3 Methods and tools for building resilience 3.4 Group Exercise #5 – Dos and don'ts of focus group and interviews	**MODULE 4: Field Practicum** 4.1 Group Exercise #7 Field Exercise • Gathering information • Focus groups • Interviews • Field mapping	**MODULE 5: Planning for and Building Resilience** 5.1 Packaging the Results for Action • Gaps and Priorities • Resources and Opportunities • Phased Action Plan 5.2 Next Steps for Field Exercise site 5.3 Review process moving forward 5.4 "Team" Work Plan Development (continued from Exercise #4) and presentation 5.5 Reflections of CCR 5.6 CLOSING – certificates
PM	**MODULE 2: Defining the Enabling Conditions for Community Resilience** 2.1 Setting a national context for community resilience 2.2 Intro to Elements *Governance, Land Use Management and Structural Design, Risk Knowledge, Coastal Resource Management* 2.3 Group Exercise #1 & Report Out	2.6 Group Exercise #3. Open Space: Findings, strengths and weaknesses of National Enabling Environment 2.7 "Fish Bowl" Discussion Panel – Integrating the elements across the three domains 2.8 Looking beyond the Workshop – CCR Pilot Assessment 2.9 Group Exercise #4: Team Work	3.5 Field Briefing 3.6 Group Exercise #6 Preparation for field exercise	4.2 Synthesize findings: Disaggregate data into strengths, weaknesses and unknowns for each benchmark 4.3 Presentations 4.4 Observer Round Table Participant 4.5 Reflections of a technical floater from the field 4.6 Synthesis of Conclusions, Opportunities and Scoring 4.7 Distribute Evaluation	
EVE		Informal Participant "Team" meeting	Karaoke – Team Building		

5-Day Course Design

The three national training sessions were designed for a target audience of national agencies, community-based organizations, international nongovernment organizations (NGO), and other selected organizations. The training program is divided into five major modules. The five modules of the workshop closely follow the CCR Guide, *How Resilient is Your Coastal Community? A Guide for Evaluating Community Resilience to Tsunamis and Other Coastal Hazards* (US IOTWS 2007).

Module 1: What does resilience look like?

1.1 Overview of workshop (objectives, expectations)

1.2 Introduction of participants and their images of resilience

1.3 Ice breaker

1.4 Overview of the CCR model and assessment tool

1.5 Resilience – Context of "Specific Country" – Successes and challenges post-tsunami

Module 2: Defining the enabling conditions for community resilience

2.1 Setting a national context for community resilience

2.2 Intro to resilience elements *Governance, Land Use Management and Structural Design, Risk Knowledge*, and *Coastal Resource Management*

2.3 Group exercise no.1: Resilience element and benchmark review and report out

2.4 Intro to resilience elements *Society and Economy, Warning and Evacuation, Emergency Response*, and *Disaster Recovery*

2.5 Group exercise no. 2: Resilience element and benchmark review and report out

2.6 Group exercise no. 3: Open space: Findings, strengths and weaknesses of the national enabling environment

2.7 "Fish bowl" discussion panel: Integrating the elements across the three domains

2.8 Looking beyond the workshop: CCR pilot assessment

2.9 Group exercise no. 4: Team work

Module 3: Methods and tools to assess resilience

3.1 Background presentation on field practicum site

3.2 Tools for sharing hazard risk information

3.3 Methods and tools for building resilience

3.4 Group exercise no. 5: Dos and don'ts of focus group and interviews

3.5 Field briefing

3.6 Group exercise no. 6: Preparations for field exercise

Module 4: Field practicum

4.1 Group exercise no. 7: Field exercise

- Gathering information
- Focus groups
- Interviews
- Field mapping

4.2 Synthesize findings

4.3 Presentations

4.4 Observer round table

4.5 Reflections of a technical floater from the field

4.6 Synthesis of conclusions, opportunities, and scoring

4.7 Distribute evaluation

Module 5: Planning for and building resilience

5.1 Packaging the Results for Action

- Gaps and Priorities
- Resources and Opportunities
- Phased Action Plan

5.2 Next steps for field exercise site

5.3 Review process moving forward

5.4 "Team work" plan development (continued from group exercise no. 4) and presentation

5.5 Reflections of CCR

5.6 Closing – certificates

A 5-day course allows the participants to be introduced to the concept of resilience as it relates to three key areas: coastal management, emergency management, and community development. This is followed by a review of the elements of resilience and the current context in each country. Field research skills are reviewed before conducting a full day of field data gathering to practice the skills and synthesize findings. The last day is focused on developing a work plan for conducting the assessment and how to create action plans using the results of the assessment.

The CCR guide is used in the courses as background material for the discussion of resilience elements, and CCR assessment worksheets are used as templates for conducting the field assessment. Details of how the five modules are carried out over the 5-day course are summarized in Table C-1.

Adapting the Design

The materials from the 5-day course can be shortened and extracted to fit shorter time allotments or training goals. Table C-2 presents some suggestions for adapting the 5-day course design to shorter time segments:

Table C-2. Recommended Topics to Cover in Shorter Training Sessions

Time	Concepts	Elements	National Context	Assessment Process with a Case Study	Field Skills	Action Planning
5 Days	1.1–1.5	2.2–2.5, 2.8–2.9	2.1, 2.6, 2.7	3.1–3.3	3.4, 3.6, Module 4	5.1–5.6
3 Days	X	X		X		X
1 Day	X	X		X		
3 Hours	X (Brief)	X (Brief)		X (Brief)		

Note: Numbers correlate to the module sessions listed above and on the CD.

Guidance for Trainers

Based on the experience from the three national workshops, here is a brief list of tips and guidance to assist the trainers in designing and facilitating future training sessions.

Design

- Vary the training format to generate participation and dialog using open forums, "fishbowl discussions" (see below), exercises, and field work.
- Try to use 'fishbowl" discussions, in which 3 to 4 participants representing different domains discuss specific issues while the rest of the participants observe, to address topics such as the national context analysis.
- Small group activities are very effective for participants to get acquainted with each other and the content.
- Ensure that the training team has at least a 3-hour session together before the workshop to assess their facilitation skills. Each member can identify their individual strengths and discuss what techniques they want to learn or improve.

- Schedule daily debriefings to provide an opportunity to review the workshop mechanics, sessions, and techniques. This also gives trainers an opportunity to get feedback on their training skills. These debriefings are essential to ensure that the workshop meets both the needs of the participants and the course objectives.
- Attract the right participants by networking with the organizations and doing background research. This also establishes the possibility for future partnerships.
- An ice-breaker exercise is an excellent way to introduce participants and encourage them to participate early on.
- Clear objectives must be communicated for the workshop and each session.

Facilitation

- Allow the participants to co-train some sessions if they have expertise in the subject matter.
- Allow time for the different sectors of coastal management, emergency management, and community development to share experiences and skills.
- Use co-facilitators in sessions to make it easier to process the discussions and make the session run effectively.
- Ensure good facilitation of the group discussions, since the amount of information generated during these sessions can be substantial.
- Prepare the participants for the site visit by giving them background materials, a clear purpose, and skills training.
- Hire a local facilitator (organization and facilitation) to assist with native language and local context.
- Assign different trainers to each of the small groups to ensure effective group work and to capture the essence of the conversations, which often is not reported out.
- Provide guidance on action planning to avoid overly general outcome statements.
- Have participants/organizations sign their action plans to engender commitment.

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