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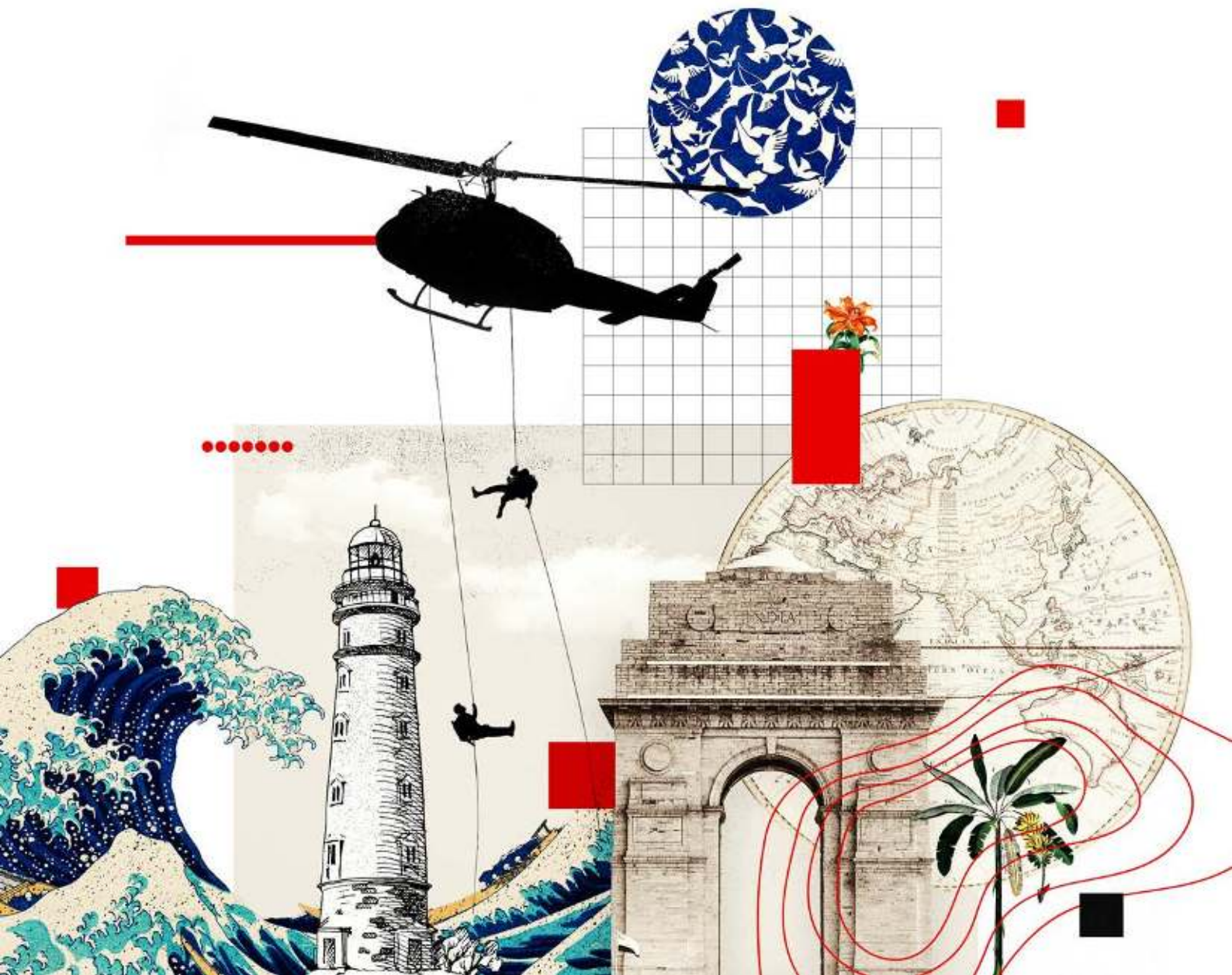


**The Asia Foundation**  
Improving Lives, Expanding Opportunities

INDIA-U.S.  
TRIANGULAR DEVELOPMENT PARTNERSHIP

# India's Disaster Risk Reduction Journey

Opportunities for Strengthening Partnerships  
in the Indo-Pacific





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## **Disclaimer**

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# Foreword

India and the U.S. share a common vision for a free and open Indo-Pacific region. India's long-standing engagement in the region makes it a strong development partner and leader. The Asia Foundation through its India- U.S. Triangular Development Partnership (TriDeP), a program funded by USAID, is working toward realizing this vision and strengthening India's and the U.S.'s development cooperation footprint in the Indo-Pacific region and beyond. The program builds on the U.S. government's commitment to strengthen triangular partnership programs with India in the Indo-Pacific region and is informed by the U.S. government's Indo-Pacific Strategy and its Pacific Islands Strategy.

TriDeP seeks to support the Government of India's development assistance in the Indo-Pacific region by identifying countries keen to expand their development partnership with India in sectors defined by their country needs, and by supporting programming based on such identification. Disaster Risk Reduction, Climate Smart Agriculture and Renewable Energy are sectors where India demonstrates policy leadership and technical skills, and thus can provide sustainable solutions. This report presents a diagnostic study that maps India's capabilities in disaster management, as well as identifying opportunities for India and the developing countries in the Pacific Islands, Southeast Asia, and South Asia to partner for promising solutions.

Over the years, India's disaster management approach has evolved rapidly to respond to the slew of challenges posed by a range of disasters. India's diverse geo-climatic conditions make

it vulnerable to multiple natural and human-caused disasters, thus prompting the country to develop tailored policies and frameworks for coordinated multi-stakeholder disaster-risk reduction efforts.

TriDeP seeks to leverage India's know-how in disaster management, by sharing technical expertise and knowledge and supporting local adaptation, to improve resilience and preparedness against disasters in the Indo-Pacific region. TriDeP aims to do this in close collaboration with a range of stakeholders, including governments, communities, and the private sector, through cost-effective and context-specific solutions.

This diagnostic identifies India's expertise in establishing well-defined institutional systems; legislative, policy and planning frameworks; robust search and rescue capabilities; improved early warning systems; technological advancements for disaster risk management; improved emergency communication; expanded disaster resource and knowledge networks; emergency operations centers; enhanced response capabilities and systems; and post-disaster mental health management. The study also identifies opportunities for India-U.S. triangular cooperation across several countries in the Indo-Pacific region.

While the diagnostic study was underway, the Covid-19 virus struck with severity unimagined in a century and has brought to the fore the disastrous dimensions of pandemics, including psychological and physical health challenges that require concerted medical responses to

address them. Several participants in a virtual meeting of experts from the Indo-Pacific region to discuss the study expressed interest in the knowledge and expertise of India in psychosocial care and telemedicine health services, both important focus areas that help to address pandemic-related health issues.

I would like to thank Balaji Singh Chowhan, who is the lead author and researcher for this report and an expert in disaster management.

I would like to thank Veena Reddy, USAID/India and Bhutan Mission Director; Karen Klimowski, Deputy Mission Director; John Smith-Sreen, Director of the Indo-Pacific Office; MaryTyler E. Holmes, Deputy Director of the Indo-Pacific Office; Sukanya Banerjee, Development Partnership Adviser and the Activity Manager for TriDeP; and Arun Sahdeo, Project Management Specialist (Disaster Risk Management) for their support to the program and their valuable inputs and suggestions that enhanced the quality of the report.

Our thanks to all the technical experts from the disaster management sector in India, South

Asia, Southeast Asia, and the Pacific Island countries for their participation in the research, valuable insights, and contributions to the study.

At The Asia Foundation, we would like to thank Anthea Mulakala, Senior Director for International Cooperation for her guidance during the study. Atul Kaushik, TriDeP Chief of Party, led the planning and execution of the diagnostic, ably assisted by Malavika Thirukode, Program Officer. Ramesh Navaladi, Deputy Chief of Party and Ajay Singh, Monitoring, Evaluation, Learning and Adaptation Specialist, each made valuable contributions to the report's approach and content. Aparna Achuthan, Program Officer, made valuable contributions to finalizing the report, and Suzan Nolan from BlueSky International contributed to the editing of the report.

I hope the findings from this report will pave the way for strengthening India's and the U.S.'s approach to triangular partnerships in the Indo-Pacific region.

**Nandita Baruah**

Country Representative – India

The Asia Foundation

# Table of Contents

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Abbreviations and Acronyms	06
List of Boxes	08
List of Tables	08
List of Annexures	08
Executive Summary	09
Chapter 1. India's Journey from Disaster Relief to Risk Reduction	15
Introduction	15
India Shifted its Paradigm From Reaction to Reduction	20
Chapter 2. India's Disaster Management Framework	26
Interplay between Institutions, Legislation and Policies	26
Focus on Disaster Management Planning	32
Perspectives on Gender Equity and Social Inclusion	35
Chapter 3: India's Shareable DRR Capabilities	41
DRR Technical, Training, and Capacity-building Institutions	42
Incident Command System Adaptation	50
Risk Communication and Language Adaptations	50
Equipment Stocks and Suppliers	50
Chapter 4. Indo-Pacific Sub-Regional DRR Status, Mechanisms, Institutions and Partners	53
Status of DRR in the South Asia Region	53
South Asia Region Institutions and Partners	55
Status of DRR in Southeast Asia	55
Southeast Asia Region Institutions and Partners	58
Status of DRR in the Indo-Pacific Islands Region	59
Indo-Pacific Islands Region Institutions and Partners	59

Chapter 5. Summary of TrC Approaches, Potential Match Countries and Recommended Initiatives for TrC	61
Triangular Cooperation, Viability, and Recommendations	62
Suitable DRR Activities for TrC Initiatives	62
Approaches to Consider During TrC Initiative Implementation	66
Suggested Approach to Addressing GESI Issues and Challenges	67
Opportunities and Challenges	67
Summary of Initial Supply-demand Country-initiative Matches for TrC	68
South Asia Region	69
Southeast Asia Region	72
Indo-Pacific Islands Region	77
References	80
Annexures	87



# Abbreviations and Acronyms

**ADB** – Asian Development Bank

**ADPC** – Asian Disaster Preparedness Center

**AHA Center** – ASEAN Coordinating Centre for Humanitarian Assistance

**ASEAN** – Association of Southeast Asian Nations

**CDRI** – Coalition for Disaster Resilient Infrastructure

**COE** – Center of Excellence

**CSO** – Civil Society Organization

**DDMA** – District Disaster Management Authority

**DFAT** – Department for Foreign Assistance and Trade (Australia)

**DM** – Disaster Management

**DMD** – Disaster Management Division of the Ministry of Home Affairs

**DMS** – Disaster Management Support

**DRM** – Disaster Risk Management

**DRR** – Disaster Risk Reduction

**EOC** – Emergency Operations Center

**FCDO** – Foreign, Commonwealth and Development Office (United Kingdom)

**GESI** – Gender Equity and Social Inclusion

**GFDRR** – Global Facility for Disaster Risk Reduction

**HPC** – High Powered Committee

**ICS** – Incident Command System

**IDKN** – India Disaster Knowledge Network

**IDNDR** – International Decade for Natural Disaster Reduction

**IDRN** – India Disaster Resource Network

**IIT** – Indian Institute of Technology

**IMD** – India Meteorological Department

**INCOIS** – Indian National Center for Oceanic Information Systems

**INGO** – International Nongovernmental Organization

**IPI** – Indo-Pacific Islands Region

**IRS** – Incident Response System

**ISRO** – Indian Space Research Organization



**JICA** – Japan International Cooperation Agency  
**Km** – Kilometer  
**NCMRWF** – National Center for Medium Range Weather Forecasting  
**NDMA** – National Disaster Management Authority  
**NDRF** – National Disaster Response Force  
**NEC** – National Executive Committee  
**NGO** – Nongovernmental organization  
**NIDM** – National Institute of Disaster Management  
**NIMHANS** – National Institute of Mental Health and Neurosciences  
**MoES** – Ministry of Earth Sciences  
**PEER** – Program for Enhancement of Emergency Response  
**RIMES** – Regional Integrated Multi Early Warning System  
**SAARC** – South Asia Association for Regional Cooperation  
**SAR** – South Asia Region  
**SDMA** – State Disaster Management Authority  
**SDMC** – SAARC Disaster Management Center  
**SEA** – Southeast Asia Region  
**SEC** – State Executive Committee  
**SEEDS** – Sustainable Environment and Ecological Development Society  
**SOPs** – Standard operating procedures  
**Sq.** – Square  
**TISS** – Tata Institute of Social Sciences  
**TrC** – Triangular cooperation  
**TriDeP** - India-U.S. Triangular Development Partnership  
**UNDP** – United Nations Development Programme  
**UNDRR** – United Nations Office for Disaster Risk Reduction  
**UNESCAP** - United Nations Economic and Social Commission for Asia and Pacific  
**U.S.** – United States  
**USAID** – United States Agency for International Development  
**USD** – U.S. Dollar  
**USFS IP** – United States Forest Service International Program  
**YASHADA** – Yashwant Rao Chavan Academy of Development Administration

## List of Boxes

- Box 1** The Incident Command System underpins India's effective disaster response
- Box 2** India helps Sri Lanka manage 2021 shipwreck and spill of oil and other pollutants
- Box 3** India participates in multi-country search and rescue field exercises
- Box 4** Moving towards GESI-sensitive disaster management: A case study in Odisha State
- Box 5** India's response to the 2015 earthquake in Nepal: A case study

## List of Tables

- Table 1** Some Common Hazards in Indo-Pacific Countries
- Table A.1.1** Indian Supply-side Experts for Preliminary Interviews
- Table A.2.1** Supply-side Experts and Organizers
- Table A.3.1** Demand-side Experts and Organizers
- Table A.6.1** Examples of Indian Equipment Stocks for Four Types of Disaster Response
- Table A.6.2** Examples of Indian Suppliers of CSSR Disaster Response Equipment
- Table A.7.1** Indian DRR Capabilities and Suggested U.S. Partners

## List of Annexures

- Annexure 1** Indian Supply-side Preliminary Telephone and In-person Interviewees (January 2021)
- Annexure 2** Supply-side Expert Convening Participants (March 2021)
- Annexure 3** Demand-side Expert Convening Participants (May 2021)
- Annexure 4** Disaster Risk Profile of Potential Match Countries
- Annexure 5** Disaster Risk Profile of Other Indo-Pacific Countries
- Annexure 6** Indicative Lists of Indian Search, Rescue and Disaster Management Equipment and Suppliers
- Annexure 7** Indian Capabilities and Suggested U.S. Partner Agencies and Organizations for Additional or Complementary DRR Supply Actions

# Executive Summary



Photographer: R. Sen

Pilgrims being rescued from Badrinath after the 2021 Uttarakhand flood.

India, due to its unique geo-climatic conditions, is vulnerable to multiple natural and human-caused disasters, such as droughts, floods, earthquakes, landslides, avalanches, hailstorms, cold waves, heat waves, glacier lake outburst floods, wildfires, oil spills, and other major pollution events. The country's journey toward holistic and modern disaster risk reduction (DRR) practices began more than 20 years ago, when several natural disasters resulted in thousands of deaths and enormous economic losses. These disasters spurred India toward a more comprehensive DRR approach, eventually leading the country to tremendous disaster management progress: Subsequent disasters have resulted in minimized deaths and losses because of India's effective DRR efforts.

Over the course of the past two decades, India's disaster management approach evolved from a reactive, search-and-rescue, and relief-centered approach primarily centered on flood and drought to a proactive, holistic approach that includes prevention, mitigation, preparedness, capacity building, risk reduction, technological investment and advancements, community involvement, and risk resilience for a far wider range of hazards. Holistic disaster management requires mainstreaming DRR into policies, institutions, infrastructure, and logistics in order to develop tools for effective and efficient action. India developed DRR policies for multiple stakeholders by integrating inputs from domain experts and all levels of governments and communities; it also increased response effectiveness through international coalitions, and coordinated risk reduction capabilities at the national and local levels.

India's holistic DRR efforts involve robust legal frameworks; effective policy design and development; domestic policy and institutional

coherence; a focus on capacity building, expert input, and knowledge sharing; well-oiled administrative mechanisms; an ability to prevent or mitigate disasters before they occur, as well as effective and inclusive rescue and recovery operations. India's disaster management learning curve owes a great deal to how India adapted crucial disaster management elements from other countries to India's own context. Now, other countries have the opportunity to emulate India's DRR journey in order to accelerate their own efforts, thereby saving thousands of lives and millions in economic losses.

India has multiple bilateral and multilateral DRR relationships with other countries, such as the United States, Switzerland, Australia, Russia, the European Commission, and United Nations agencies. Given this international cooperation framework already in place and India's extensive DRR capabilities, it would be hugely beneficial for India to branch out to additional triangular cooperation (TrC) initiatives, especially partnered with the United States Agency for International Development (USAID), which already has a strong DRR backbone with India. These TrC initiatives would be led by India as the primary source of expertise and technical assistance and could also benefit from the involvement of several United States agencies and private-sector or nongovernmental organizations. India's South-South development cooperation model would thus be considerably enhanced, with the triangulation of efforts between India and the United States increasing India's development assistance footprint in the developing countries of the Indo-Pacific region and beyond.

This report begins with an explanation of India's 20-year journey from search and rescue-related crisis management to prevention,



mitigation, and preparedness, setting the groundwork for how India's experiences can be adapted to other countries' own disaster management contexts. The second chapter details the interplay between India's DRR strategy, legislation, policy interventions, disaster management administration and institutions, and its perspectives on gender equity and social inclusion in DRR efforts. Chapter three breaks down how India can share its knowledge and DRR capabilities through the country's multiple DRR technologies and capacity-building institutions, including centers of excellence for training in general disaster management and early warning systems; specialized institutions for search and rescue and disaster assessment, mitigation, and planning; private- and nongovernmental organization-run training institutes; Incident Command System adaptations; risk communication and language adaptations; and equipment stocks and suppliers. The fourth chapter outlines the DRR status of three Indo-Pacific sub-regions:



Photographer: Saikiran Kesari  
Stranded citizens making their way through the flooded streets of Mumbai, India during the 2020 Mumbai floods.

South Asia, Southeast Asia, and the Indo-Pacific Islands, and briefly discusses the potential DRR needs of ideal TrC partners. Chapter five concludes with a discussion about the viability of TrC initiatives, and makes recommendations for suitable TrC activities in 10 Indo-Pacific countries.

### **About the India-U.S. Triangular Development Partnership (TriDeP)**

With support from the United States Agency for International Development (USAID) India, The Asia Foundation is implementing the India-U.S. Triangular Development Partnership (TriDeP), a three-year program in support of the United States' and India's mutual aims in the Indo-Pacific Region. In a ground-breaking initiative to catalyze North-South-South triangular cooperation (TrC) throughout an entire region – the Indo-Pacific – rather than with a single country, the TriDeP program will facilitate partnerships between India, the United States, and several South Asian, Southeast Asian, and Indo-Pacific Island countries.<sup>1</sup>

The TriDeP program has identified three priority areas where India can share its proven expertise: disaster risk reduction (DRR), climate-smart agriculture, and renewable energy. The TriDeP program team selected DRR for its inaugural research initiative to explore how and where India's demonstrated DRR policy leadership, practical experience, and sustainable results can be shared with countries in the region. After assessing India's DRR capacities and capabilities and matching them to the needs and capabilities of potential Indo-Pacific partner countries, the TriDeP program will develop demand-driven, context-specific TrC projects that combine Indian experience and

expertise with Indian and American technical assistance, drawing on India's centers of excellence, training institutions, relevant private sector entities, and nongovernmental and civil society organizations.

## Research Objectives

The TriDeP program team undertook action research on India's DRR institutions and capabilities in order to understand the Indian-Indo-Pacific DRR landscape, identify DRR needs in potential beneficiary countries, highlight areas of India's DRR expertise that could be shared, suggest priority partners and projects for initial TrC implementations, and determine suitable activities to support project design and implementation.

## Research Methodology

The action research for this report took place from January through June 2021. The research process began with a thorough review of the literature followed by nine telephone and seven in-person interviews with 16 Indian government representatives, technical specialists, and practitioners experienced in DRR and disaster management in order to gain a preliminary overview of India's current capabilities – what we will call the “supply-side” of DRR (see Annexure 1 for participant list). The study also involved extensive desk research to gather background information about India's supply-side capabilities. The supply-side research also involved convening a group of 17 experts from India, including independent DRR experts, leaders of DRR civil society organizations (CSOs) working in India, and current and retired government functionaries who lead or have led India's disaster responses. These experts were joined by six supporting

Photographer: Dr. Ashok K

A Doppler Radar meteorological geodesic dome atop a hillock at Vishakhapatnam, India.



staff members from The Asia Foundation and USAID (see Annexure 2 for participant list).

The supply-side research was complemented by what we will call “demand-side” desk research about Indo-Pacific countries’ geographies and their disaster exposures, histories, institutional and technical capabilities, current disaster-aid partnerships, and relevant socioeconomic profiles. The desk research was enhanced through discussions with a group of 39 experts in the fields of DRR and climate change impacts; these experts represented countries, states, or organizations from Australia, Bangladesh, Bhutan, Germany, India, Nepal, United Kingdom, United Nations, United States, and international nongovernmental and civil society organizations. These experts were joined by seven supporting staff members from The Asia Foundation and USAID (see Annexure 3 for participant list). The demand-side experts discussed DRR needs as perceived by countries in the region, identified geopolitical interests or sensitivities, and postulated supply-demand matches. Since Covid-19 pandemic restrictions prevented in-person meetings, both supply- and demand-side convenings took place online and lasted about two hours each.

During the demand-side convening, the Covid-19 pandemic prompted requests from some Indo-Pacific countries for assistance with health- and psychosocial-care needs to combat and counter the effects of the pandemic. Although the TriDeP team did not focus on pandemic disasters in the initial research phases, this report describes some of India’s supply-side telemedicine and psychosocial-care capabilities that could match demand-side requests for pandemic- and other health-related cooperation projects.

Drawing on the desk research, interviews, and discussions with the TriDeP program team, and his own extensive experience in the field and personal familiarity with the actors, the author identifies 10 countries as potential TrC candidates and indicates their potential needs for equipment, services, and technical assistance that would increase the effectiveness of disaster risk management and response. In his selection of potential match countries, the author also considered complementary and competing DRR programs and activities already in progress with other providers. The author cautions, of course, that all DRR assistance proposals should align with host government priorities and that all recommended disaster management solutions must be fine-tuned and based on further contextual analyses.

Pertinent facts about the 10 potential match countries and possible TrC initiatives are detailed in Annexure 4, which covers Bangladesh, Bhutan, Cambodia, Fiji, Lao People’s Democratic Republic, the Maldives, the Philippines, Nepal, Timor-Leste, and Viet Nam. In addition, the author presents disaster risk profiles for 16 other Indo-Pacific Region countries that may become candidates for TrC in the future: Brunei, Cook Islands, Indonesia, Kiribati, Malaysia, Myanmar, Nauru, Palau, Papua New Guinea, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, and Vanuatu (Annexure 5). The author’s TrC recommendations are consistent with the Intermediate Result (IR) 3.1 of the USAID India Country Development Cooperation Strategy (CDCS).<sup>2</sup>



## About The Asia Foundation

The Asia Foundation is a non-profit international development organization committed to improving lives across a dynamic and developing Asia. Informed by six decades of experience and deep local expertise, its work across the region addresses five overarching goals – strengthen governance, empower women, expand economic opportunity, increase environmental resilience, and promote international cooperation.

The TriDeP creates an opportunity for The Asia Foundation to examine emerging cross-cutting critical issues, such as disaster risk reduction, that warrant deeper investigation to inform its program strategies to ensure the Foundation remains at the leading edge of changing dynamics in the regional context – geopolitical, environmental, and legal/regulatory – and well-positioned to tackle the most critical issues facing Asia.

Photographer: Knud Falk/Climate Centre

A training workshop to develop disaster contingency plans against floods and storm surges in Bihar, India.



## CHAPTER 01

# India's Journey from Disaster Relief to Risk Reduction



Photographer: Fernando Quevedo de Oliveira  
Forest fires above Thak village in Uttarakhand, India in May, 2016.

## Introduction

Disaster management is a complex concept that calls for well thought-out policies, a robust legal basis, institutions curated to act and prepare for disasters, well-oiled administrative mechanisms, and players who will spring into action not only during disasters but well before they occur in order to prevent or mitigate losses. To be effective, all these elements must come together as a seamless whole. The policies, institutions, and logistics of disaster management are as important as the actual equipment used to rescue people – absolutely vital in handling disasters, in reaching to the last mile, and in determining the tools for effective and efficient

action. Equally important is the involvement of disaster management practitioners in policy design and development – the domain and subject matter experts who understand the complexity and who know how to make disaster management policies, institutions, and logistics work together most effectively.

Effective disaster management usually requires a long phase of development; time is the main challenge in setting up vital elements. Experts see India's present disaster management approach as a journey that lasted just over two decades. It began at the time of super Cyclone



**1999**

The Government of India and other stakeholders implemented recommendations from a High Powered Committee (HPC).

The HPC's report guided India's disaster management approach from a relief-centric approach to one that embraces prevention, mitigation, and preparedness.

**2001**

To strengthen India's approach, the HPC also made other recommendations: linking development efforts to disaster reduction; establishing a disaster knowledge network, promoting international cooperation; applying a national disaster mitigation strategy; adopting a community-based approach; and fostering a culture of preventive thinking.

**2005**

The enactment of the National Disaster Management Act and the development of a National Disaster Management Authority (NDMA), and state- and district-level disaster management authorities (SDMAs and DDMAAs) set the stage for India's National Institute of Disaster Management (NIDM) and National Disaster Response Force (NDRF).



**2009**

The National Policy on Disaster Management (2009) motivated community-based disaster management, last-mile integration of policy and plans, executional capacity development, consolidation of past initiatives, deployment of best practices, cooperation with agencies at national and international levels, and multi-sectoral synergies.

**2016**

First announced in November 2016 during the Asian Ministerial Conference on Disaster Risk Reduction, the Prime Minister's Ten Point Agenda restated DRR priorities, such as bolstering local capacities, enhancing knowledge networks, and supporting international coalitions.

**2019**

The 2016 National Disaster Management Plan, subsequently updated in 2019, provided a framework for disaster management plans at the ministerial, departmental, state, and district levels. The Plan set out mechanisms for multiagency coordination: the National Executive Committee (NEC), headed by the Ministry of Home Affairs Secretary at the national level, and the State Executive Committee, headed by a Chief Secretary at the state-government level.



Odisha in 1999, the Gujarat earthquake in 2001, and the Indian Ocean Tsunami in 2004, when deaths and other calamities counted in the thousands or tens of thousands and economic losses were huge. Now, India anticipates and manages oncoming disasters, such as the cyclones that recently battered India's east and west coasts, so that deaths and calamities are minimized and assets protected.

So, what can other countries learn from India's experience, how can they emulate it and thereby accelerate their own journey in order to save thousands of lives and millions in losses? This chapter recounts India's journey as the country made a paradigm shift from relief-centric

disaster (crisis) management to a holistic approach that encompasses prevention (what steps to ensure, to the extent possible, that disasters do not happen), preparedness (how to prepare in advance for disasters that are either likely to occur or that cannot be prevented in order to ensure they do not reach crisis mode), and mitigation (how to minimize losses).

India's journey began with the Government of India setting up a High Powered Committee (HPC) that worked from 1999 to 2001 to study disaster management approaches and practices in other countries. This effort allowed the HPC to lay out the problem and offer solutions. Essential steps followed: the adaptation of

Photographer: R.Sen

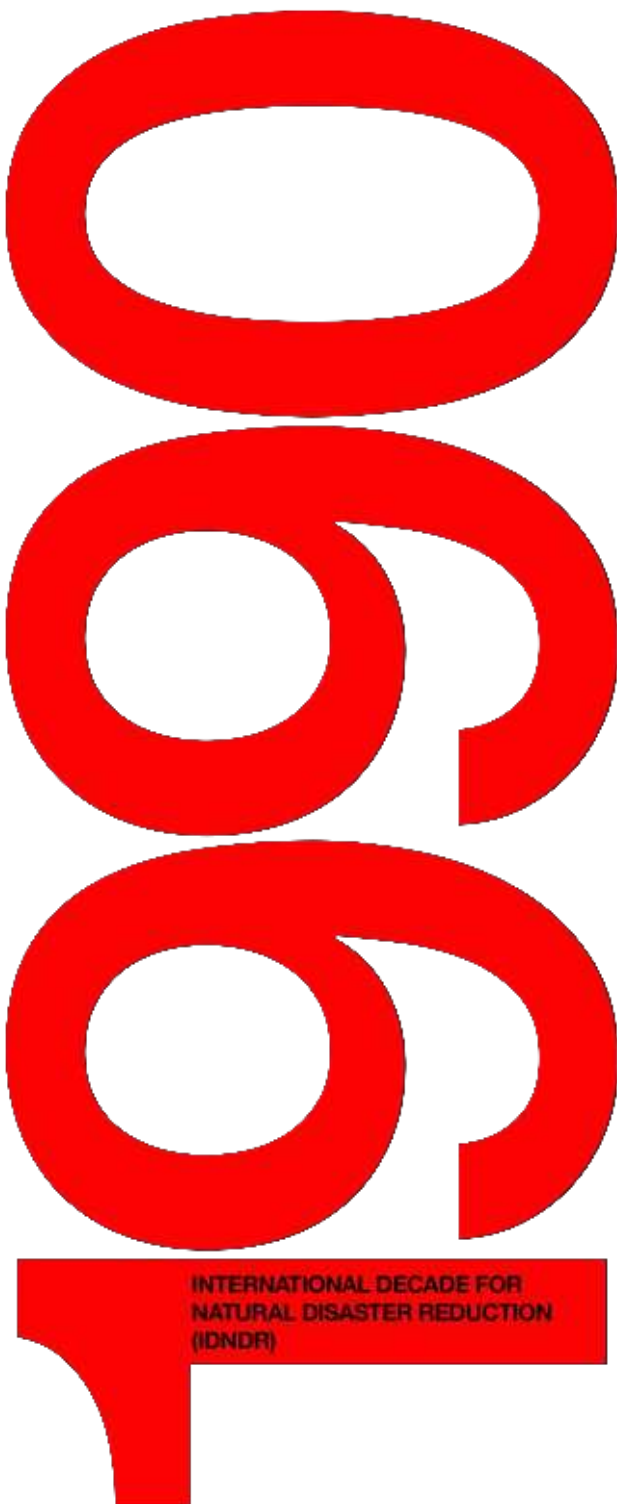
Devastation at Puri beach in the aftermath of cyclone Fani in 2019.



an Incident Command System (2003) that codified a standardized, on-scene, multi-level, all-risk incident management approach; the development of a Disaster Management

Status Report (2004) that determined the baseline and provided specific directions; a Disaster Management Act (2005) that led to the legal basis for setting up and integrating all players into one whole; a National Disaster Management Policy (2009) that determined – after extensive consultations at all levels – how administrations with different and often disparate responsibilities and authorities would act together; a Disaster Management India Report (2011) that reassessed the baseline and laid out aspirations; and two National Disaster Management Plans (2016 and 2019) that adjusted the institutional oiling of the disaster management machinery for all to read, understand, and act in unison, with the Prime Minister's Ten-Point Agenda (2016) making it clear that India's political leadership backed the Plans.

This process took a little over 20 years. Slowly, gradually, surefootedly (often reassessing stakeholder interests and tailoring policy to address them), and backed by the requisite force of law and administrative authority, India created a legal structure (the central government-level allocation of business rules, the transaction of business rules, and so forth, giving it administrative heft), a central, state, and district-level institutional framework (agencies known as NDMA, NIDM, NDRF, SDRE, SDMA, DDMA, and others), and a multi-agency and multi-level coordination mechanism (one of the most challenging aspects that countries grapple with). These crucial elements were joined by a financial mechanism, a culture of planning, and a culture of preventive thinking rather than crisis management, not to mention last-mile integration of policies, plans and players, and continuous training and capacity building. Having achieved those milestones,



India continued its journey by increasingly focusing on the contextualization, scalability, affordability, and inclusivity of its disaster management plans and interventions.

In this chapter, the reader from a disaster management agency in an Indo-Pacific country can apprehend how India created crucial disaster management elements, adapt India's experience to their countries' own context, and accelerate their learning curve. In subsequent chapters, readers – disaster management professionals and potential partners – will be informed about the mechanisms and institutions India could put at their disposal should a country wish to benefit from Indian disaster management expertise and resources. This chapter is just the beginning of the TriDeP partnership process: bilateral discussions, trilateral and multilateral discourse, and bilateral engagement can follow after the reader understands India's journey, its paradigm shift from search and rescue-related crisis management to proactive disaster prevention and preparedness, the people and processes involved, and the relevance of India's experience and capabilities for their own country today.

### **India Shifted its Paradigm From Reaction to Reduction**

India, due to its unique geo-climatic conditions, is vulnerable to multiple natural and human-caused disasters, such as droughts, floods, earthquakes, landslides, avalanches, hailstorms, cold waves, glacier lake outburst floods, wildfires, oil spills and other major pollution events. The country's disaster management approach over the years has evolved from a search-and-rescue and relief-centered approach, focused mainly on floods and

droughts, to a holistic multi-hazard approach that combines prevention and preparedness with warning systems, search and rescue capabilities, risk reduction measures, disaster mitigation, community involvement, constant capacity building, and risk resilience. India's paradigm shift supported the integration of DRR into national and state development plans, the setting up of specialist response teams, and the implementation of gender responsive crisis management. With on-going input from seasoned disaster management experts, India developed multiple policies for coordinated multi-stakeholder DRR and disaster management efforts. More recently, the Prime Minister's Ten Point Agenda focused on building local capacities, spearheading opportunities to learn from disasters, and increasing response effectiveness through international coalitions.

The Government of India and other stakeholders implemented recommendations from a High Powered Committee (HPC), established in 1999. The HPC's report guided India's disaster management approach from a relief-centric approach to one that embraces prevention, mitigation, and preparedness. After considerable discussions with domain experts and others, the HPC recommended a legal framework, an organizational structure at central, state, and district levels, financial mechanism, proposals for hazard specific zones, and planning processes for ushering in more progress across several levels. The HPC also recommended setting up a linchpin of coordinated disaster response known as an Incident Command System, a standardized, on-scene, all-risk incident management approach that allows interdisciplinary teams – first responders, administrators, technical specialists, and others – to adopt an integrated



organizational structure, respond to single or multiple disaster incidents, and manage multiagency and multijurisdictional resources without being hindered by jurisdictional – village, district, state, nation – boundaries (Box 1).<sup>3</sup>

To strengthen India's approach, the HPC also made other innovative recommendations: linking development efforts to disaster reduction; establishing a disaster knowledge network, promoting international cooperation; applying a national disaster mitigation strategy; adopting a community-based approach; and fostering a culture of preventive thinking. It also prepared a National Disaster Response Plan (2001) and provided recommendations on the role of disaster management education, awareness, mitigation, and public participation, including the role of nongovernment organizations (NGOs), the private sector, local governance institutions, the insurance sector, and others.<sup>4</sup>

The Government of India and other stakeholders took multiple steps to implement the HPC's recommendations. The transfer of disaster management from the Ministry of Agriculture and Cooperation<sup>1</sup> to the Ministry of Home Affairs in 2002, the enactment of the National Disaster Management Act in 2005, and the development of a National Disaster Management Authority (NDMA), and state- and district-level disaster management authorities (SDMAs and DDMA) set the stage for India's National Institute of Disaster Management (NIDM) and National Disaster Response Force (NDRF).

The 2005 National Disaster Management Act provided the required legislative framework for India's new holistic approach.<sup>5</sup> India's milestone Eleventh Five Year Plan (December 2008)<sup>6</sup> formally recognized the impact of climate change on the frequency and intensity of disasters – including human-caused disasters, such as air pollution – and the need for digital solutions for risk reduction. Applying expertise and lessons learned to successive policies and programs, India led a coordinated effort among multiple stakeholders for risk reduction and disaster management.

The National Policy on Disaster Management (2009) motivated community-based disaster management, last-mile integration of policy and plans, executional capacity development, consolidation of past initiatives, deployment of best practices, cooperation with agencies at national and international levels, and multi-sectoral synergies. In particular, the policy promoted innovation and education, encouraged mitigation measures, and mainstreamed disaster risk management into the developmental planning process. The policy intended to enable a regulatory environment and a compliance regime. Furthermore, the policy hoped to establish a mechanism for identifying, assessing, and monitoring disaster risk. The policy also recommended developing contemporary forecasting and early warning systems, and strengthened disaster relief for vulnerable populations. For post-disaster recovery, the policy recommended a “build back better” approach and multi-stakeholder partnerships.<sup>7</sup>

First announced in November 2016 during the Asian Ministerial Conference on Disaster Risk Reduction, the Prime Minister's Ten Point Agenda restated DRR priorities, such

<sup>1</sup> The former Ministry of Agriculture and Cooperation is now known as the Ministry of Agriculture and Farmers Welfare.

as bolstering local capacities, enhancing knowledge networks, and supporting international coalitions.<sup>8</sup> The 2016 National Disaster Management Plan, subsequently updated in 2019, provided a framework for disaster management plans at the ministerial, departmental, state, and district levels.<sup>9</sup> The Plan set out mechanisms for multiagency coordination: the National Executive Committee (NEC), headed by the Ministry of Home Affairs Secretary at the national level, and the State Executive Committee, headed by a Chief Secretary at the state-government level. This institutional mechanism provides for the convergence of the country's legislative and executive wings. In addition, a district-level administration reports to a District Collector who is also the head of the DDMA,<sup>10</sup> which links in turn to state and national authorities.

India has long focused on strengthening community participation in disaster risk management, as seen in the multiyear Government of India-UNDP Disaster Risk Management Project, which “has been empowering communities since 2002 to manage disaster risk in rural and urban areas.”<sup>11</sup> Additionally, several international

and domestic NGOs and CSOs, such as the Indian Red Cross, Catholic Relief Services, and the Sustainable Environment and Ecological Development Society (SEEDS), have worked tirelessly in strengthening community capabilities.<sup>12</sup> Recently, nudged by a corporate social responsibility law, many private sector entities have also begun to help with domestic disaster risk reduction efforts. Following the severe Cyclone Odisha in 1999, community participation is often given as the reason the State of Odisha successfully evacuated hundreds of thousands of people safely and minimized the loss of lives and property during subsequent cyclones, notably Phalin in 2013 and Fani in 2019.<sup>13</sup>

During its journey, India has consistently adopted newer technologies and technology transfer for disaster preparedness. For example, the India Meteorological Department (IMD) has embraced several new technological advancements to strengthen its early warning capabilities. Additionally, the completion and 2019 publication of a detailed analytical study pertaining to disaster risk and resilience of India demonstrated India's ability to deal with large datasets and its willingness to share its data and experiences.<sup>14, 15</sup>

India's DRR journey was also influenced by international efforts, such as the designation of the 1990s as the International Decade for Natural Disaster Reduction (IDNDR), and

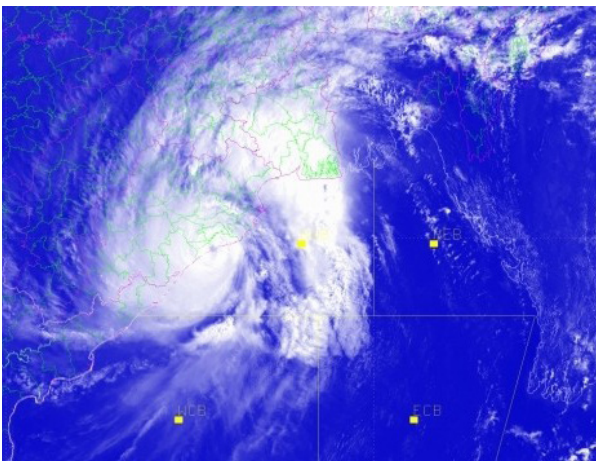


Photo Credit: M. Mohapatra and A. Sharma/IMD

Satellite image showing the eye of cyclone Fani at the time of landfall near Puri in Odisha, India on May 3, 2019.

the Hyogo<sup>2</sup> and Sendai<sup>3</sup> frameworks. India's paradigm shift also benefitted from bilateral and multilateral cooperation with the United States (U.S.), Switzerland, Australia, Russia, the European Commission, United Nations (UN) agencies, and others, including initiatives such as the USAID Office of U.S. Foreign Disaster Assistance's Program for Enhancement of Emergency Response (PEER)<sup>16</sup> and other disaster management-support<sup>17</sup> and risk-management projects funded and assisted by the UNDP,<sup>18</sup> DFAT, European Commission, and others. Further international partnerships include India's leadership role in the Coalition for Disaster Resilient Infrastructure (CDRI)<sup>4</sup>; it creates resilient infrastructure systems that ensure sustainable development and repairs significant damages caused to infrastructure by disasters.<sup>19</sup>

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<sup>2</sup> The HYOGO Framework for Action (HFA) was the global blueprint for disaster risk reduction efforts between 2005-2015. The HFA was adopted in 2005 at the World Conference on Disaster Reduction held in Kobe, Hyogo, Japan. The HFA aimed to substantially reduce disaster losses by 2015 in terms of lives and the social, economic, and environmental assets of communities and countries.

<sup>3</sup> The Sendai Framework for Disaster Risk Reduction (SFDRR) was adopted at the Third UN World Conference on Disaster Risk Reduction in Sendai, Japan on March 18, 2015. The SFDRR outlines seven clear targets and four priorities for action to prevent and reduce disaster risks. It aims to achieve a substantial reduction of disaster risks and losses of lives, livelihoods, and health and damages to the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries over a period of 15 years.

<sup>4</sup> The U.S. and India are founding members of the CDRI, which counts 22 countries and seven organizations as members, including multilateral institutions such as the World Bank and the United Nations Office for Disaster Risk Reduction (UNDRR).



Photographer: Vasuki Rao

A deep space antenna belonging to the Indian Space Research Organization (ISRO) near Bengaluru, India.



## BOX 1 | THE INCIDENT COMMAND SYSTEM UNDERPINS INDIA'S EFFECTIVE DISASTER RESPONSE

In 2003, after reviewing disaster management practices in other countries, the HPC recommended that a version of the United States Forest Service (USFS) Incident Command System (ICS) be institutionalized in India. The ICS is a standardized approach to virtually all types of natural or human-caused disasters (i.e., incidents) that takes place at the scene of a disaster and allows operatives from multiple disciplines, such as search and rescue teams, administrative or protective services, and health and psychosocial care workers, among others, to work within a predetermined and integrated organizational structure in order to respond to a single or multiple disaster incidents while managing multiagency, multiorganization, and multijurisdictional resources nearly seamlessly.<sup>20</sup>

The USFS version of the ICS required some modifications and adaptations to suit the Indian context. While the overall approach made sense, India partnered with USAID and the USFS to modify the ICS and align it with India's 2005 Disaster Management Act and the country's administrative structure.<sup>21</sup> In India, the main stakeholders in any incident response are the administrators of the various national, state, district, union territory, and metropolitan governments. The roles of NGOs, civil defense volunteers, communities, and personnel from the NDRF, SDRF and other organizations had to be carefully integrated in the ICS response structure. When completed, India rebaptized its newly indigenized and adapted ICS the "Incident Response System (IRS)."<sup>22</sup>

The IRS plays a crucial role in organizing and strengthening Indian disaster management. As one of its many capabilities, India can share its ICS adaptation and training expertise with other countries, using the USFS ICS as a starting point and making changes as needed.

## CHAPTER 02

# India's Disaster Management Framework

Discussion on India's disaster management framework can be divided into the following categories and capabilities:

- Interplay between Institutions, Legislation and Policies
- Focus on Disaster Management Planning
- Perspectives on Gender Equity and Social Inclusion

## Interplay between Institutions, Legislation and Policies

Institutional, legislative and policy interventions have supported the shift in India's disaster management approach; these interventions can serve as models for other countries on how to update disaster management laws and policies and coordinate institutions with mechanisms.



Until 2001, disaster management in India was the responsibility of the Natural Disaster Management Division (NDMD) in the Ministry of Agriculture and Cooperation. The NDMD was headed by the Joint Secretary and Central Relief Commissioner, who was responsible for coordinating national disaster response and relief support to state governments. In 2001, the disaster management function shifted to the Ministry of Home Affairs with the establishment of the Disaster

Management Division (DMD). The nodal ministry for managing drought remained the Ministry of Agriculture and Cooperation, and epidemics remained under the purview of the Ministry of Health and Family Welfare. The DMD is “responsible for response, relief and preparedness for natural calamities and man-made disasters (except drought and epidemics) [and for disaster-related] legislation, policy, capacity building, prevention, mitigation and long-term rehabilitation.”<sup>23</sup> The DMD also supports the NDMA in the preparation of National Disaster Management Plans, implements the national plans, coordinates and enforces the policies and additional plans for disaster management, provides disaster relief to other countries, and establishes broad policies and guidelines for the National Institute of Disaster Management (NIDM), a knowledge and training institution.<sup>24,25</sup>

The Indian Ministry of Home Affairs reviewed the status of disaster management in India and developed a Disaster Management Status Report in August 2004.<sup>26</sup> This report outlined institutional and policy frameworks and measures for disaster prevention, mitigation, and preparedness. It presented a National Disaster Management Framework, explained disaster management within the Tenth Five-

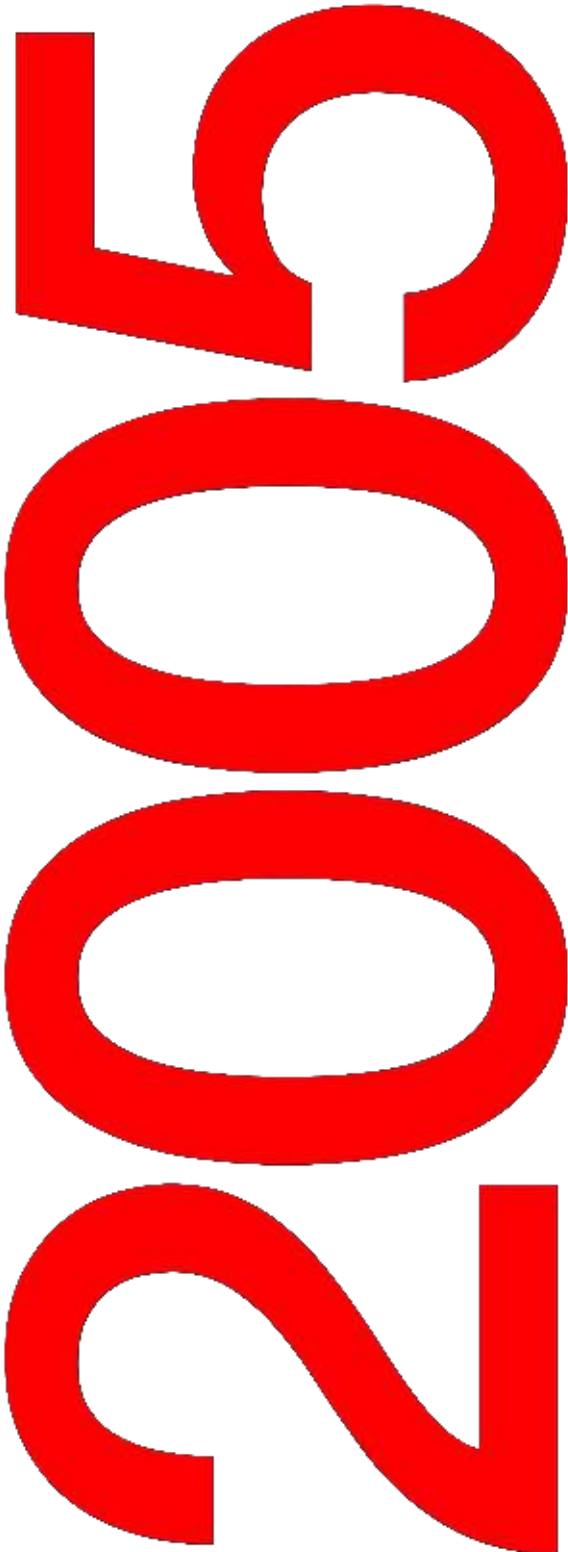
Year Plan, and provided guidelines to state governments and union territories. The report also took into account lessons learned from the 1999 Odisha Cyclone and the 2001 Bhuj earthquake in Gujarat State, both of which underscored the need to involve disaster management and domain experts in a multidimensional endeavor and diverse scientific, engineering, and financial processes. The report's lessons also emphasized the need for multi-disciplinary and multi-sectoral approaches to risk reduction strategies.

The Ministry of Home Affairs' approach covered institutional mechanisms; disaster prevention strategies; early warning systems; guidelines for disaster mitigation, preparedness, and response; and human resource development. The Ministry of Home Affairs also provided a roadmap of expected inputs; areas of intervention; and national, state, and district agencies that could be involved in DRR. The roadmap was shared with the state governments and union territory administrations. India's central ministries and departments and the state and union territory governments were advised to develop their own respective roadmaps, modelled after the national roadmap. This step provided a critical link between thought (the HPC report) and action (the DRR roadmaps), setting out what needed to be achieved on the ground.

India's 2005 Disaster Management Act is a defining moment in the evolution of India's disaster management.<sup>27</sup> “The Act provides for effective management of disasters and all related or incidental matters.”<sup>28</sup> The Act established financial mechanisms for disaster management, including a National Disaster Mitigation Fund for undertaking permanent mitigation measures in disaster-prone states, and National and State Disaster Response Funds to support



## DISASTER MANAGEMENT ACT



immediate disaster response actions.<sup>29</sup> It also defined powers, authorities, and functions of key stakeholders. The Act further defined the role and responsibilities of India's national and state ministries and departments, and local authorities. In these ways, the Act paved the way for a legal mandate for actions, established and funded institutions, and set up an accountability framework.

In accordance with section 8 of the Disaster Management Act (2005), India constituted the National Executive Committee (NEC) to strengthen inter-ministerial coordination, especially for post-disaster response. The NEC is headed by the Secretary of the Ministry of Home Affairs, with secretaries of all relevant ministries and departments as members. The NEC has disaster management administrative control over India's agriculture, atomic energy, defense, drinking-water supply, environment and forests, finance, health, power, rural development, science and technology, space, telecommunication, urban development, and water resources.<sup>30</sup> As the coordinating and monitoring body, the NEC is responsible for implementing disaster management policies and plans and ensuring compliance with central government disaster management directives. It also evaluates disaster preparedness at all government levels and coordinates responses during disaster events.

In addition to providing guidance to central-government ministries and departments, the NEC provides guidance to the SDMAs, which are chaired by each state's chief minister and create policies, plans, and guidelines for disaster management at the state level. SDMAs also coordinate interstate disaster management plans and review state development plans, including

measures taken for disaster mitigation, capacity building, and preparedness.<sup>31</sup>

Each state has an essential link between the SDMA and state-level departments and agencies: to strengthen coordination: like the NEC at the national level, a State Executive Committee (SEC) assists its SDMA with state-level disaster management, including the coordination and development of the

by a District Collector, is comprised of relevant government officials and an elected local representative. The DDMA functions like the SDMA to ensure adequate district-level planning, preparation and last-mile responsiveness. It identifies vulnerable areas, implements mitigation actions, coordinates responses in the event of threatening situations or during disasters, establishes stockpiles of relief supplies, ensures that the communication



Photo Credit: Twenty20photos

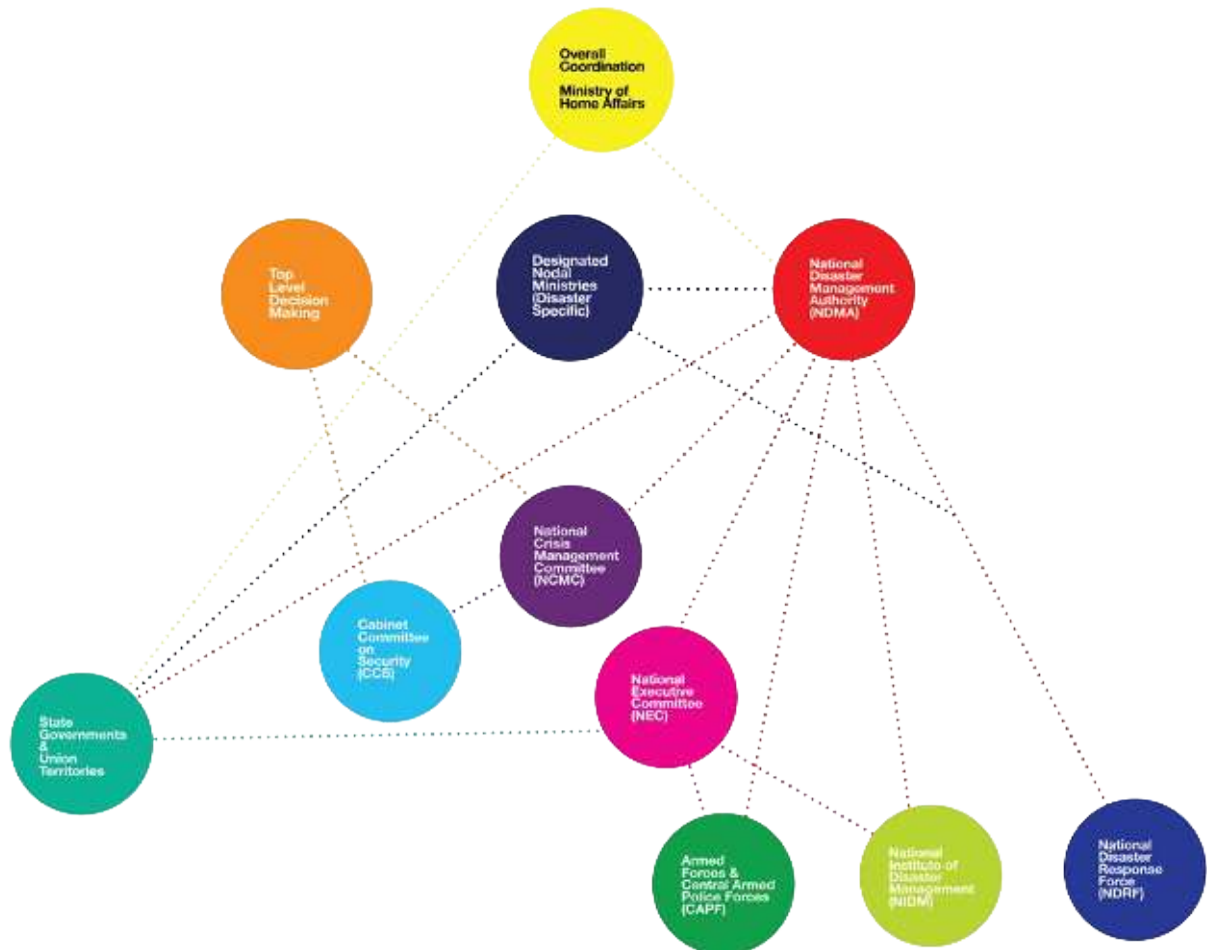
Severe drought in Rajasthan, India during the drought of 2009, the severest one to strike India in the past 35 years.

State Disaster Response Plan. The SEC is headed by the chief secretary of the state government, with secretaries of other relevant state departments as members.<sup>32</sup> SECs also monitor the implementation of national-, state-, departmental- and district-level plans and promote general education and community capacity building.<sup>33</sup>

At the district level, a District Disaster Management Authority (DDMA), headed

system is in order, encourages NGO and volunteer participation in district disaster management efforts, undertakes mock drills and exercises to test preparedness, and establishes additional measures to integrate departmental efforts with community and other disaster-preparedness measures.<sup>34</sup>

## NATIONAL LEVEL DISASTER MANAGEMENT CO-ORDINATION MECHANISM

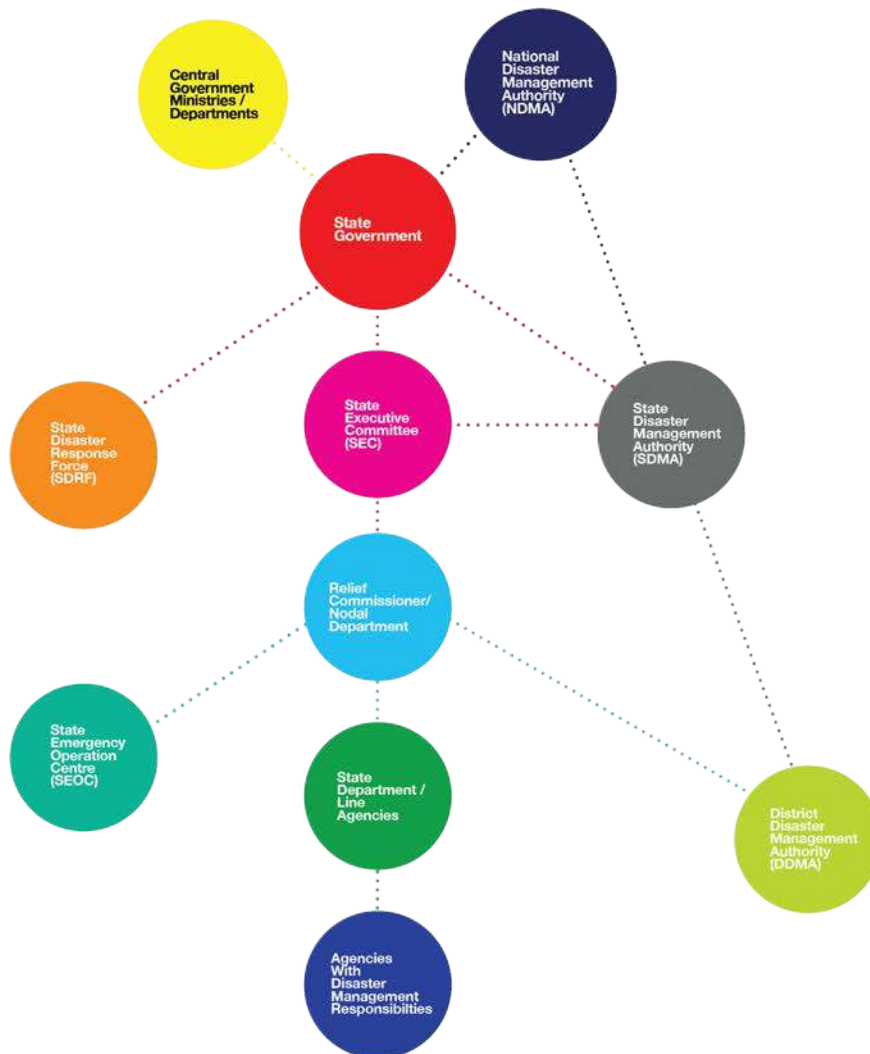


National Disaster Management Plan, 2019.

*A publication of the National Disaster Management Authority, Government of India.*  
November 2019, New Delhi.

Note: This represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.

## STATE LEVEL DISASTER MANAGEMENT CO-ORDINATION MECHANISM



National Disaster Management Plan, 2019.

*A publication of the National Disaster Management Authority, Government of India.*  
November 2019, New Delhi.

Note: This represents merely the institutional pathways for coordination, decision-making and communication for disaster management and does not imply any chain of command.



## Focus on Disaster Management Planning

Through its detailed provisions, the 2005 National Disaster Management Act created a facilitative environment for disaster preparedness and disaster management. The Act made several provisions to carry forward the recommendations made by the HPC. For example, Section 11 of the Act provides information about which institutions or agencies should prepare the National Disaster Management Plan and the roles of various ministries. Section 23 of the Act provides guidelines for State Disaster Management

Plans and explains what information the plans should include, such as proposed prevention, mitigation, and capacity building measures, and the roles and responsibilities of ministries and departments during any crisis. The State Disaster Management Plans are reviewed annually. Act Section 31 explains how to prepare a District Disaster Management Plan.

In addition, Section 37 explains how all different ministries and departments of the Government of India should prepare their disaster management plans clearly, making sure to include plans for mitigation, prevention, preparedness, and capacity building, detailing how each ministry or department will respond

Photographer: Biswaranjan Rout

ODRF (Odisha Disaster Response Force) personnel on a rescue operation after the flood waters of river Kuakhai, the branch river of Mahanadi, flooded the eastern Indian region of Odisha's capital city Bhubaneswar in July 2018.





Photographer: Naveen  
State Disaster Response Force (SDRF) camp on Kedarnath trek route, May 2015.

to a crisis or a disaster. Similarly, Section 40 outlines how each state ministry or department must formulate a State Disaster Management Plan with clear instructions at the ministry and departmental levels so that the state plan will integrate with National Plans. Section 40 also details prevention, mitigation, and capacity building actions; and clearly establishes the roles and responsibility of each ministry and department during disaster response. In addition to the Act, the National Disaster Management Authority issues guidelines for State Disaster Management Plan preparation.<sup>35</sup> The policies and plans announced by governments provide guidance to responsible officials so they can carve out relevant operational details. The 2009 National Disaster

Management Policy laid out institutional techno-legal and financial arrangements for disaster prevention, mitigation, preparedness, response, relief, rehabilitation, reconstruction, recovery, capacity development, knowledge management, and research and development. Notably, it adopted community-based disaster management practices to increase execution effectiveness.<sup>36</sup> In turn, the 2016 National Disaster Management Plan further comprehensively dealt with institutional mechanisms, mitigation, and disaster management for various hazards, and identified roles for key stakeholders. Additionally, in 2016, Prime Minister Shri Narendra Modi reemphasized the importance of reducing disaster risk when building public works, such

as roads and bridges; insuring risks, including for the poorest; strengthening risk management through greater use of technologies, communities, universities, women, and lessons learned; and fostering international cooperation

to improve response effectiveness.

He summarized India's priorities in a Ten-Point Agenda on Disaster Risk Reduction:<sup>37</sup>

## INDIA'S 10 POINT AGENDA ON DISASTER RISK REDUCTION

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- 1.** ——— Mainstream disaster risk reduction in public expenditure.
- 2.** ——— Risk coverage for all.
- 3.** ——— Encourage greater involvement and leadership of women in disaster risk management.
- 4.** ——— Invest in mapping disaster risk mapping, covering all hazards.
- 5.** ——— Leverage technology to enhance the efficiency of disaster risk management efforts.
- 6.** ——— Develop a network of universities to work on disaster issues.
- 7.** ——— Make use of social media and mobile technologies.
- 8.** ——— Invest in local capacity, not only for response but for disaster risk reduction.
- 9.** ——— Systematize post-disaster recovery based on lessons learned from past disasters.
- 10.** ——— Bring about greater cohesion in international response to disasters.



In response to the changing nature of vulnerabilities and hazards, the NDMA revised the National Disaster Management Plan in 2019 to lay down clear priorities for the government, clarify the roles and responsibilities of stakeholders, and further strengthen India's capacity to respond to, and recover from, disaster events.<sup>38</sup> The 2019 Plan aligned the country's disaster management priorities with the Sendai Framework for Disaster Risk Reduction 2030 targets. The Plan also focused on integrating the United Nations' Sustainable Development Goals (SDGs) and the Paris Agreement. The 2019 Plan mainstreamed DRR into developmental planning by adopting a multi-disciplinary and integrated approach. It emphasized addressing the issues of vulnerable populations, including women, children, cultural and ethnic minorities, the elderly, and the socially and economically disadvantaged. The 2019 Plan also detailed specific responsibilities for stakeholders at various stages of disaster management, ultimately enhancing the country's ability to cope with disasters at all levels.

The HPC's and its successors' strategic vision, accompanied by institutional mechanisms, laws, guidelines, and continuous monitoring and reviews, have helped guide changes to India's disaster management approach, which has, in turn, strengthened India's capabilities to the point where they can support disaster management in India and in other regions across the world. India complements the district, state, and national disaster-related institutions described above by drawing on its Armed Forces and Coast Guard assets to address humanitarian and human-caused disasters, such as by airdropping relief supplies to marooned locations, conducting search and rescue operations, or addressing oil spills in

territorial or international waters (Box 2).<sup>39,40</sup> The management of oil spills differs from other disasters in terms of the institutional handling because spills may occur within India's territorial sea, Exclusive Economic Zone, or in international waters, and different laws and procedures (and therefore different agencies) need to be involved, including foreign ministries and naval agencies. India also shares some of its other DRR capabilities with regional neighbors, organizing and participating in multi-country field exercises and mock drills to extend and enhance preparedness and cooperation (Box 3).

### **Perspectives on Gender Equity and Social Inclusion**

As India continues its DRR journey, it strives for ever greater gender and social inclusivity in its strategies, policies, laws, and operations; finding it important to identify and address the differential impacts of disasters based on gender and social identities. The impact of disasters on women and socially marginalized groups tends to be higher as they are often more exposed to disaster risks and suffer higher rates of mortality and loss of livelihoods due to poor mobility, lack of access to shelter, food and primary health care. The vulnerability of women, in particular, is further exacerbated by regressive gender and social norms. More women tend to depend on domestic activities and an informal economy. As a result, disaster-induced displacement and loss of household resources have a significantly higher impact on women's economic security. These challenges further result in lack of access to resources, reduced economic opportunities and exclusion from decision-making.

## BOX 2 | INDIA HELPS SRI LANKA MANAGE 2021 SHIPWRECK AND SPILL OF OIL AND OTHER POLLUTANTS

A cargo ship named X-Press Pearl caught fire on May 20, 2021, about nine nautical miles, or 16 km, away from the commercial port of Colombo. In addition to carrying 278 tons of bunker fuel oil, 50 tons of gas oil, and 20 containers of lubricating oil,<sup>41</sup> the ship had 1,486 containers on board that contained several potentially harmful chemicals, including nitric acid, caustic soda, sodium methoxide, methanol, and others.

The fire continued for several days and was brought under control by 1 June 2021. The Sri Lankan Navy, Air Force, Coast Guard, and the Indian Navy responded to the situation by dousing the fire. Twenty-five crew from India, the Philippines, China, and Russia were rescued from the ship and moved to hospitals in Colombo for treatment.

Several minor explosions occurred while the ship was on fire. A number of plastic pellets, chemicals, and other harmful substances spilled into the sea, damaging the marine ecosystem, coastal environment, and many livelihoods. This flotsam covered a vast area, affecting the Colombo and Kalutara districts in Sri Lanka. Monsoon winds and rains from the southwest complicated the response to this incident. The plastic pallets and other plastic products killed marine life; several dead sea turtles, fish, and birds were seen along the coastline. Debris littered 80 km of beachfront and fishing was banned across approximately 50 km of the Colombo and Gampaha districts, affecting 16,500 fishing families and others who depend on the sea for their livelihoods. The spill exacerbated hardships brought on by the southwest monsoon rains, which had prevented fishers from venturing into the sea for about two weeks prior to the fire's onset. The Marine Environment Protection Authority (MEPA) in Sri Lanka deemed the fire the worst environmental disaster in the country's history with unimaginable consequences for the marine environment and ecology. In addition to the environmental damage, the shipwreck also had humanitarian consequences.<sup>42, 43</sup>

In addition, the safety of women during disasters is often compromised; because of this, women's safety becomes a significant aspect of disaster-support program design. Due to the sudden loss of livelihood sources and consequent displacement, the risk of trafficking of women and adolescent girls also increases during disaster situations. Furthermore, disaster trauma does not end with the emergency; many times, trauma lasts for years after the initial event – another aspect that disproportionately affects women compared to men.<sup>45</sup> After disasters, women often have significantly higher functional disabilities than men and tend to succumb to various forms of violence, abuse, and harassment.<sup>46</sup>

Recognizing this higher degree of vulnerability to a disaster's consequences, many Indian organizations cater to women, children, and socially marginalized groups in the decision-making process and as recipients of program benefits. The Government of India-UNDP Disaster Risk Reduction Program<sup>47</sup> focuses on women's participation during program implementation with objective indicators, such as the number of women trained for various disaster risk management skills, the number of women within community-based groups, and the number of women attending various meetings. Some disaster rehabilitation initiatives, such as the Odisha Super Cyclone Rehabilitation Program, Gujarat Earthquake Recovery Program,<sup>48</sup> Tsunami Recovery Program, and Kosi Flood Rehabilitation Program, among others, give special attention to the needs of women, persons with disabilities, and other socially marginalized groups during program implementation (Box 4).<sup>49</sup>

In addition, India's National Institute of Mental Health and Neurosciences (NIMHANS) places significant emphasis on gender and social inclusion in their psychosocial care training modules and programs. Similarly, institutes like the Tata Institute of Social Sciences (TISS) and NGOs, such as SEEDS, Unnati, Oxfam, CARE, and ActionAid, are considered experts on addressing gender and social inclusion issues during program design and implementation. The National Institute of Disaster Management (NIDM) has developed gender training modules to facilitate the implementation of gender sensitive interventions during and after disasters across the Indian states. The National Disaster Response Force took a step towards becoming a gender sensitive organization by inducting women into its search and rescue force. A task force set up to update the 2005 Disaster Management Act recommended inclusion provisions for women, children, persons with disabilities, and other vulnerable groups. The 2019 National Disaster Management Plan includes gender empowerment and social inclusion in its provisions, with a separate chapter that addresses gender-based vulnerabilities, conditions of historically disadvantaged scheduled castes and tribes, and the elderly, children, and persons with disabilities.<sup>50</sup>



### BOX 3 | INDIA PARTICIPATES IN MULTI-COUNTRY SEARCH AND RESCUE FIELD EXERCISES

To enhance disaster preparedness among regional neighbors, India has organized several field exercises and mock drills, such as the 2015 South Asian Association Disaster Management Exercise (SAADMEx) for other South Asia Association for Regional Cooperation (SAARC) member countries: Afghanistan, Bhutan, Bangladesh, the Maldives, Nepal, Pakistan, and Sri Lanka. India also organized two Bay of Bengal Initiative for Multi Sectoral Technical and Economic Cooperation (BIMSTEC) field exercises. The first was held in 2017 with Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka and Thailand. The second BIMSTEC exercise took place in 2020 and involved five member countries: Bangladesh, India, Myanmar, Sri Lanka, and Nepal.<sup>44</sup>

Photo Credit: Winterline Production

SDRF Uttarakhand raft patrolling in Holy Ganges river for safety and rescue purposes, at Haridwar, Uttarakhand, India in April 2021.





#### **BOX 4 | MOVING TOWARDS GESI-SENSITIVE DISASTER MANAGEMENT: A CASE STUDY IN ODISHA STATE**

Over the years, through frequent hazards and disasters, the State Government of Odisha has put in place an efficient and effective DRR and disaster management structure that has achieved a measure of success not only in dealing with disasters, but also in addressing the needs of women during and after disasters. The emphasis on community and women's involvement in the Odisha State Disaster Management Policy (2005) reflects its integrated approach. The State Disaster Management Plan (2019) includes a role for the Department of Women and Child; recognizes that women, persons with disabilities, and other vulnerable groups have minimum capacities to withstand damages caused by disasters; and addresses gender discrimination, maternal health, pregnant women, and various vulnerabilities during and after disasters.

On the ground, Odisha State has an efficient institutional mechanism for first responders, and its community disaster-preparedness approach encourages women's participation. The state's early warning system deploys a variety of means to ensure that women are not excluded from timely warnings and information about impending disasters. Multi-hazard-resistant shelters along the coasts, designed by the Indian Institute of Technology at Kharagpur, have separate halls, sanitation facilities, and bathrooms for women, ensuring privacy and safety, especially for young girls and pregnant women. The government also promotes disaster resilient housing; about 20,000 houses constructed in three coastal districts are a boon for women, who bear the brunt of the pre-disaster workload of saving their belongings and the post-disaster responsibility of reconstructing their shelters.

Women are the key stakeholders of Odisha State's approach; the government has systematically invested in building their capacities for a resilient state. Under the Community-based Disaster Preparedness Program, training and capacity building are organized for women so they can use and benefit from early warning systems, psychosocial support, first aid, search and rescue, and shelter management. Women play a leading role in disaster management teams and committees, such as those set up for cyclones, food, shelters, maintenance, and management. Local government workers are statutory members of these committees. Disaster management plans at district, block, and Gram Panchayat (village) levels have also institutionalized women's participation. The administration of one of the three most cyclone-prone districts in the state, Ganjam District collaborates with self-help groups trained in DRR to implement disaster management programs.<sup>51</sup>

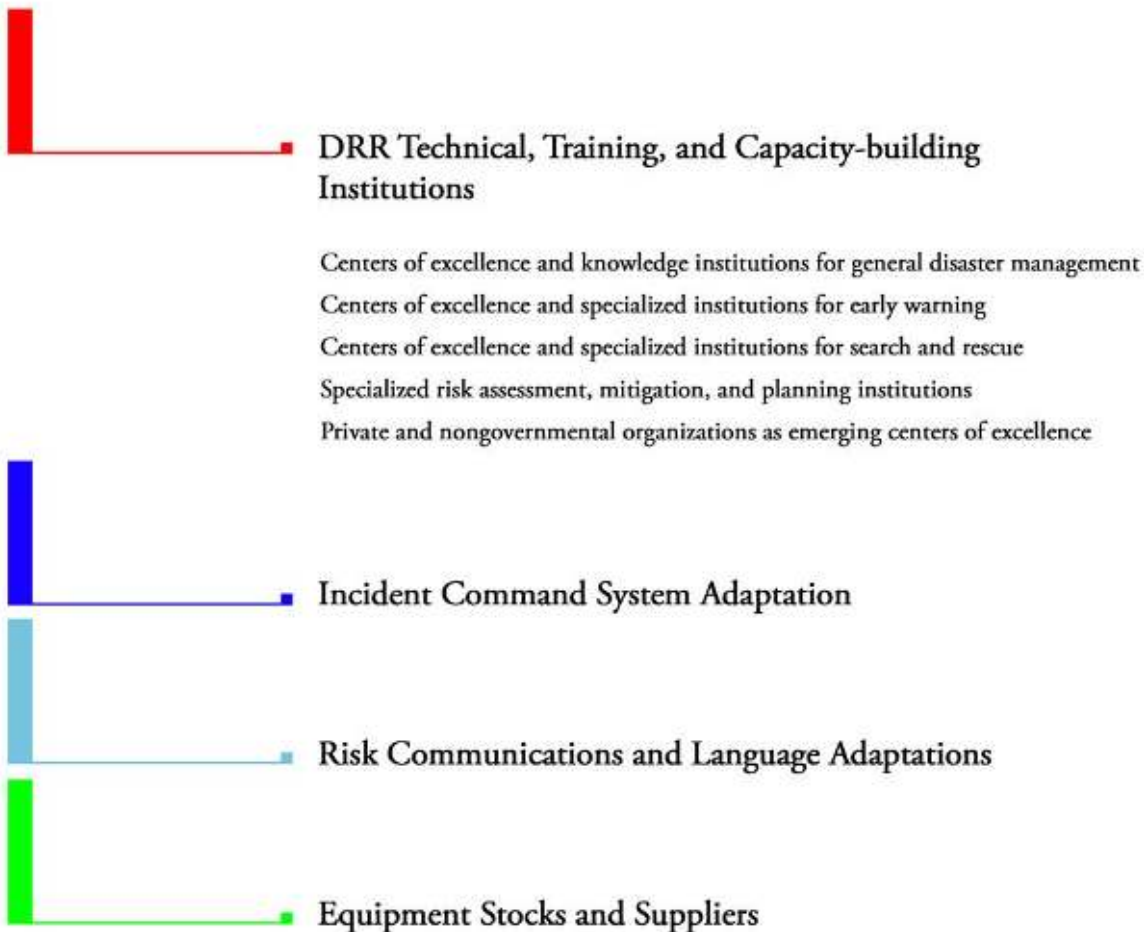




## CHAPTER 03

# India's Shareable DRR Capabilities

India can share the following disaster management capabilities through TrC:

- 
- **DRR Technical, Training, and Capacity-building Institutions**
    - Centers of excellence and knowledge institutions for general disaster management
    - Centers of excellence and specialized institutions for early warning
    - Centers of excellence and specialized institutions for search and rescue
    - Specialized risk assessment, mitigation, and planning institutions
    - Private and nongovernmental organizations as emerging centers of excellence
  - **Incident Command System Adaptation**
  - **Risk Communications and Language Adaptations**
  - **Equipment Stocks and Suppliers**

## DRR Technical, Training, and Capacity-building Institutions

Capacity building is a complex, long-term endeavor that develops human resources, establishes well-functioning organizations, creates a suitable work environment, and enhances a supportive sociopolitical environment. The Government of India, in order to improve disaster management planning and response, is dedicated to capacity building and training human resources at various institutions. The 2009 National Policy on Disaster Management articulates a strategic approach towards capacity development:

- Develop community-based disaster management systems based on communities' specific needs in terms of regional diversity and multi-hazard vulnerabilities.
- Identify knowledge-based institutions with proven performance.
- Promote international and regional cooperation.
- Adopt global best practices and technologies.

### Centers of excellence and knowledge institutions for general disaster management

India has established multiple national and state-run education and training initiatives that focus on disaster management and preparedness. Its leading DRR center of excellence, the National Institute of Disaster Management (NIDM), was developed under the 2005 Disaster Management Act to create a disaster-resilient India by building capacity at all levels. The NIDM is a nodal training institute for India's Incident Response System (IRS) – the indigenized Incident Command System

(ICS) (see Box 1). The NIDM also maintains the India Disaster Knowledge Network (IDKN) and the India Disaster Resource Network (IDRN).

A premier training academy, the Lal Bahadur Shastri National Academy for Administration (LBSNAA) in Mussoorie, houses the Center for Disaster Management (CDM) for research and training. Other examples of India's well-developed disaster management capacity-building infrastructure include the Centers for Disaster Management in Administrative Training Institutes (ATI), which are state-run facilities that amplify training capacities in the district and sub-district levels; the Disaster Management Institute (DMI), an autonomous institution under the Housing and Environment Department of the State of Madhya Pradesh, which imparts professional training and conducts consultancy services on managing natural and human-caused disasters;<sup>52</sup> the Center for Disaster Management at the Yashwantrao Chavan Center for Development Administration (YASHADA) located in Pune in the State of Maharashtra, which empowers stakeholders and community through specific training programs, provides technical guidance and consultancy services to state and district disaster management authorities, and researches and consults in the fields of policy advocacy, institutional frameworks, and faculty and stakeholder capacity building;<sup>53</sup> the Disaster Mitigation and Management Center in Dehradun, the capital of the State of Uttarakhand, which protects the community and the environment from the overwhelming damage caused by disasters; and the South Asian Association for Regional Cooperation (SAARC) Disaster Management Center (SDMC), which enhances regional cooperation for preparedness and mitigation of natural disasters (see Box 3).<sup>54</sup>

In addition, in September 2019 Prime Minister Shri Narendra Modi launched the Coalition for Disaster Resilient Infrastructure (CDRI), a specialized institution to develop resilient infrastructure and provide technical support in the areas of risk assessment; it develops tools and models, designs projects and risk-financing mechanisms, performs capacity building, conducts research, manages knowledge, and fosters international partnerships.

While disaster management activities have

historically focused mainly on physical preparedness, such as evacuation drills and procurement of life-saving equipment, less emphasis has been given to mental health, psychological first aid, or mental-health and psychosocial support, especially to disaster-affected children and women. For this reason, India's Center for Psychosocial Support in Disaster Management at the NIMHANS has provided psychosocial support and mental health services for the survivors of disasters over the past four decades, offering psychosocial first

Photo Credit: ISRO

Launch of India's latest navigation satellite IRNSS-1D onboard PSLV-C-27 on 27 Mar 2015 from Sriharikota to take the country closer to setting up its own navigation system.



aid, care, support, rehabilitation, and online and in-person training and knowledge-management services.<sup>55</sup>

India has also established a National Oil Spill Disaster Contingency Plan (NOS-DCP).<sup>56</sup> In 2014, the NOS-DCP was redrafted to facilitate national preparedness and response to hazardous and noxious substances (HNS) and elaborate the role and responsibility of various ministries and some nongovernmental entities. The Indian Coast Guard in the Ministry of Defense is the central coordinating and training agency for oil spill management in Indian waters.<sup>57</sup> For example, in 2013, the Indian Coast Guard provided training to personnel from Sri Lanka and the Maldives on oil spill management.<sup>58</sup>

### **Centers of excellence and specialized institutions for early warning**

India has made significant progress in the area of early warning communications, which forewarn responding agencies and threatened communities about impending disaster events, particularly cyclones, tsunamis, and floods. India also has early warning capabilities for earthquake, drought, lightning strikes, heat waves, cold waves, and locust swarms.

Multiple technical institutions have developed early warning capabilities and contributed to this field in India. These include a center of excellence, the India Meteorological Department (IMD), established in 1875 with a network of about 90 weather observatories for systematic observations and research. Currently IMD has 25 types of atmospheric monitors operational across the country; these include meteorological, climatological, environmental, air pollution, and other specialized observations.

IMD has also begun an initiative to forecast outbreaks of vector-borne diseases, such as malaria and dengue.<sup>59</sup> Currently, IMD maintains 559 surface meteorological observatories, approximately 35 radio stations, and 64 pilot balloon stations for monitoring the upper atmosphere.<sup>60</sup>

IMD collaborates with several national institutes, such as the Indian Institute of Tropical Meteorology, Indian Institute of Tropical Science, Indian Space Research Organization (ISRO), Center for Mathematical Modelling and Computer Simulations, and the National Center for Medium Range Weather Forecasting. IMD also collaborates with foreign meteorological partners and is a member of World Meteorological Organization (WMO). IMD and partner agencies provide technical assistance for strengthening early warning systems for cyclones, floods, lightning strikes, rainfall, earthquakes, and disease outbreaks. The institution also offers training and capacity building support for human resource development and provides weather advisory services for other countries located in the Indian Ocean.

The National Center for Medium Range Weather Forecasting (NCMRWF) is another institution that develops weather prediction systems. IMD and NCMRWF work together for short- and medium-range weather monitoring, forecasting, and reporting. NCMRWF also offers training and capacity building support for short- to medium-range weather forecasting.<sup>61</sup>

In 2007, motivated by the 2004 Indian Ocean Tsunami, the Ministry of Earth Sciences (MoES) established the Indian National Tsunami Warning System at the Indian



National Center for Oceanic Information Systems (INCOIS) in Hyderabad. The INCOIS has developed detailed protocols for issuing tsunami watches, alerts, and warnings.<sup>62</sup> The INCOIS gives information to all Indian state governments, central government agencies, and other stakeholders about the origin, time, epicenter location, magnitude, and depth of undersea seismic events. The INCOIS works in tandem with the National Institute of Ocean Technology and issues bulletins on tsunamis within 60 minutes of occurrence. The INCOIS has developed various simulation models and conducts simulation exercises. The INCOIS also undertakes capacity development programs for various national and regional stakeholders, providing training and technical assistance for setting up and running tsunami warning systems and centers, designing simulation models, and conducting simulation exercises.

The Indian Space Research Organization (ISRO)'s National Remote Sensing Center (NRSC), another center of excellence, launched several satellites primarily to observe the Earth's climate and environment as part of an ISRO Disaster Management Support (DMS) Program, which comprehensively addresses various aspects of natural disasters in the country, using space-based inputs. The Indian remote sensing satellites are meant for natural resource monitoring and management and Indian national satellites (INSAT) are meant for communication services.<sup>63</sup> These satellites have a range of disaster management applications. The ISRO and the NRSC create digital databases for facilitating hazard-zonation, assessing damages, monitoring major natural disasters using satellite and aerial data, developing tools and techniques for decision support, establishing satellite-based reliable communication networks, and providing early-

warning communications and support. The ISRO also provides training, capacity building, and technical support for these technologies and activities. The ISRO has also set up the National Database for Emergency Management (NDEM), a geographical information system (GIS) repository of data. It comprises of both hazard-specific data and dynamic data in spatial and non-spatial forms. In addition, the ISRO contributes to many international initiatives by sharing data and information, such as the International Charter Space and Major Disasters<sup>64</sup> and "Sentinel Asia"<sup>65</sup> for supporting disaster management activities in the Asia-Pacific Region.

The Indian Institute of Technology in Roorkee (IIT Roorkee), a center of excellence, has developed two types of early warning systems for earthquakes. Three years ago, it set up sensors and a siren alert system in earthquake-prone areas of Uttarakhand State to warn people of impending earthquakes, giving them a lead time of 10 to 60 seconds.<sup>66</sup> More recently, the IIT Roorkee developed a mobile phone application that warns of earthquakes in the region.<sup>67</sup>

### **Centers of excellence and specialized institutions for search and rescue**

India has developed several specialized institutions for disaster search and rescue activities. These include a center of excellence, the National Disaster Response Force (NDRF), which currently has 12 battalions consisting of several 18- to 50-person response teams. It is the largest multi-skilled disaster response force in the world, and the NDRF Academy is a premier training institute for search and rescue. The NDRF's long history and training





Photographer: Mrinal Pal

National Disaster Response Force (NDRF) headquarters in New Delhi.

capacity originally stems from advancements made by some of its constituents: the Border Security Forces (BSF), Indo-Tibetan Border Police (ITBP), Central Industrial Security Force (CISF), and Assam Rifles.<sup>68</sup> Under the USAID PEER initiative, the ITBP and the CISF developed a training-of-trainers (ToT) course for search and rescue trainers and teams. The PEER program is still active in the region, and the NDRF continues to participate in PEER activities.<sup>69</sup>

Other specialized search and rescue institutions include the National Fire Service College (NFSC), established in 1956, which develops uniformity among fire organizations across the country;<sup>70</sup> the National Civil Defence College, a nodal institute for chemical, biological, radiological, nuclear, industrial, and first responder emergency training; it supports Indian emergency relief organizations by offering 22 courses through three training program levels – Development of Skills, Building Knowledge, and Generating

Awareness;<sup>71</sup> The Nehru Institute of Mountaineering (NIM), located in the town of Uttarkashi, is the most prestigious mountaineering institute in Asia, and the only one in India certified by the International Climbing and Mountaineering Federation (UIAA) that offers mountain search and rescue training.<sup>72</sup> Finally, the National Industrial Security Academy (NISA) in Hyderabad is the apex training institute of Central Industrial Security Force (CISF);<sup>73</sup> NISA hosts the Fire Service Training Institute (FSTI), and jointly trains for fire-fighting and water and confined-space search and rescue.<sup>74</sup>

### **Specialized risk assessment, mitigation, and planning institutions**

India established multiple technical institutions focused on DRR, including sites that engage in risk assessment, mitigation, and planning. The Building Material and Technology Promotion Council (BMTPC) develops capacity for

hazard mapping and developing risk atlases, in addition to providing technology and material specifications for hazard-resistant building.<sup>75</sup> Along the same lines, the Bureau of Indian Standards (BIS) has developed building codes and standards for various products used in building and infrastructure.<sup>76</sup>

In addition, Indian Institutes of Technology (IIT) are autonomous public technical universities located across India<sup>77</sup> that have capabilities pertaining to seismic and atmospheric sciences. The IIT Roorkee Department of Earthquake Engineering was established in 1960. The Department brings together experts from multiple disciplines, such as structural and soil engineers, geologists, and seismologists. In addition to providing post-graduate courses, the Department conducts basic and applied research and organizes trainings for field engineers in various aspects of earthquake engineering.<sup>78</sup> Similarly,

the IIT Mumbai Industrial Research and Consultancy Center has developed expertise in different aspects of structural safety and provides training and advisory services.<sup>79</sup> The IIT Kanpur National Center for Earthquake Engineering collects and maintains relevant information resources and makes these available to professionals, researchers, academicians, and others who mitigate earthquake risk in India. The Center undertakes a range of capacity building activities towards earthquake safety, such as organizing trainings, workshops, and research. The Center also has a number of publications related to earthquake engineering.<sup>80</sup> The IIT Delhi Center for Atmospheric Sciences is a premier center for education and research in atmospheric and oceanic sciences. The Center runs a Master of Technology program and undergraduate courses in atmospheric and oceanic sciences. It also undertakes cutting-edge interdisciplinary research in atmospheric modelling, oceanic modelling, air pollution, and

Photographer: Ananya Bilimale

Rescue operation underway in the Himalayas, Nepal in April 2020.



climate science.<sup>81</sup> These IITs have significant capacity for developing tools and models, assessing risks, training architects and engineers, developing standards, and providing technical support to other countries.

### **Private and nongovernmental organizations as emerging centers of excellence**

India has vibrant private sector and nongovernmental or academic organizations that actively participate in the disaster risk management domain. In a good example that could be emulated elsewhere, India uses a corporate social responsibility modality to incentivize the private sector to invest in disaster resilience, and to develop expertise in disaster management program delivery. Section 135 of the India Companies Act (2013) mandates companies of a certain size and profit to invest in projects for social development in India. In 2020, the Government of India specifically included DRR activities, including preparedness, response, relief, and rehabilitation, to qualify under the Act. This nudged many companies to initiate such activities and has enabled them to gain considerable disaster-related expertise. For example, several Indian companies have actively helped pandemic response efforts in India by supporting the procurement of medical equipment required for treatment, providing relief to migrant laborers living in cities, and supporting the establishment of Covid care centers.

Furthermore, Indian and international NGOs have provided psychosocial support to Indians stricken by illness: CARE trained community volunteers and established a tele-counseling

center in Bihar; Caritas trained local volunteers and set up sports and recreation facilities and child-friendly spaces in relief camps; and NIMHANS-trained psychologists and Indian NGOs. INGOs operating in India, including ActionAid, Save the Children, and Oxfam, complement the activities of Indian NGOs that have significant capacity in community-based disaster preparedness and response and in mainstreaming gender, psychosocial care, and risk management.<sup>82</sup>

One private-sector Indian healthcare company already cooperates with Fiji: The Apollo Hospitals Group has sent Indian specialists on medical and training visits to Fiji and has established a telemedicine facility at Fiji National University.<sup>83</sup> Another example of international cooperation comes from India's Postgraduate Institute of Medical Education and Research; it has initiated the SAARC Telemedicine Network, which connects two hospitals in each SAARC member country to helplines in specialized hospitals in India.<sup>84</sup>

Other examples of Indian private-sector and NGO expertise that have TrC potential include companies like Risk Management Solutions India, a subsidiary of RMS, a global risk intelligence, modelling, and data company. It provides geospatial and engineering solutions for climate change, natural calamities, human habitation, food security, autonomous transportation, smart utilities, and networks. Taru Leading Edge is a think-tank that focuses on development challenges and combining public and private solutions. In addition to risk assessment studies, Taru Leading Edge has developed modules for training government officers on issues pertaining to violence against women.<sup>85</sup> Hindustan Computers Limited (HCL) Technologies, through the



HCL Foundation and in partnership with NGO coalitions, supported the updating of disaster risk management plans in Kerala after 2015 floods.<sup>86</sup> ARISE, a global coalition for promoting corporate involvement in disaster risk management, started by the United Nations Office for Disaster Risk Reduction (UNDRR) in 2015, launched in India in March 2019, adding Indian companies to its globe-spanning network of businesses.<sup>87</sup>

Similarly, GeoHazards Society, the India-registered partner of the INGO GeoHazards International, is a center of excellence for landslide risk assessment and structural and non-structural retrofitting.<sup>88</sup> Another Indian NGO, SEEDS, qualifies as a center of excellence for disaster management, community development, and environmental, transport, urban and regional planning. Additional NGOs, such as Unnati, or the Organization for Development Education,<sup>89</sup> and the All India Disaster Mitigation Institute,<sup>90</sup> offer training and technical assistance on gender and social inclusion, community-based DRR, community disaster planning, mainstreaming DRR, and integrating climate change adaptation into development planning.

Among academic organizations, the Tata Institute of Social Sciences (TISS) has significant capabilities in community-level social vulnerability analysis; it also provides training modules, training institutions, and trainers on issues pertaining social inclusion, gender, and community risk analysis.<sup>91</sup> Other Indian universities, such as the Center for Disaster Research at Jawahar Lal University; Guru Gobind Singh Indraprastha University; Punjab University; Sikkim Manipal University; and Indira Gandhi National Open University offer long-term diploma courses and training



Photographer: CR Shelare

A villager in Bihar, India receiving psychosocial support through tele-counselling in 2021.

on disaster mainstreaming, reduction, planning, and management; some also focus on GESI and climate change adaptation.

## Incident Command System Adaptation

India's Incident Response System (IRS), modelled on the USFS Incident Command System (ICS), is well-developed. India transitioned smoothly from the ICS to IRS, adapting the former to Indian circumstances, such as the country's legal, administrative, institutional, and hierarchical systems of accountability. As it did for itself, India could successfully adapt the very useful ICS to meet a partner country's requirements, particularly in South Asian countries that have similar administrative mechanisms (see Box 1). Originally, the USFS supported ICS training and capacity building modules customized to India's situation and, to strengthen training, developed scenarios contextualized to India's circumstances under a 2003 USAID Disaster Management Support Project.<sup>92</sup> Emulating this model of cooperation, India could collaborate with USFS experts in adapting ICS training modules and draft ICS institutionalization guidelines to meet a partner country's requirements<sup>93</sup> or assist with ICS institutionalization that is underway. In the past, experts from India have joined the U.S. Forest Service International Program (USFS IP) trainers to support training programs in South Asian countries; they have also participated in lessons-learned exercises. Developing and strengthening this kind of collaboration in the region holds promise. India has also demonstrated effective use of its IRS in managing religious events where large crowds congregate (such as Kumbh Mela); this capability could also be very useful for some countries.<sup>94</sup> Furthermore, the NDMA organizes mock drills based on the IRS, and this expertise could be shared with countries that want to build procedures for ICS mock drills.<sup>95</sup>

## Risk Communication and Language Adaptations

Many Indian DRR specialists working in national and state government offices, agencies, and CSOs speak, read, and write English and Hindi. When needed, Indian DRR agencies are adept at providing interpreters and producing translations for training manuals, standard operating procedures (SOPs), and other communications. The NIDM and NDRF have used these facilities effectively when training foreign trainees in India.

## Equipment Stocks and Suppliers

The NDRF has identified, assessed, and acquired several types of equipment over time to carry out search and rescue missions in different disaster settings, such as earthquakes, floods, medical first response, high altitude missions, and nuclear, biological, or chemical emergencies. In addition to equipment that directly helps the NDRF in its operations, the NDRF also possesses supportive equipment, such as communications gear, flood lights, boats and rafts, safety equipment, tents, and other operational equipment. The NDRF also has several trained canine squads that help the NDRF in search and rescue missions, especially in post-earthquake scenarios.

The NDRF can mobilize this equipment within the country or within other countries. For example, the NDRF successfully mobilized all the required equipment to provide search and rescue support in Nepal after a devastating earthquake in 2015 (Box 5).



## **BOX 5 | INDIA'S RESPONSE TO THE 2015 EARTHQUAKE IN NEPAL: A CASE STUDY**

A severe earthquake of about 7.8 magnitude struck central Nepal on April 25, 2015, which resulted in 9,000 lives lost, about 22,000 persons injured, and millions rendered homeless.<sup>96</sup> The Government of India was among the first to respond to the crisis with Operation Maitri, a rescue and relief operation launched within minutes of the news. Run by the Indian government and Indian Armed Forces, Operation Maitri included ex-servicemen of the Gurkha regiment and conducted relief, damage assessment, and salvage operations in coordination with the Nepalese Government.<sup>97</sup>

India supplied food, including food for children, such as milk, biscuits and water. It also provided medical assistance, including medical supplies and manpower (nurses, paramedics, and doctors), setting up field hospitals, a 45-bed hospital at Lagankhel, Nepal, established by the Indian Army. India also sent NDRF teams for around the clock rescue and relief operations. Effective helicopter operations rescued the injured and air dropped relief materials to inaccessible places. India also had executives and technical staff from the Indian Oil Company and the Power Grid Corporation of India assist with power grid operations and ensure an uninterrupted fuel supply, thus taking care of all immediate and essential needs.<sup>98</sup> India used aerial vehicles to map the destruction and help channel resources effectively, continuing to provide aid and assistance throughout the post-disaster period with mobile medical teams, specialist doctors, and army and air force units for air dropping and transporting essential supplies. Furthermore, it enlisted the Sashastra Seema Bal to send vehicles, ambulances, and water tankers from their border camps. As a result of these efforts,<sup>42</sup> India was also able to evacuate 20,000 Indian citizens and 170 foreign nationals from Nepal.<sup>99</sup>

In the post-disaster period, aid from India in the form of financial assistance and expertise continued over a period of time for various reconstruction activities and trainings, which also prioritized the needs of vulnerable people, including female-headed households and children. India helped rebuild earthquake-resilient homes; healthcare centers; schools with computer/science labs; water and sanitation hygiene (WASH) infrastructure; and psychosocial counselling facilities. In addition, India provided sectoral expertise in agriculture, roads and transport, electricity, hydropower, health, education, cultural heritage, and DRR for ongoing restoration and reconstruction. India's USD 1 billion contribution was almost one-seventh of the total USD 6.7 billion it took to rebuild the Himalayan state.<sup>100</sup>



The NDRF also trains the State Disaster Response Forces (SDRFs) established by several states in India. In order to support and facilitate their procurement process, the SDRFs evaluate

equipment and provides information about such equipment and relevant vendors on its website. See Annexure 6 for indicative lists of equipment and suppliers.

Photo Credit: The National Aeronautics and Space Administration (NASA) - EOSDI  
Super Cyclonic Storm Amphan over the Bay of Bengal on May 18, 2020.



## CHAPTER 04

# Indo-Pacific Sub-Regional DRR Status, Mechanisms, Institutions and Partners



## Introduction

This chapter outlines the disaster risk reduction status of three Indo-Pacific sub-regions, South Asia, Southeast Asia, and the Indo-Pacific Islands, and briefly discusses the possible DRR needs of countries identified as having potential for TrC. A more detailed analysis of potential partner countries is contained in Annexure 4. Annexure 5 provides relevant details about other countries in each region. As explained in the research methodology section above, all analysis is based on a desk review and deliberations during meetings with DRR experts in the region. The potential needs are indicative in nature and are meant to spur further discussions with the TriDeP team. Some, but not all

possible, common hazards in key Indo-Pacific countries are summarized by sub-region in Table 1. When noting potential hazards, it is essential to keep in mind that many, if not all, will be exacerbated by climate change.

## Status of DRR in the South Asia Region

The South Asia Region (SAR) comprises eight countries, namely Afghanistan, Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. With over 1.8 billion people, SAR collectively represents 25 percent of the

global population. The geography of the region is very diverse, ranging from high elevations in the Himalayas to long coastlines formed by the Arabian Gulf, the Indian Ocean, and the Bay of Bengal. Due to its geographic location and geo-climatic characteristics, SAR remains vulnerable to natural hazards, such as cyclones, floods, earthquakes, tsunamis, extreme precipitation (especially during monsoon rains), droughts, landslides, and glacial lake outburst floods (GLOFs). And although the research did not specifically study epidemics, pandemics or offshore oil spills, the region is not immune from such hazards. According to the World Bank, between 1971 and 2009, SAR was the site of 1,017 natural disasters, causing the region nearly USD 80 million in damages

and losses, affecting 2 billion people and killing 800,000.<sup>102</sup> The number of natural disasters and their associated costs are rising. In 2016, SAR experienced USD 6.04 billion in costs due to natural disasters. While 22 percent less than the annual average from 2006 to 2015, the overall trend indicates that natural disasters have increased in SAR, both in occurrence and intensity, largely thought to be because of climate change.<sup>103,104</sup> Most South Asian countries take a traditional approach towards DRR, focusing on post-disaster response and relief, but the increase in disaster awareness has resulted in many, as in India, taking a more holistic approach towards disaster risk management.



Photographer: R. Sen

Relief being distributed in the aftermath of cyclone Fani in 2019.



## South Asia Region Institutions and Partners

Eight countries constituted the South Asian Association for Regional Cooperation (SAARC) in 1987, aiming to promote the welfare of the peoples of South Asia, and to accelerate economic growth, social progress, and cultural development in the region. SAARC also promoted active collaboration with regional and international organizations for mutual assistance in the economic, social, cultural, technical, and scientific fields.<sup>105</sup> SAARC member countries also established the SAARC Disaster Management Center (SDMC) to provide policy advice, technical support on system development, capacity building services, and training for holistic management of disaster risk in the SAARC region. The SDMC, currently operating from within India, facilitates information and expertise exchange for effective and efficient management of disaster risk. It focuses on the following priorities:<sup>106</sup>

- Establish and strengthen the regional disaster management system to reduce risks and improve response and recovery management at all levels.
- Identify and elaborate country and regional priorities for action.
- Share best practices and lessons learned from DRR efforts at national levels.
- Establish a regional system to develop and implement regional programs and projects for early warning.
- Establish a regional system of exchanging information on prevention, preparedness, and management of natural disasters.

- Create a regional response mechanism dedicated to disaster preparedness, emergency relief, and rehabilitation to ensure immediate response.
- Create a regional mechanism to facilitate monitoring and evaluation of achievements towards goals and strategies.

SAARC member countries have established bilateral cooperation for disaster risk management among themselves and with multiple donor agencies, such as USAID, the World Bank, Global Facility for Disaster Risk Reduction (GFDRR), Japan International Cooperation Agency (JICA), Asian Development Bank (ADB), Swiss Development Corporation, Australia's Department for Foreign Assistance and Trade (DFAT), and the United Kingdom's Foreign, Commonwealth and Development Office (FCDO), and various United Nations agencies, like the UNDRR, and multiple NGOs, such as World Vision, Caritas, ActionAid, Oxfam, and CARE.

## Status of DRR in Southeast Asia

The Southeast Asia Region (SEA) comprises Brunei, Cambodia, Indonesia, Lao People's Democratic Republic (PDR), Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam – the 10, members of the Association of Southeast Asian Nations (ASEAN) – and Timor-Leste. SEA covers a total land area of 4.4 million square kilometers (sq. km) and has a population of 608 million people.<sup>107</sup> The region is characterized by riverine plains, deltas, and coastal plains. Due to its geography and climatic conditions, SEA is one of the world's most vulnerable regions to natural hazards and climate change, exposed to



Table 1 Some Common Hazards in Indo-Pacific Countries

Country	Avalanche	Cold Wave	Cyclones	Drought	Earthquake	Epidemic	Flood	Forest Fire	GLOF	Land-slide	Oil Spill	Tsunami
<b>South Asia Region</b>												
Afghanistan	●	●		●	●	●	●	●		●		
Bangladesh			●	●	●	●	●	●			●	
Bhutan	●	●			●	●	●	●	●	●		
India	●	●	●	●	●	●	●	●	●	●	●	●
Maldives			●	●	●	●	●	●		●	●	●
Nepal	●	●		●	●	●	●	●	●	●		
Pakistan			●	●	●	●	●	●		●	●	
Sri Lanka			●	●		●	●	●		●	●	●
<b>Southeast Asia Region</b>												
Brunei			●			●	●	●		●	●	
Cambodia			●	●	●	●	●	●		●		●
Indonesia			●	●	●	●	●	●		●	●	●
Lao PDR			●	●	●	●	●	●				
Malaysia			●	●		●	●	●		●	●	
Myanmar			●		●	●	●	●		●		●
Philippines			●		●	●	●	●		●	●	●
Singapore				●		●	●	●			●	
Thailand			●	●		●	●	●		●	●	
Viet Nam			●	●		●	●	●		●	●	
Timor-Leste			●	●	●	●	●	●		●	●	●
<b>Indo-Pacific Islands Region</b>												
Cook Islands			●	●		●	●	●			●	
Fiji			●			●	●	●		●	●	●
Kiribati			●	●		●	●	●			●	●
Nauru			●	●		●	●	●			●	
Palau			●	●		●	●	●			●	
Papua New Guinea			●	●	●	●	●	●			●	
Samoa			●	●	●	●	●	●			●	●
Solomon Islands			●	●	●	●	●	●			●	●
Tonga			●		●	●	●	●			●	
Vanuatu			●	●	●	●	●	●			●	●

Note: This table does not reflect all possible hazards for all countries, such as tidal surge, coastal or slope erosion, volcanic eruption, heat wave, pollution, rising sea level, strong wind or tornado, or heavy rainfall, among others.

Source: Authors based on Kifle (2017)<sup>101</sup> and references cited in Annexures 4 and 5.

Photographer: Hale Irwin

A snowstorm halts traffic at the base of the Taglang La (Tanglang La) Pass (17,480 ft) in December 2021.

The Manali to Leh Highway is one of the highest and most rugged mountain passes in the world.



hazards such as earthquakes, tropical cyclonic storms (typhoons), floods, landslides, tsunamis, droughts, forest fires, and volcanic eruptions. The coastlines of the Philippines and Viet Nam are particularly exposed to tropical storms that originate in the north-western Pacific Ocean, tracking westwards. The coastline of Myanmar is exposed to tropical storms originating in the North Indian Ocean, tracking eastwards. The Philippines and Indonesia are also exposed to

frequent earthquakes due to the location of the boundaries of the Indo-Australian, Eurasian, and Philippine tectonic plates. SEA is also vulnerable to epidemics and pandemics, and offshore oil and chemical spills near coastal countries.

In recent decades, it has become more and more evident that climate change adaptation and DRR are inextricably linked.<sup>108</sup> From 1972-

2009, SEA experienced 1,211 natural disaster events, resulting in large economic drawbacks and 414,900 deaths.<sup>109</sup> In 2018, 27 million people were affected by natural disasters, and the region lost USD 1.2 billion due.<sup>110</sup> On the global scale, a high number of disasters marked 2018 and almost half of the 281 natural disaster events occurred in the Asia-Pacific region, including eight out of 10 of the deadliest disasters.<sup>111</sup>

Beyond natural disasters, SEA also has significant socioeconomic challenges, including an estimated 38 million people living in multidimensional poverty, with the actual numbers likely much higher.<sup>112</sup> The ASEAN countries have also witnessed rapid and unplanned urbanization and growing populations, which increases the region's disaster

and climate change risks.<sup>113</sup> Often, minority populations, such as women, children, people with disabilities, and the elderly, are more vulnerable to the shocks of natural disasters. The ASEAN member countries have signed and ratified the Convention on the elimination of all forms of discrimination against women (CEDAW) in an effort to reduce the risk of disasters to women.

### **Southeast Asia Region Institutions and Partners**

In terms of regional mechanisms for disaster risk reduction, ASEAN member countries in SAR signed and ratified the ASEAN Agreement for Disaster Management and Emergency Response (AADMER) in July 2009. The AADMER



Photographer: V Srinivasan

A family affected by the 2015 South India floods in Royapettah, Chennai, India.

works as a regional framework for cooperation, coordination, technical assistance, and resource mobilization in all aspects of disaster risk management and emergency response. A work program has been agreed for the period 2021-2025 with the priority areas of risk assessment and monitoring (RAM), prevention and mitigation (P&M), preparedness and response (P&R), resilient recovery (RR), and global leadership (GL). ASEAN member countries have also adopted the “One ASEAN One Response (OAOR)” that guides cooperation during the response phase.<sup>114</sup>

On 17 November 2011, the region's 10 ASEAN member countries established the ASEAN Coordinating Center for Humanitarian Assistance (AHA), which is an intergovernmental organization and aims to facilitate disaster management cooperation and coordination amongst member countries. The Center primarily works with countries' national disaster management organizations (NDMOs), but it also partners with international organizations, the private sector, and CSOs.<sup>115</sup>

### **Status of DRR in the Indo-Pacific Islands Region**

While the Pacific Island countries comprise 25 countries and territories spread over more than 25,000 islands and islets of the western and central Pacific Ocean, our focus concerns 10 developing island states that are located in the Indo-Pacific Islands Region (IPI), what we will call the Indo-Pacific Islands: Cook Islands, Fiji, Kiribati, Nauru, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu. Their geo-physical locations and climatic conditions make these IPI countries extremely prone to earthquakes, volcanic eruptions,

storm surges, drought, floods, tropical cyclones, coastal erosion, and other risks worsened by climate change.<sup>116</sup> Between 1967 and 2013, countries across the sub-region experienced 1,183 natural disasters, affecting 11.8 million people and resulting in over 19,000 fatalities, including USD 2.8 billion worth in losses because of tropical cyclones, USD 310 million in losses from floods, and USD 155 million from drought.<sup>117</sup> As in other regions, IPI countries are also subject to epidemics and pandemics, and especially exposed to oil and chemical spills.

### **Indo-Pacific Islands Region Institutions and Partners**

Most Indo-Pacific Island states have formulated laws, policies, plans and programs, and institutions to address disaster and climate risks. However, many IPI countries often lack resources and adequate capacity to deal with ever-increasing disasters and, therefore, rely on external support. Collectively, Pacific Island countries set up a Secretariat for the Pacific Community (SPC), which is an international development organization owned and governed by 17 member countries and territory members to provide scientific and technical support for development. The SPC focuses primarily on climate change, disaster risk management, food security, gender equality, human rights, non-communicable diseases, and youth employment. The Applied GeoScience and Technology Division of the SPC established the Pacific Damage and Loss Information System.<sup>118</sup> Additionally, a number of donors, such as USAID, World Bank, GFDRR, JICA, DFAT, ADB, New Zealand International Development Cooperation, and various UN agencies, like UNDRR, support disaster risk management

initiatives in the region. Because IPI countries are geographically isolated, small in size, and have limited resources, the region requires investment in DRR programs, particularly those that focus on improving early warning systems, communications, supply chains, community-based disaster preparedness, climate change adaption, and first response capacities.



Photo Credit: Look4What  
Chemical Fire on the X-Press Pearl off the coast of Sri Lanka in May 2021.



## CHAPTER 05

# Summary of TrC Approaches, Potential Match Countries and Recommended Initiatives for TrC

This chapter discusses the viability of potential TrC initiatives and suitable activities, presents some approaches for implementations, and

suggests ways to strengthen GESI while implementing TrC activities. This chapter also presents the researcher's views regarding



Photo Credit: Media Nation

Medical assistance tent and a medical red-cross vehicle at the Kendriya Vidyalaya Relief Camp, at the Air Force Station, Srinagar, Jammu & Kashmir, India for rescue operations following the J&K Floods in September, 2014.

potential opportunities and challenges that will occur while implementing TrC initiatives.

### Triangular Cooperation, Viability, and Recommendations

There are multiple opportunities to offer India's DRR expertise to countries in the Indo-Pacific and the TriDeP is well-prepared to begin discussions about such initiatives in order to create viable and valuable partnerships.

Photographer: Prabhat Mehrotra

A police officer helps an old man during the 2019 Delhi Floods as they walk in flood water in a residential area near the banks of the overflowing Yamuna River in New Delhi, India.



The USAID India Country Development Cooperation Strategy (CDCS) states that USAID can cooperate with the Development Partnership Administration (DPA) Division of India's Ministry of External Affairs in multiple development fields, including DRR.<sup>119</sup> India, because of its extensive capabilities, can be the primary source of expertise and technical assistance, and lead bilateral cooperation efforts, but TrC projects could also benefit from the involvement of several U.S. agencies

and private sector or nongovernmental organizations. For example, the USFS IP could collaborate with the NIDM and NDMA in ICS adaptation and institutionalization activities, emergency operations center training, and capacity development. Similarly, the U.S. National Oceanic and Atmospheric Agency (NOAA) could collaborate with the IMD and the NCMRWF in the areas of tracking weather systems and generating early warnings. Annexure 7 details possible Indian and U.S. partner agencies and organizations along with recommended implementation subjects.

### Suitable DRR Activities for TrC Initiatives

TrC activities should align with India's DRR expertise and Indo-Pacific countries' needs and involve suitable subject and domain experts with experience in seeing India through its paradigm shift from search and rescue-related crisis management to prevention and preparedness. Suitable activities may include:

#### i. Strengthening First Responder Capacity

- Supporting the NDRF Academy in curriculum development, preparing a blueprint for creating training infrastructure, and conducting training-of-trainer activities to strengthen NDRF Academy capabilities and the academy's ability to support different Indo-Pacific countries in the region.

- Assessment and training phases should identify skill and equipment gaps, including country-specific GESI issues and country-specific strategies to address GESI concerns. Such strategies can include making women part of search and rescue teams, training women

as trainers, including sessions on gender and social issues, and promoting the importance of gender-sensitive planning.

## ii. Strengthening Institutional and Community Capacity

Under this activity, the TriDeP program could consider organizing workshops, exchange programs and direct support for:

- Designing and enacting legislation and policies, and establishing institutional mechanisms, such as response frameworks and coordination mechanisms, in order to strengthen disaster risk management governance.
- Promoting disaster management planning through policies, acts, and by designing plan templates, training, establishing suitable processes at national and sub-national levels.
- Training and capacity building to strengthen disaster management understanding in various thematic areas, such as disaster recovery, stakeholder response, stakeholder roles, climate change adaptation, gender and inclusion issues, and others.
- Strengthening community-based disaster preparedness through the provision of equipment and training on community-based plans, search and rescue, early warning dissemination, relief camp management, and others.
- Mainstreaming DRR and climate change adaptation in development planning at national and local levels, with a special focus on natural resource management.

- Improving access to psychosocial care through training-of-trainers, community-based volunteers, and NGOs on implementing psychosocial care activities, and by training administrators to understand and appreciate the scope of the psychosocial care framework.

- Conducting workshops to raise awareness about the need for, and significance of, psychosocial care during disasters, community-based practices, roles of various stakeholders, and strategies to institutionalize psychosocial care.

- Supporting the development of a strategy, framework, architecture, and marketplace for telemedicine services.

Introductory workshops in the above fields could be effective ice-breaking exercises and help in building rapport. Such workshops could also become effective tools to emphasize gender and social inclusion issues, discuss challenges, and design strategies to address various concerns. The initiative will help connect India's centers of excellence (COEs) with technical organizations, such as the NDMA, NIDM, NIMHANS, IITs, BMTPS, SEEDS India, and TISS with relevant stakeholders in potential match or partner countries. The workshops could also discuss gaps at different levels, including the policies, institutional frameworks, capabilities, and skills needed to implement suitable activities on the ground. A consultative process will help reveal country-specific gaps. Viet Nam, Fiji, the Philippines, and Cambodia could be shortlisted for deepening partnerships at the institutional and community levels to strengthen legislative practices, institutional mechanisms, community-based disaster preparedness practices, post-disaster psychosocial care, disaster management

planning tool design, disaster management planning processes, DRR and climate change adaptation, and GESI.

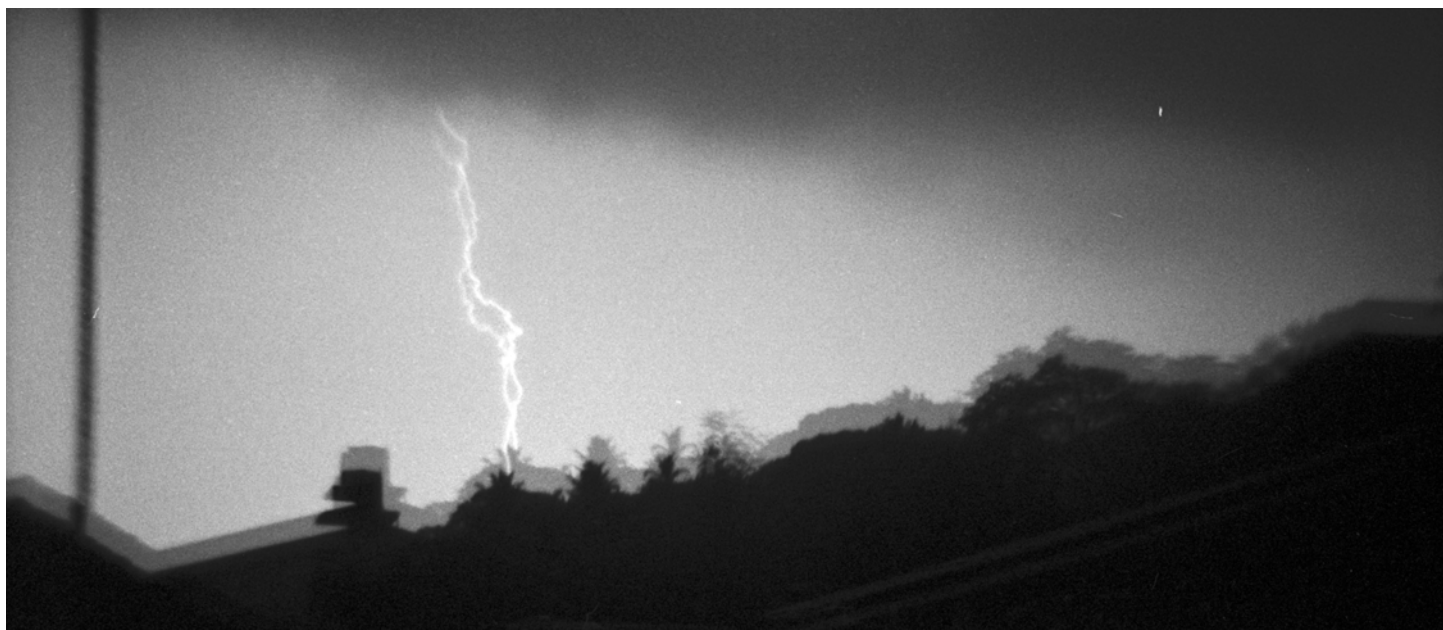
### iii. Supporting ICS Adaptation Initiatives

There is a need to solve challenges related to effective coordination, information, and resource management while responding to disaster events; convening participants proposed the institutionalization of Incident

various stages of ICS adaptation, training, and institutionalization. India could share its experience of ICS-to-IRS adaptation, guideline design, and operations training. Opportunities for further capacity building and institutionalization of the IRS in India also exist.

### iv. Training and Capacity Building

As an integral part of its disaster management



Photographer: Nikita Naiknavare & Kiran Pradhan

Thunderstorms in Panjim, Goa, India during severe cyclonic storm Tauktae on May 14, 2021.

Command Systems as a possible solution. Indian institutions, using their experiences and expertise, could assist with ICS adaptation and institutionalisation in Indo-Pacific Region countries. Indian technical organizations could also work in partnership with the USFS IP in establishing an ICS as a common response framework, which could also help to strengthen regional cooperation. The TriDeP program could identify suitable Indian trainers to support the USFS trainers during

journey, India has established several training institutions and programs to help strengthen understanding about disaster management concepts, planning protocols and skills, and several topics pertinent to DRR, such as SOPs plans and trainings for search and rescue, ICSs, emergency operations centers (EOCs), and psychosocial care. The TriDeP program could promote engagements to identify training needs and help establish institutional mechanisms for training and capacity building.



#### v. Creating Institutional Partnerships to Promote DRR Research

There should be greater focus on research in the field of DRR. The TriDeP program should promote collaboration between relevant research institutions in India, such as the TISS, IIT Roorkee, and NIDM, and corresponding institutions in countries in the Indo-Pacific Region. Establishing a network of research institutions for promoting disaster reduction research will strengthen research practices and share knowledge between countries.

#### vi. Addressing Forest Fires

Forest fires are a significant emerging hazard in South Asia, Southeast Asia, and several Indo-Pacific Islands. Several participants in the national and international convenings felt that the TriDeP program should work with relevant U.S. government agencies. Some participants called for a workshop on forest fire issues and challenges for Indo-Pacific countries, and for strengthening India's capabilities in managing forest fires so it can share knowledge elsewhere in the Indo-Pacific Region. This will help India manage forest fires and enable India to support other Indo-Pacific countries as they confront the challenge of wildfires.

#### vii. Other initiatives

- In partnership with the NDMA, NIDM, and SDMC, organize a workshop regarding planning involved in setting up and managing EOCs. Suitable U.S. government agencies, such as the Federal Emergency Management Agency (FEMA), the USFS, and EOCs from U.S. states could also partner in this initiative.

- India has organized search and rescue drills with SAARC and BIMSTEC countries in the past (see Box 3). In the medium-term, after the Covid-19 pandemic situation stabilizes, the TriDeP program could organize a joint search-and-rescue drill involving Cambodia and Timor-Leste, and especially Nepal, Bangladesh, and Bhutan, where there is a potential for transboundary disasters that involve India.

- Multi-agency coordination is one of the most critical aspects during disaster response. The SDMC and NIDM could collaborate to organize a workshop to train officers from Indo-Pacific countries on multi-agency coordination. The NIDM successfully organized one such workshop in partnership with FEMA in 2009.<sup>120</sup>

- Training on weather forecasting and early warning communication for the Indo-Pacific countries in collaboration with the IMD and other institutions, such as Bangkok-based Regional Integrated Multi Early Warning System (RIMES), is another important initiative. During these trainings, the TriDeP program should identify partners who could expand bilateral and regional collaboration between India and other regional countries, and strengthen such alliances. The Asia Foundation could then follow up to strengthen partnerships between India and other Indo-Pacific countries.

- Climate change poses significant threats to many countries in Indo-Pacific Region, especially the Indo-Pacific Island countries. Protection and mitigation from the adverse effects of natural resource degradation and climate change appear to be significant challenges. TrC projects could support protection and mitigation actions and strengthen knowledge and practices through

“nature-based solutions”<sup>1</sup> and “eco DRR”<sup>121</sup> to protect and safeguard natural resources, such as mangroves, wetlands, and water bodies. These interventions could solve or mitigate disaster risk issues through low carbon activities using natural resources,<sup>122</sup> such as developing green walls to cut the velocity of cyclonic winds, planting trees on slopes to mitigate landslides, or rejuvenating water bodies to mitigate heat effects.<sup>123</sup> India could also work with Fiji and other Indo-Pacific Island countries to address slow-onset hydrological and meteorological disasters, such as drought, and also explore solutions for disaster resilient infrastructure in partnership with CDRI.

- Provide needs-based post-disaster humanitarian assistance and support recovery planning.

## Approaches to Consider During TrC Initiative Implementation

Some participants in the international convening pointed to three strategies that could support implementations of TrC initiatives:

1. **Establish and Strengthen Networks:** Sustaining actions beyond the project period is an important aspect when implementing project-based activities. Networks of CSOs and government agencies, including the SAARC Disaster Management Center (SDMC), ASEAN Coordinating Centre for Humanitarian Assistance on Disaster Management (AHA Center), and Pacific Islands Applied GeoScience Commission (SOPAC), and links with and

<sup>5</sup> WWF defines “nature-based solutions” as “Ecosystem conservation, management and/or restoration interventions intentionally planned to deliver measurable positive climate adaptation and /or mitigation benefits that have human development and biodiversity co-benefits managing anticipated climate risks to nature that can undermine their long-term effectiveness.”

between research institutions and communities, should be established and strengthened to ensure a continuous exchange of knowledge and actions. A community of practice among subject matter experts should be established to facilitate and sustain a region-wide forum for cross-fertilizing ideas and sharing knowledge. The existence of networks will lead to continuous knowledge exchange because of the availability of communication technology, and it will motivate more donors to pursue disaster management programs, leading to the expansion and continuity of DRR activities in the region.

2. **Partner with Stakeholders:** Program implementation will bring governments, the private sector, academic institutions, and nongovernmental stakeholders together. Bringing such stakeholders together will help address different programmatic needs, mobilize technical resources, create a multiplier effect, and contribute to sustainability. In addition to Indian agencies, private sector entities, COEs, universities, and other training and capacity building institutions, the following entities are suitable partners for TrC activities: RIMES; ADPC; UN agencies such as UNDP, UNESCAP, UNDRR, UNEP; SDMC; AHA Center; International Union for Conservation of Nature (IUCN); International Center for Integrated Mountain Development (ICIMOD); Pacific Islands Applied GeoScience Commission (SOPAC); Secretariat for the Pacific Community (SPC), CDRI, and others.

3. **Promote Joint Research Initiatives:** Many countries in the Indo-Pacific Region suffer from a lack of suitable research initiatives, even after disaster events. The TriDeP program should focus on forging alliances between various institutions in the Indo-Pacific Region,

such as the AHA Center, RIMES, and ADPC, and institutes and universities in India, such as the TISS, NIDM, and IIT Roorkee, to strengthen research focus and capabilities.

### **Suggested Approach to Addressing GESI Issues and Challenges**

The vulnerability of women, children, and other social minorities, stemming from biological, sociocultural, and economic reasons, becomes exacerbated during the disaster events. Sociocultural and economic constructs tend to broaden during disaster events; therefore, it is important to identify issues and challenges pertaining to GESI. To ensure that these issues are adequately addressed during service delivery, it is important to ensure that the supply-side institutions, COEs, professionals, and technical experts who participate in project activities, such as trainings and discussions, are aware of and understand GESI issues and challenges and are prepared for how to deal with them.

Similarly, projects should develop tools that could collect required information about GESI issues and challenges in different countries and contexts. Such tools could collect information beforehand and use it when preparing for workshops and training programs. The training workshops, further, should have sessions and modules which discuss GESI elements to help participants identify and appreciate the issues and challenges in their respective contexts. Efforts need to be made at various levels, including policy development, planning, and hiring and training responders, to guarantee that institutions can monitor and address GESI issues. Workshops and trainings should focus on proposals to strengthen alternative approaches and reinforce a multi-layered,

gender and inclusion-sensitive approach at every opportunity.

Similarly, projects should also include GESI approaches and outputs as a part of a project's monitoring, evaluation, and learning systems. The TriDeP program should use knowledge and learning enhancement and data-based approaches for designing monitoring and evaluation plans. The TriDeP program team may also hire a GESI expert to guide this entire process.

### **Opportunities and Challenges**

The supply and demand analysis points to several areas where India's technical strengths could support countries in the Indo-Pacific Region in strengthening their disaster risk management. Similarly, there is a considerable interest in the Indo-Pacific Region for multi-stakeholder engagement, international collaboration, and partnerships for resolving disaster risk management challenges. Several donors will be keen to support disaster risk management TrC projects, including USAID, FCDO, DFAT, JICA, GFDRR, the World Bank, European Union, European Commission Department of Humanitarian Aid (ECHO), Swiss Development Corporation, and the Bill and Melinda Gates Foundation. These prospective partnerships offer an opportunity for India to provide its technical capabilities in support of Indo-Pacific countries.

Although Indian government agencies, COEs, and private sector entities are interested in working with Indo-Pacific countries, completing partnership formalities, and obtaining government permissions for engaging identified entities, is a challenging and time-consuming

process. Partnering with recipient countries will also require significant preparation and groundwork on the recipient side. Similarly, Indian government agencies, COEs, and private sector entities need preparation to enable them to appreciate sociocultural nuances of the recipient countries and GESI issues; they also need approaches to address such nuances and issues. Furthermore, since the Indo-Pacific Region is extremely disaster prone, any major disaster could cause significant disruptions to ongoing disaster risk management. This makes disaster response, relief, and rehabilitation a major priority. Similarly, the geopolitical context constantly evolves within individual countries and regionally. Realignments may mean that donors' interests may change in some countries. Finally, the Covid-19 pandemic situation is still not stable in many countries, which may require significant adaptation to planned activities according to what may be swiftly changing situations. Constant brainstorming sessions with experts will help make the decisions required to adapt projects and activities as needed.

### Summary of Initial Supply-demand Country-initiative Matches for TrC

India has several DRR experiences and capabilities to offer to countries in the Indo-Pacific Region, and Indian expertise and equipment can support their efforts to address DRR challenges. TrC initiatives under the TriDeP offer excellent opportunities for India to collaborate with several countries across the region, and to combine its expertise with that of U.S. institutions wherever required, in order to help all countries enhance their DRR knowledge and capabilities.

In accordance with the original terms of reference and in consultation with The Asia Foundation, the author initially identified six countries for potential TrC initiatives: Bangladesh, Bhutan, Fiji, the Maldives, Nepal, and Vietnam. These countries are a suitable match for TrC initiatives due to the potential for shared or transboundary risk with India, potential for the application of expertise from India, ongoing collaborations,



Photographer: Julian Bound

Man sits outside his house, ruined by an earthquake, in Bhaktapur, Nepal, on May 9, 2015.



donor interest, and political-economic considerations, and because India already has significant development cooperation footprints in each country's immediate neighborhood. In subsequent discussions, the Foundation expressed the view that the TriDeP program's initial focus should include developing countries in Southeast Asia and the Indo-Pacific Islands. Therefore, the Foundation suggested that TrC initiatives should also be explored for Lao PDR, Timor Leste, and Cambodia. The research found these three countries suitable TrC candidates because of their similar disaster risk profiles, the potential usefulness of Indian expertise, level of donor interest, and various political-economic considerations. Finally, during the demand-side convening, the TriDeP team learned that the Philippines could benefit from India's pandemic-related telemedicine capabilities, psychosocial care experience, and other expertise. These 10 match countries and their TrC recommendations are described below. See Annexure 4 for additional match-country profile information, and Annexure 5 for profiles of countries not included here (Brunei, Cook Islands, Indonesia, Kiribati, Malaysia, Myanmar, Nauru, Palau, Papua New Guinea, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, Vanuatu).

## South Asia Region



### Bangladesh

The People's Republic of Bangladesh, the world's eighth most populous country, has more than 164 million inhabitants<sup>124</sup> and covers approximately 147,570 square kilometers (sq. km),<sup>125</sup> consisting of more than 310 rivers and

tributaries draining into the Bay of Bengal, the world's largest delta system.<sup>126</sup> Over the years, Bangladesh has made significant economic progress, reducing the number of persons living below USD 1.90 per day from 44.2 percent to 14.8 percent between 1991 and 2016.<sup>127</sup> Bangladesh is prone to natural hazards, such as cyclones, tidal surges, tornadoes, earthquakes, floods, and riverbank erosion. The country also faces drought, infrastructure collapse, and high arsenic contamination in its ground water. Structural fires in urban areas are one of the emerging risks in the country. Bangladesh is also prone to climate change due to its geographical location and hydro-meteorological conditions. About 44 percent of the population are still engaged in agricultural activities, which are highly vulnerable to climate risks.<sup>128</sup>

Bangladesh and India have active bilateral cooperation in diverse areas, such as infrastructure development, transport, human resource development, and others,<sup>129</sup> making Bangladesh an ideal partner for triangular cooperation.

The following could be priority areas for Bangladesh under TrC:

- Creating and sharing risk assessment tools, techniques, training, and technical support, including hazard mapping, risk and vulnerability assessment, risk-informed urban planning, and climate- and disaster-proofing development programs.
- Strengthening disaster response and preparedness by developing training modules and providing equipment for search and rescue, setting up and equipping a national emergency operations center, and supporting the USFS and Bangladesh in institutionalizing Bangladesh's

version of an ICS, the Incident Management System.

- Conducting pilot projects in the areas of nature preservation and climate change adaptation that promote nature-based solutions, such as saline-resistant crops and landslide mitigation using natural materials.
- Assisting with pandemic management, especially in the area of public health, risk communication, and vaccination.
- Enhancing disaster response by moving beyond legislation and mechanisms to institutionalize disaster management and DRR all over the country.
- Bolstering disaster response by using a gender-inclusive lens when working with disaster-prone communities, particularly in remote areas.



## Bhutan

The Royal Kingdom of Bhutan is a landlocked country bordering India, China, and the Tibet Autonomous Region. With a land area of approximately 38,394 sq. km that consists primarily of high mountains and river valleys, Bhutan has a population of 735,553.<sup>130</sup> Bhutan's economy remains predominately based on agriculture, and approximately 56 percent of the population are dependent on it.<sup>131</sup> Hydropower generation is a major economic activity.

Bhutan is prone to various natural hazards, such as earthquakes, windstorms, forest fires, GLOFs, other floods, and landslides, among others. The country has not faced any large-scale disasters in the past decade; however, seasonal hazards

occur frequently, causing economic losses, and livelihood and environmental degradation.

Bhutan is also considered susceptible to climate change risks.

The following could be priority areas for Bhutan under TrC:

- Strengthening disaster-response and early-warning capacities by developing training modules and providing equipment for search and rescue, setting up and equipping a national emergency operations center, assisting with the institutionalization of an Incident Command System, and bolstering the GLOF early warning system.
- Creating and sharing risk assessment tools, techniques, training, and technical support, including hazard mapping, risk and vulnerability assessment, risk-informed urban planning, and disaster management and contingency plans.
- Assisting with pandemic management through access to required medical and diagnostic resources.
- Focusing on gender-inclusive disaster management planning, training, and capacity building, and developing gender-disaggregated data for policymaking.
- Suggesting additional gender sensitivities that could be integrated into the 2014 Disaster Management Act.



## Nepal

The Federal Democratic Republic of Nepal is a mountainous landlocked country in the Himalayas. It has a diverse and complex topography and geology with a highly variable climate. It is bordered by India and China, out of which approximately 1,850 km is an open border with India.<sup>132</sup> The population of Nepal is approximately 29 million,<sup>133</sup> and 80 percent

of its population are dependent on agriculture for their livelihoods. Tourism, hospitality, forest-based agriculture, and hydropower generation are Nepal's primary economic activities.

More than 80 percent of the population is exposed to natural hazards, such as earthquakes, droughts, avalanches, epidemics, pandemics, floods, landslides, extreme temperatures, and GLOFs.<sup>134</sup> Nepal ranks 46<sup>th</sup> highest in exposure risk to disasters and humanitarian crises, according to INFORM Risk Index 2019,<sup>135</sup> and

Photographer: Atul Pandey

Villagers stranded in the 2021 flood of Bihar, India.



10<sup>th</sup> on the 2021 Global Climate Risk Index, which assesses the impact of meteorological events in relation to economic losses and human fatalities.<sup>136</sup>

The following could be priority areas for Nepal under TrC:

- Developing institutions at national, provincial, and district levels, and supporting and strengthening the National Disaster Risk Reduction and Management Authority.
- Strengthening firefighting services for both structural and forest fires.
- Designing, establishing, and equipping a national emergency operations center, and providing related training and capacity building.
- Adapting and institutionalizing an Incident Command System.
- Bolstering pandemic management, especially in the area of public health management, risk communication, vaccination management.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community levels.

## Southeast Asia Region



### Cambodia

The Kingdom of Cambodia is located between Thailand, Viet Nam, and Lao PDR. It has approximately 181,035 sq. km of land area,

46 percent of which is covered with tropical forests. The topography of the country includes mountains, forests, rivers, flood plains, and lakes. It has an estimated population of 16.2 million people (rural 78 percent and urban 22 percent).<sup>137</sup> Cambodia's economy relies heavily on agriculture. Its economy is one of the fastest growing in the world, and its rapid average 7.7 percent GDP growth rate from 1995 to 2019 has lifted Cambodia to the lower middle-income threshold.<sup>138</sup>

Cambodia is vulnerable to natural hazards, including floods, droughts, cyclonic storms, landslides, epidemics, pandemics, lightning strikes, and earthquakes. It is among the most exposed countries to disasters and ranks 15<sup>th</sup> in the world, in terms of average occurrences of disasters per million people and per thousand sq. km of land area.<sup>139</sup> Riverine flooding poses the highest risk in terms of average annual loss to the capital stock in Cambodia.<sup>140</sup>

The following could be priority areas for Cambodia under TrC:

- Conducting risk assessments and hazard mapping.
- Strengthening weather forecasting and early warning systems.
- Strengthening search and rescue capacities with an emphasis on flood rescue and Incident Command System training.
- Providing need-based training and capacity building of various stakeholders, including community-based disaster preparedness.
- Providing support for building resilient infrastructure, such as roads and community



Photographer: Anup Shrestha

A hill station and a popular tourist hotspot, Kuri village in Nepal was one of the areas affected by the 2015 Nepal earthquake.



centers, schools, and government offices.

- Identifying mitigation and adaptation solutions for climate change and exploring possibilities for implementing eco-DRR solutions, such as increasing green cover and fortifying riverbanks.
- Strengthening the participation of women in all administrative levels of disaster management planning, training, and capacity building.



### Lao PDR

The Lao People's Democratic Republic is a landlocked country bordering Myanmar,

Cambodia, China, Thailand, and Vietnam. The total land area measures approximately 236,800 sq. km with a mountainous topography; only about 6 percent of the land is arable. In 2015, the total population was 6.49 million, of which only 32.9 percent lived in urban areas; approximately 72 percent of the working-age population relies on agriculture.<sup>141</sup> Lao PDR, due to its tropical weather conditions, is exposed to a range of hazards, such as droughts, floods, and storms.<sup>142</sup> In addition to these hydro-meteorological disasters, the country is also threatened by epidemics and earthquakes.

The following could be priority areas for Lao PDR under TrC:

- Conducting risk assessments for various sectors and expanding the existing

comprehensive disaster database.

- Strengthening weather forecasting and early warning systems.
- Mainstreaming disaster risk reduction, with a focus on the agriculture sector.
- Supporting the building of resilient infrastructure, such as roads and community centers, schools, and medical centers.
- Strengthening response capacities through search and rescue training with an emphasis on flood rescue and Incident Command System training.
- Providing training and capacity building for local communities, the government, and nongovernmental organizations.
- Strengthening community-based disaster preparedness, particularly provincial, district, and village disaster prevention and control committees.
- Expanding the use of local languages in disaster communications.
- Providing gender-inclusive disaster management planning, training, and capacity building, including creating data disaggregated by age, sex, and disability.



## The Philippines

The Republic of the Philippines, with a population of approximately 105 million people, is an archipelago consisting of

approximately 7,100 islands and islets, covering a land area of about 300,000 sq. km. The Philippines' climate is tropical, characterized by relatively high temperatures, high humidity, and abundant rainfall. Approximately 51 percent of the population lives in urban areas and the remaining 49 percent in rural areas.<sup>143</sup> Agriculture, mining, forestry, fishing, and services are major sources of livelihoods.<sup>144</sup> The Philippines is highly vulnerable to earthquakes, typhoons (cyclones), volcanic eruptions, floods, landslides, tsunamis, and forest fires. About 60 percent of the country's total land area is exposed to multiple hazards, and 74 percent of the population is susceptible to the impact of these hazards. Hydro-meteorological disasters, such as typhoons and floods, accounted for approximately 80 percent of disaster events in the last 50 years.

The following could be priority areas for the Philippines under TrC:

- Strengthening the National Emergency Response Force to build search and rescue and firefighting capabilities.
- Designing and equipping a national emergency operations center and providing related training and capacity building.
- Exchanging lessons learned in India and other South Asian countries on Incident Command System institutionalization.
- Piloting nature-based solutions for shoreline protection, such as growing trees.
- Training in community-based disaster risk management practices with a focus on gender mainstreaming.

- Mainstreaming disaster risk reduction and climate change adaptation or mitigation into development planning.
- Supporting disaster impact and climate impact assessments.
- Improving data management systems and the efficient and timely use of data.
- Exploring possibilities for financing disaster risk and increasing insurance coverage.
- Supporting solutions for health-related disasters through telemedicine, including psychosocial care.
- Establishing enhanced inter-agency collaboration to address psychosocial care practice and delivery.
- Training and building capacity for teachers and other frontline workers to provide better psychosocial care.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community levels.



## Timor-Leste

With a land mass of 14,874 sq. km, the Democratic Republic of Timor-Leste has a population of approximately 1.32 million. Located within the Malay-Indonesian archipelago in Oceania, 400 km north of Australia, Timor-Leste comprises the eastern half of Timor Island and two nearby islands,

Atauro and Jaco, and Oecusse, an exclave on the northwestern side of Timor Island. Timor Island is mountainous.<sup>145</sup> Timor-Leste is a young country, having become independent only in 2002.

Timor-Leste is prone to floods, landslides, droughts, earthquakes, tsunamis, and tropical cyclones. Flood is Timor-Leste's most frequent natural disaster, followed by drought and storms. Rapid deforestation and climate change may cause a hotter, drier climate, which may in turn lead to harsher and longer drought conditions and heavier rainfall, increasing flood and landslide hazards.<sup>146</sup>

The following could be priority areas for Timor-Leste under TrC:

- Strengthening weather forecasting and early warning communication systems.
- Mainstreaming disaster risk reduction in the agriculture sector, including the application of remote sensing and geographic information system (GIS)-based tools.
- Strengthening and developing institutions and technical capabilities in the areas of early warning systems, flood forecasting and management, and search and rescue.
- Supporting the building of resilient infrastructure, such as roads, and social infrastructure, such as schools, hospitals, and flood shelters.
- Strengthening response capacities through search and rescue and Incident Command System training.
- Focusing on gender-inclusive disaster



management planning, training, and capacity building.



## Viet Nam

The Socialist Republic of Viet Nam is located on the east side of Indochina Peninsula. It borders China, Lao PDR, and Cambodia. It has a total area of 331,236 sq. km characterized by mountains and hilly terrain that covers about three-fourths of the total area. There are two major river systems: The Red River in the north

and the Mekong River in the south. Viet Nam has a tropical climate, and the country receives copious rainfall during monsoon season (June and August).<sup>147</sup> Viet Nam has a population of 94.7 million people, of which 35.7 percent lives in urban areas.<sup>148</sup>

Viet Nam is prone to a number of natural hazards, such as tropical cyclones, floods, droughts, landslides, forest fires, coastal erosion, and others. It is also vulnerable to epidemics and pandemics. Cyclones and floods are the most frequent natural hazards.<sup>149</sup>

The following areas of cooperation could be



Photo Credit: iStock by Getty Images  
Boracay Island in Aklan Province, the Philippines facing typhoon winds in 2012.



explored in Viet Nam under the TrC:

- Training of search and rescue teams for flood rescue.
- Modernizing early warning systems for floods and cyclones.
- Developing resilient infrastructure, including formulating codes and standards, training architects, and institutionalizing building codes.
- Expanding information and communications technologies for disaster risk management.
- Adapting and institutionalizing an Incident Command System.
- Enhancing gender-inclusive disaster management planning, training, and capacity building at all administrative levels.

## Indo-Pacific Islands Region



### Fiji

The Republic of Fiji consists of 322 islands in the Pacific Ocean. The capital city is Suva. Fiji has a population of 0.9 million, of which 90 percent lives on the two main islands of Viti Levu and Vanua Levu. About 56 percent of the population lives in urban areas. Most are indigenous Fijians with a mixture of Melanesians and Polynesian ancestry. Indo-Fijians form a sizable minority. The total land area of the islands covers 18,274 sq. km over a geographical area of approximately 50,000 sq. km.

Fiji is prone to earthquakes, tsunamis, and landslides.<sup>150</sup> There are two active volcanoes. Additionally, Fiji is prone to annually occurring cyclones, heavy rainfall, and flooding. Its islands are also exposed to sea level rise and shore inundation. Climate change is one of the most prominent threats to the lives, livelihoods, security, and well-being of Pacific Islanders, including Fijians. Climate change impacts, such as sea level rise, ocean acidification, precipitation changes, and extreme weather events especially threaten Fiji because the population and infrastructure are mainly located near the ocean.

The following could be priority areas for Fiji under TrC:

- Promoting community-based disaster risk management practices with a focus on gender mainstreaming.
- Mainstreaming disaster risk reduction and climate change adaptation into development planning.
- Supporting disaster recovery design, especially with a focus on the inclusion of women and other marginalized peoples.
- Supporting disaster impact and climate impact assessments.
- Supporting infrastructure risk assessments and designing resilient infrastructure.
- Piloting engineering and nature-based solutions for coastal protection, such as developing mangroves, growing trees on the coastline, and installing permeable pavement to absorb rainwater.

- Sharing private sector disaster cooperation practices from India, such as medical services, and informing how the private sector can support disaster response efforts and rehabilitation.
- Providing a psychosocial methodology, psychosocial training curriculum, and telemedicine psychosocial first-aid counselling after disaster events.
- Providing gender-inclusive disaster management planning, training, and capacity building, including creating data disaggregated by age, sex, and disability.
- Developing Fiji into a springboard for launching TrC initiatives for all Indo-Pacific Island countries.



## The Maldives

With a 2014 population of 402,071 people, the Republic of Maldives is a small island developing state. Located in the Indian Ocean, it has a land area of 298 sq. km in a territory of over 90,000 sq. km. This makes the Maldives the most geographically dispersed nation in the world, comprising about 1,200 islands within 26 naturally formed atolls. Out of the 1,200 islands, 187 islands are inhabited, while another 128 islands are exclusively occupied by resort hotels. The Maldives is the smallest Asian country in terms of both population and land area. With an average ground-level elevation of 1.5 meters (4 ft 11 in) above sea level, it is also the planet's lowest country. It contains the world's lowest natural high point in the world, at 2.4 meters (7 feet 10 inches). Over 99

percent of the Maldives is made up of the sea, and only 0.331 percent (115 sq. miles) of its 35,000 sq. mile surface area is dry land.

The Maldives is exposed to natural hazards, such as droughts, storms, heavy rainfalls, cyclones, storm surges, coastal erosion, and tsunamis. Hydro-meteorological disasters accounted for 45 percent of the country's deaths and 79 percent of the economic losses between 1988 and 2007. The most common hazard is flooding. Coastal storm surges are the main culprit. Such surges are often prolonged during swell wave conditions. The other culprits include astronomical tides, high winds, and gradually rising sea levels. Additional disasters, such as offshore oil spills and fires, also affect the islands.

The following could be priority areas for the Maldives under TrC:

- Strengthening the National Emergency Response Force to build search and rescue capacities and strengthen fire services capabilities.
- Designing and establishing a national emergency operations center (including equipment) and related training and capacity building.
- Adapting and institutionalizing an Incident Command System.
- Building capacities and providing equipment for managing oil spills.
- Providing a psychosocial training curriculum and methodology and psychosocial first aid after disaster events.

- Piloting context-based, nature-based solutions, such as growing trees for shoreline protection.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community level.



Photographer: Carl Kho

People going about their lives in the aftermath of the devastating effects of Typhoon Rai in 2019, in Lapu-Lapu City, Cebu, the Philippines.

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# Annexures (1-7)

# Table of Contents

---

Annexure 1.	Indian Supply-side Preliminary Telephone and In-person Interviewees (January 2021)	92
Annexure 2.	Supply-side Expert Convening Participants (March 2021)	94
Annexure 3.	Demand-side Expert Convening Participants (May 2021)	97
Annexure 4.	Disaster Risk Profile of Potential Match Countries	101
	Bangladesh	102
	Geographic, Economic and Disaster Risk Profile	102
	Institutional and Policy Profile	102
	Disaster Management Capacities, Capabilities and Challenges	103
	Bilateral Relations with India	104
	Relations with Other Partners	104
	Social Profile	104
	Covid-19 Coda	105
	Recommendations Under TrC	105
	Bhutan	105
	Geographic, Economic and Disaster Risk Profile	105
	Institutional and Policy Profile	106
	Disaster Management Capacities, Capabilities and Challenges	106
	Bilateral Relations with India	107
	Relations with Other Partners	107
	Social Profile	108
	Covid-19 Coda	108
	Recommendations Under TrC	108
	Cambodia	109
	Geographic, Economic and Disaster Risk Profile	109
	Institutional and Policy Profile	109
	Disaster Management Capacities, Capabilities and Challenges	110
	Bilateral Relations with India	110
	Relations with Other Partners	111



	Social Profile	111
	Covid-19 Coda	111
	Recommendations Under TrC	111
Fiji		112
	Geographic, Economic and Disaster Risk Profile	112
	Institutional and Policy Profile	113
	Disaster Management Capacities, Capabilities and Challenges	113
	Bilateral Relations with India	113
	Relations with Other Partners	114
	Social Profile	114
	Covid-19 Coda	114
	Recommendations Under TrC	114
Lao PDR		115
	Geographic, Economic and Disaster Risk Profile	115
	Institutional and Policy Profile	116
	Disaster Management Capacities, Capabilities and Challenges	116
	Bilateral Relations with India	117
	Relations with Other Partners	117
	Social Profile	117
	Covid-19 Coda	117
	Recommendations Under TrC	117
The Maldives		118
	Geographic, Economic and Disaster Risk Profile	118
	Institutional and Policy Profile	119
	Disaster Management Capacities, Capabilities and Challenges	119
	Bilateral Relations with India	120
	Relations with Other Partners	120
	Social Profile	121
	Covid-19 Coda	121
	Recommendations Under TrC	121
Nepal		121
	Geographic, Economic and Disaster Risk Profile	121
	Institutional and Policy Profile	122
	Disaster Management Capacities, Capabilities and Challenges	123
	Bilateral Relations with India	123
	Relations with Other Partners	123
	Social Profile	124

	Covid-19 Coda	124
	Recommendations Under TrC	124
The Philippines		124
	Geographic, Economic and Disaster Risk Profile	124
	Institutional and Policy Profile	125
	Disaster Management Capacities, Capabilities and Challenges	126
	Bilateral Relations with India	126
	Relations with Other Partners	127
	Social Profile	127
	Covid-19 Coda	127
	Recommendations Under TrC	127
Timor-Leste		128
	Geographic, Economic and Disaster Risk Profile	128
	Institutional and Policy Profile	129
	Disaster Management Capacities, Capabilities and Challenges	129
	Bilateral Relations with India	129
	Relations with Other Partners	129
	Social Profile	130
	Covid-19 Coda	130
	Recommendations Under TrC	130
Viet Nam		131
	Geographic, Economic and Disaster Risk Profile	131
	Institutional and Policy Profile	132
	Disaster Management Capacities, Capabilities and Challenges	132
	Bilateral Relations with India	133
	Relations with Other Partners	133
	Social Profile	134
	Covid-19 Coda	134
	Recommendations Under TrC	134
Annexure 5.	Disaster Risk Profile of Other Indo-Pacific Countries	135
	Brunei	136
	Cook Islands	137
	Indonesia	138
	Kiribati	139
	Malaysia	140
	Myanmar	141
	Nauru	142

	Papua New Guinea	143
	Palau	144
	Samoa	145
	Singapore	146
	Solomon Islands	147
	Sri Lanka	148
	Thailand	149
	Tonga	151
	Vanuatu	151
Annexure 6.	Indicative Lists of Indian Search, Rescue and Disaster Management Equipment and Suppliers	153
Annexure 7.	Indian Capabilities and Suggested U.S. Partner Agencies and Organizations for Additional or Complementary DRR Supply Actions	155

# Annexure 1

Indian Supply-side Preliminary Telephone  
and In-person Interviewees (January 2021)



The lead author, Mr. Balaji Singh Chowhan identified the following interviewees for their extensive experience in disaster management and their past or present position in relevant organizations and requested their participation an individual interview. After introducing the purpose of the TriDeP Program, the author pursued an open discussion, with clarifying and follow-up questions as needed.

<b>Interviewee Name</b>	<b>Designation and Organization</b>	<b>Interview Means</b>
Dr. Binoy Acharya	Director, UNNATI - Organization for Development Education	Telephonic
Dr. Janki Andharia	Professor, Tata Institute of Social Sciences (TISS)	Telephonic
Dr. Milindo Chakrabarti	Professor and Associate Dean, O. P. Jindal Global University (JGU) Visiting Fellow, Research and Information System for Developing Countries (RIS)	In person
Mr. Manu Gupta	Co-Founder, Sustainable Environment and Ecological Development Society (SEEDs)	Telephonic
Mr. Rajeev Issar	Policy Analyst, United Nations Development Programme (UNDP)	Telephonic
Mr. Sanjeev Kumar Jindal	Joint Secretary, Disaster Management Division (DMD), Ministry of Home Affairs (MHA), Government of India	In person
Mr. Anup Karanth	Disaster Management Specialist, The World Bank	Telephonic
Mr. Kamal Kishore	Member, National Disaster Management Authority (NDMA), Government of India	In person
Mr. Vinod Menon	Former Member, National Disaster Management Authority (NDMA), Government of India	Telephonic
Dr. Mrutyunjay Mohapatra	Director General, India Meteorological Department (IMD), Government of India	In person
Mr. G. Padmanabhan	Emergency Analyst (retired), UNDP Disaster Reduction Thought Leader	Telephonic
Mr. N.M. Prusty	Director, Centre for Development and Disaster Management Support Services (CDDMAS) Disaster Management Thought Leader	Telephonic
Mr. Anil Kumar Sinha, IAS (Indian Administrative Service)	Secretary (retired), Ministry of Agriculture, Government of India Chairman (retired), Bihar State Disaster Management Authority	Telephonic
Dr. Thirrupagah, IAS	Additional Secretary, National Disaster Management Authority, Government of India	In person
Mr. Krishna Vatsa, IAS	Member, National Disaster Management Authority (NDMA), Government of India	In person
Mr. Manoj Kumar Yadav	Deputy Inspector General, National Disaster Response Force	In person

# Annexure 2

Supply-side Expert Convening  
Participants (March 2021)

The lead author, Mr. Balaji Singh Chowhan identified the following subject matter experts for their extensive experience in disaster planning and management and their past or present position in relevant organizations and requested their participation in the convening. The author facilitated the meeting with organizational, production, and recording assistance provided by the TriDeP program team and The Asia Foundation and USAID staff.

<b>Name</b>	<b>Designation</b>	<b>Organization</b>
Mr. Bhaskar Barua	Former Secretary	Ministry of Agriculture, Government of India
Major General Manoj Kumar Bindal	Executive Director	National Institute of Disaster Management (NIDM)
Ms. Balaka Dey	Program Management Specialist	United States Agency for International Development (USAID)
Mr. Manu Gupta	Co-Founder	Sustainable Environment and Ecological Development Society (SEEDs)
Dr. Hari Kumar	South Asia Regional Coordinator	Geo Hazards International
	Secretary	Geo Hazards Society
Dr. Santosh Kumar	Professor; Former Acting Director, SAARC Disaster Management Centre	National Institute of Disaster Management (NIDM)
Mr. Murali Mohana Reddy Kunduru	Adviser	Save the Children International
Ms. Nina Minka	Senior Disaster Management Adviser	United States Agency for International Development (USAID)
Ms. Abha Mishra	National Project Coordinator	United Nations Development Programme (UNDP)
Mr. Rajiv Ranjan Mishra	Director General	National Mission for Clean Ganga, Department of Water Resources, River Development and Ganga Rejuvenation
Dr. Mrutyunjay Mohapatra	Director	General Meteorology, India Meteorological Department (IMD)
Mr. N.M. Prusty	Director; Disaster Management Thought Leader	Centre for Development and Disaster Management Support Services (CDDMAS)
Mr. P.N. Rai, IPS (Indian Police Service)	Member (retired)	State Disaster Management Authority (SDMA), Bihar State
Dr K Sekar	Professor	Department of Psychiatric Social Work, National Institute of Mental Health and Neurosciences (NIMHANS)

<b>Table A.2.1 Supply-side Experts and Organizers</b>		
<b>Name</b>	<b>Designation</b>	<b>Organization</b>
Prof. Vinod Sharma	Vice Chairman	Sikkim State Disaster Management Authority
	Senior Professor	Indian Institute of Public Administration (IIPA)
Mr. Anil Kumar Sinha, IAS	Secretary (retired)	Ministry of Agriculture, Government of India
Col. Vishwas Supanekar	Director	Centre for Disaster Management, Yashwantrao Chavan Academy of Development Administration (YASHADA)
<b>Organizational Support</b>		
Ms. Nandita Baruah	India Country Representative	The Asia Foundation, India
Mr. Atul Kaushik	TriDeP Chief of Party	The Asia Foundation, India
Ms. Julia Kennedy	Deputy Indo-Pacific Coordinator	United States Agency for International Development (USAID)
Mr. Ramesh Navaladi	TriDeP Deputy Chief of Party	The Asia Foundation, India
Ms. Tara Sharma	TriDeP GESI Consultant	The Asia Foundation, India
Ms. Malavika Thirukode	TriDeP Program Officer	The Asia Foundation, India



# Annexure 3

Demand-side Expert Convening  
Participants (May 2021)

The lead author, Mr. Balaji Singh Chowhan, and the TriDeP team identified the following subject matter experts for their organization's or their own extensive experience in disaster risk reduction and requested their participation in the convening. The author facilitated the meeting with organizational, production and recording assistance provided by the TriDeP team, and The Asia Foundation and USAID staff.

<b>Name</b>	<b>Designation</b>	<b>Organization</b>
Dr. Mona Chhabra Anand	Director of Research and Knowledge Management	Coalition for Disaster Resilient Infrastructure (CDRI)
Ms. Litea Biukoto	Team Leader Risk Reduction	The Pacific Community (SPC)
Mr. Anthony Blake	Emergency Management Capability Development Advisor	The Pacific Community (SPC) and Pacific Islands Emergency Management Alliance
Ms. Iria Touzon Calle	Risk Knowledge and Analysis Programme Officer	United Nations Office for Disaster Risk Reduction (UNDRR)
Ms. Snigdha Chakraborty	Country Manager	Catholic Relief Services, Bangladesh
Ms. Balaka Dey	Program Management Specialist	United States Agency for International Development (USAID), India
Mr. Amod Mani Dixit	Strategy Advisor	National Society for Earthquake Technology (NSET), Nepal
Mr. Michael Ernst	Consultant	Office of Food for Peace, United States Bureau of Humanitarian Assistance
Ms. Erica Geronimo	Program Leader, Coalition for Change (CfC)	The Asia Foundation, The Philippines
Mr. Karimi Gitonga	Regional Technical Advisor, DRR and Climate Change Adaptation	Catholic Relief Services, Bangladesh
Ms. Chandra Hada	DRR Management Specialist	International Trade and Development (DAI)
Ms. Kathryn Hawley	Senior Adviser, Public Sector Development Services	The Asia Foundation
Mr. Janath Hettiarachchi	Disaster Risk Management Officer	World Food Programme (WFP), Sri Lanka
Dr. Khalid Hossain	Program Coordinator	International Union for Conservation of Nature (IUCN), Bangladesh
Mr. Mostafa Kamal	Technical Advisor, Disaster Risk Reduction and Resilience	Catholic Relief Services, Bangladesh

<b>Name</b>	<b>Designation</b>	<b>Organization</b>
Mr. Pradip Khatiwada	Executive Director	Youth Initiatives (YI) Lab
Ms. Mamta Kohli	Senior Social Development Adviser	Foreign, Commonwealth and Development Office (FCDO), British High Commission, India
Ms. Sandra Kraushaar	Director	The Asia Foundation, Pacific Islands
Ms. Abha Mishra	National Project Coordinator	United Nations Development Programme (UNDP)
Ms. Anthea Mulakala	Senior Director, International Development Cooperation	The Asia Foundation
Mr. Thummarukudy Muraleedharan	Operations Manager, Crisis Management Branch	United Nations Environment Programme (UNEP)
Mr. Laksiri Nanayakkara	Emergency Preparedness and Response Officer	World Food Programme (WFP), Bhutan
Mr. Ashray Bikram Pande	Economic Governance Program Manager	The Asia Foundation, Nepal
Mr. Sivapuram Prabhakar	Research Manager	Institute for Global Environmental Strategies
Mr. Vishwa Ranjan Sinha	Program Officer, Water and Wetlands, South Asia	International Union for Conservation of Nature (IUCN), Asia Regional
Mr. Gaurav Ray	Head of Office, Senior Representative	German Red Cross, Bangladesh
Ms. Ilisapeci Rokotunidau	Director General	Fiji Red Cross
Ms. Anais Rouveyrol	DRM and Community Resilience Advisor	Pacific Islands Emergency Management Alliance
Mr. Arun Sahdeo	Head	UN Volunteers, New Delhi
Mr. Jagan Shah	Senior Infrastructure Adviser	Foreign, Commonwealth and Development Office (FCDO), British High Commission, India
Ms. Tara Sharma	TriDeP GESI Consultant	The Asia Foundation, India
Ms. Dechen Shering	DRM Consultant	The World Bank and World Food Programme, Bhutan
Mr. Ajay Kumar Singh	TriDeP Monitoring, Evaluation, Learning and Adaptation (MELA) Specialist	The Asia Foundation, India

<b>Table A.3.1 Demand-side Experts and Organizers</b>		
<b>Name</b>	<b>Designation</b>	<b>Organization</b>
Mr. Arjun Sivayogan	Senior Supply Chain Associate	World Food Programme
Ms. Milika Sobey	Program Manager	The Asia Foundation, Pacific Islands
Mr. Sanjay Srivastava	Chief of Disaster Risk Reduction	United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)
Ms. Stephanie Marie Tan	Senior Program Officer, Coalition for Change (CfC)	The Asia Foundation, The Philippines
Ms. Preeti Thapa	Deputy Country Representative	The Asia Foundation, Nepal
Mr. Timothy Wilcox	Program Manager, Asia and the Pacific	United Nations Office for Disaster Risk Reduction (UNDRR)
Ms. Dechen Yangzom	Program Policy Officer, Disaster Risk Management	World Food Programme (WFP), Bhutan
<b>Organizational Support</b>		
Ms. Nandita Baruah	India Country Representative	The Asia Foundation, India
Ms. Pavneet Kaur	TriDeP Administrative Assistant	The Asia Foundation, India
Mr. Atul Kaushik	TriDeP Chief of Party	The Asia Foundation, India
Ms. Julia Kennedy	Deputy Indo-Pacific Coordinator	United States Agency for International Development (USAID)
Mr. Ramesh Navaladi	TriDeP Deputy Chief of Party	The Asia Foundation, India
Ms. Malavika Thirukode	TriDeP Program Officer	The Asia Foundation, India



# Annexure 4

Disaster Risk Profile of Potential  
Match Countries

This annexure presents disaster risk profiles for 10 Indo-Pacific Region countries identified as having potential for triangular collaboration and recommends TrC initiatives that would match India's capabilities with the needs of Bangladesh, Bhutan, Cambodia, Fiji, Lao PDR, the Maldives, the Philippines, Nepal, Timor-Leste, and Viet Nam.



## Bangladesh

### Geographic, Economic and Disaster Risk Profile

The People's Republic of Bangladesh, the world's eighth most populous country, has more than 164 million inhabitants<sup>1</sup> and covers approximately 147,570 square kilometers (sq km).<sup>2</sup> Bangladesh is a low-lying country with more than 310 rivers and tributaries that drain into the Bay of Bengal, the world's largest delta system.<sup>3</sup> Over the years, "Bangladesh has made significant economic progress, reducing the number of persons living below USD 1.90 per day from 44.2 percent to 14.8 percent between 1991 and 2016."<sup>4</sup>

Bangladesh is prone to natural hazards such as cyclones, tidal surges, tornadoes, earthquakes, floods, and riverbank erosion. The country also faces drought, infrastructure collapse, and high arsenic contamination of groundwater. Structural fires in urban areas are one of the emerging risks in the country. The country is also prone to climate change due to its geographical location and hydro-meteorological conditions. About 44 percent of the people are still engaged in agricultural activities which are highly vulnerable to climate risks.<sup>5</sup>

"Bangladesh has a long history of natural disasters. Between 1980 and 2008, it experienced 219 natural disasters due to its geo-climatic conditions, land characteristics, multiplicity of rivers, and the monsoon climate render the country highly vulnerable to them. Bangladesh suffers from floods, cyclones, storm surges, riverbank erosion, earthquakes, droughts, salinity intrusions, fires, and tsunamis. The coastal morphology of Bangladesh exacerbates the impact of cyclones and floods in particular, both kinds of events causing massive damages. Cyclones occurred in 1970, 1991, 2007 and 2009 and killed 364,000, 136,000, 3,363 and 190 people respectively."<sup>6</sup>

"Disasters pose considerable challenges not only to livelihoods, but also to the economy. Financial protection from disasters, i.e., disaster risk financing or insurance, has increasingly been applied in developed countries. However, the application of ex ante disaster risk financing is very scarce in developing countries including Bangladesh. Based on historical data, natural hazard events in Bangladesh cost more than USD 10 billion economic losses from 2000 to 2013, but the total funding available for relief, rehabilitation, and reconstruction for the same period was USD 2 billion only. It is estimated that Bangladesh will incur a financial impact of about USD 3.2 billion on average per year due to cyclone and flood, or about 2.2 percent of gross domestic product."<sup>7</sup>

### Institutional and Policy Profile

Bangladesh is divided into six divisions, 64 districts, 492 sub-divisions and 12 city corporations.<sup>8</sup> The Government of Bangladesh has made several efforts to strengthen the country's disaster risk management system.

There is a dedicated Ministry of Disaster Management and Relief (MoDRM)<sup>9</sup> to deal with disasters. Key measures include putting in place a legal framework by enacting the Disaster Management Act (2012),<sup>10</sup> formulating a Standing Order on Disasters (revised in 2019),<sup>11</sup> setting up country-wide disaster management information management centers (DMICs), and implementing a National Plan for Disaster Management (2016-2020).<sup>12</sup> The National Plan for Disaster Management includes hazard-specific plans, agency plans, and sectoral plans that have disaster risk management actions incorporated into them.<sup>13</sup>

Institutional mechanisms at the national level include the National Disaster Management Council, Inter-ministerial Disaster Management Coordination Committee, Ministry of Disaster Management and Relief, Department of Disaster Management, and National Disaster Advisory Committee. At the district level, the District Disaster Management Committee is the key institution.

### **Disaster Management Capacities, Capabilities and Challenges**

Bangladesh is most affected by cyclones and floods and therefore efforts have been made to mitigate and manage risks from these two major hazards. The country has established cyclone and flood warning systems, developed cyclone shelters in coastal areas, and put in place robust community-based disaster-preparedness mechanisms. The Bangladesh Meteorological Department (BMD) is a nodal agency for weather forecasting and has developed capabilities to animate the tropical cyclone and flood warning systems. Bangladesh has also established a Cyclone Preparedness Programme (CPP)<sup>14</sup> which aims to build a

network of trained volunteers across coastal belt. Furthermore, the country's DMICs support information management and coordination down to sub-district (Upazilla) levels. To further strengthen disaster response and coordination, Bangladesh is also in the process of institutionalizing an Incident Command System (ICS),<sup>15</sup> which it calls the "Bangladesh Incident Management System (BIMS)", working with the USFS with support from USAID.

The Fire and Civil Defense Service (FSCD) have significant firefighting and emergency first response capabilities, including search and rescue. Bangladesh also has a large volunteer program<sup>16</sup> to support urban disaster risk management. Local and national NGOs, UN agencies, donors, and communities actively participate in disaster risk management, offering solutions to various challenges.

With regard to Bangladesh's capabilities for sharing data, mapping risk, assessing vulnerability zones, preparing standard operating procedures (SOPs) and other disaster-management tools, the country's Standing Orders on Disaster is a comprehensive document that provides SOPs based on various disaster risk management functions, agencies, and departments. The Standing Orders on Disaster also include gender-responsive guidelines to follow when pursuing disaster risk management. The FSCD maintains data pertaining to past disasters and lists of available search and rescue equipment.<sup>17</sup>

The "lack of sub-national-level capacities limits the effective implementation of disaster risk reduction and climate adaptation aspirations."<sup>18</sup> A lack of financial and human resources is also hindering the progress envisioned by the national government, which states that

“ensuring that new infrastructure development is risk-informed also poses as an additional challenge to various sectors already seeing infrastructure gaps that continue to widen with the increasing implication of climate change”.<sup>19</sup> In terms of future resource options, “investing in social well-being and physical resilience require massive scale investments and as was established before, the government is already facing a significant funding gap in disaster management. Thus, the importance of stakeholders and donors to resilient development is highlighted even further.”<sup>20</sup>

### **Bilateral Relations with India**

Bangladesh and India enjoy a long historical relationship, with India having played a significant role in the independence struggle of Bangladesh. India's history of engaging with Bangladesh as a development partner started as soon as Bangladesh gained independence in 1971. Bangladesh and India have active bilateral cooperation in diverse areas such as infrastructure development, transport sector, and human resource development, among others.<sup>21</sup> India has also provided humanitarian assistance to Bangladesh during past disasters. For example, during Cyclone Sidr in November 2007, India donated aid worth over USD 37 million, including relief materials consisting of medicines, tents, blankets, ready-to-eat meals, portable water-purifiers, 1,000 metric tons (MT) of skimmed-milk powder and 40,000 MT of rice.<sup>22</sup> During a March 2021 visit by India's Prime Minister to Bangladesh, the two countries signed an agreement for cooperation in the domain of disaster management.

### **Relations with Other Partners**

Under South-South cooperation, Bangladesh has also been an active partner with Bhutan, Fiji, the Maldives, the Philippines, and Nepal. The Government of Bangladesh receives DRR support from various national governments, including the United States, United Kingdom, Japan, Australia, and India; national (Grameen Bank) and international nongovernmental organizations (NGOs), including CARE, Catholic Relief Services, ActionAid, Oxfam, Asian Disaster Preparedness Center (ADPC), international and national Red Cross agencies; United Nations (UN) agencies; and bilateral and multilateral partners, such as the European Union, World Bank, Asian Development Bank (ADB), and others. Foundations, such as The Bill and Melinda Gates Foundation, are also active in Bangladesh.<sup>23</sup> Bangladesh is a member of the Coalition for Disaster Resilient Infrastructure CDRI and the SAARC.

### **Social Profile**

The Standing Orders on Disaster provide a strong reference to the issues and challenges pertaining to gender and social inclusion, noting that, “Women and children, persons with disabilities and socially disadvantaged communities are more vulnerable to disaster emergencies. They are negatively impacted by disasters in various ways. Although Bangladesh has managed to reduce human mortality rates significantly over the past few years, women and children mortality rates are still higher than men in disaster. At the same time, they are often not included in humanitarian assistance programs including various disaster risk reduction programs. Thus, their specific needs and views are not being reflected into disaster risk management plans that are adopted in the



pre-disaster, disaster, and post-disaster periods. Disaster risk management is a fundamental pillar of sustainable development and therefore requires a 'Gender Responsive' approach."<sup>24</sup>

### **Covid-19 Coda**

The Covid-19 pandemic has caused severe disruptions across the world and Bangladesh is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Bangladesh could tap. Currently, the pandemic situation is still a concern and there are some active restrictions for travel between India and Bangladesh. India is supporting a vaccination drive in Bangladesh, but the pandemic situation is expected to place limitations on face-to-face meetings and training sessions, at least until the pandemic situation has normalized and the restrictions are completely withdrawn.

### **Recommendations Under TrC**

The following could be priority areas for Bangladesh under TrC:

- Creating and sharing risk assessment tools, techniques, training, and technical support, including hazard mapping, risk and vulnerability assessment, risk-informed urban planning, and climate- and disaster-proofing development programs.
- Strengthening disaster response and preparedness by developing training modules and providing equipment for search and rescue, setting up and equipping a national emergency operations center, and supporting the USFS and Bangladesh in institutionalizing Bangladesh's version of an ICS, the Bangladesh Incident

Management System.

- Conducting pilot projects in the areas of nature preservation and climate change adaptation that promote nature-based solutions, such as saline-resistant crops and landslide mitigation using natural materials.
- Assisting with pandemic management, especially in the area of public health, risk communication, and vaccination.
- Enhancing disaster response by moving beyond legislation and mechanisms to institutionalize disaster management and DRR all over the country.
- Bolstering disaster response by using a gender-inclusive lens when working with disaster-prone communities, particularly in remote areas.



### **Bhutan**

#### **Geographic, Economic and Disaster Risk Profile**

The Royal Kingdom of Bhutan is a landlocked country that borders India, China, and the Tibet Autonomous Region. With a land area of approximately 38,394 sq. km comprised primarily of high mountains and river valleys, Bhutan has a population of 735,553.<sup>25,26</sup> Bhutan's economy remains predominately agricultural; approximately 56 percent of the population is dependent on it. Hydropower generation is another major economic activity.<sup>27</sup>

Bhutan is prone to various natural hazards, such as earthquakes, windstorms, forest fires, glacier lake outburst floods (GLOFs), other

floods, and landslides, among others. The country has not faced a large-scale disaster in the present decade, but frequent seasonal hazards cause economic losses, and livelihood and environmental degradation. Bhutan is also considered susceptible to climate change risks. Three notable disasters that hit the country in the previous decade include floods in 17 Dzongkhags (districts) in 2009, due to Cyclone Aila, that resulted in estimated damages of USD 17 million to properties and housing; a 2009 earthquake that caused estimated damages of USD 52 million; and a 2011 earthquake that affected about 7 percent of the population and caused damages of USD 24.26 million, including to religious and cultural buildings.<sup>28</sup>

While flooding is most frequent, Bhutan is highly susceptible to earthquake because it is situated in the world's most seismically active zone, between the Indian and Eurasian tectonic plates. Bhutan's roads, dams, and power plants are at risk to both earthquake and glacier lake outburst (GLOF) events. The Royal Government of Bhutan has also identified climate change as a challenge to be addressed.<sup>29</sup>

“While Bhutan is exposed to a wide range of natural hazards, it is the underlying vulnerabilities that translate physical exposure to hazards into disaster risks. These include poor construction practices, inadequate enforcement of building by-laws, rapid urbanization, environmental degradation, and low levels of awareness on disaster risk reduction and planning. The limited availability of safe land for construction in mountainous regions, scattered settlement patterns and irregular climatic conditions further aggravate vulnerabilities”.<sup>30</sup>

## Institutional and Policy Profile

Bhutan is a democratic monarchy. It enjoys vibrant democracy with regular elections to its parliament. The Royal Government of Bhutan has developed an institutional mechanism for disaster risk management in the country. It has enacted Disaster Management Act (2013),<sup>31</sup> and formulated a policy framework. The National Disaster Management Authority (NDMA) has been constituted with mandate for decision making and coordination.<sup>32</sup> The Department of Disaster Management is the executive arm of the NDMA. The Department of Disaster Management is also the primary agency for initiating deliberations on international collaborations in the area of disaster risk management. The Gross National Happiness Commission (GNHC) actively participates in program development, contracting process and monitoring of internationally aided projects. Department of Hydromet Services is a suitable technical counterpart for early warning-related efforts.<sup>33</sup>

## Disaster Management Capacities, Capabilities and Challenges

A comprehensive roadmap used internally by Bhutan's disaster management department identifies five priority areas: “(1) Disaster Awareness, (2) Data Preparedness, (3) Governance (4) Resourcing, and (5) Sector Preparedness. These roadmap pillars translate operationally into risk mapping and hazard zonation, development of baselines, disaster statistics, and losses databases; facilitating better sharing of knowledge, science and technology, and innovations to enable better informed decisions on disaster management; and improving public awareness and education.”<sup>34</sup>

The roadmap considers development and support of a Comprehensive Disaster Data Management Information System (DMIS) as a critical action. Under the Governance pillar, the roadmap also seeks to strengthen multisectoral coordination and partnership at different levels, including 20 Dzongkhag. The roadmap further aims to develop SOPs and guidelines for communication between agencies. Bhutan's other priorities include sharing data decision-making, establishing emergency operations centers at national and Dzongkhag levels, orientating officials about the Incident Command System providing training to search and rescue teams, and strengthening early warning communication.<sup>35</sup>

Over the years, Bhutan has developed technical and human resource capabilities to support disaster risk management efforts. Bhutan has also developed an action plan for earthquake safety at schools and health facilities and a disaster risk management strategy (2017).<sup>36</sup> In addition, Bhutan has established a satellite-linked GLOF early-warning system which monitors the developments upstream glacial lakes, transmits information about changes, and provides warning to at-risk communities. His Highness the King of Bhutan also established a vibrant volunteer force, known as DeSuungs,<sup>37</sup> to support disaster risk management efforts. Currently, the volunteer force counts 20,000 people, which includes 7200 women. There is no specialized urban search and rescue (USAR) team, but the Royal Bhutan Police and the Royal Bhutan Army carry out search and rescue operations whenever required. Bhutan is also in the process of institutionalizing an Incident Command System.<sup>38</sup>

## Bilateral Relations with India

Bhutan and India have active bilateral cooperation in diverse areas such as hydroelectric, infrastructure development, and hospitality, among others.<sup>39</sup> Bhutan enjoys very good diplomatic relations with India and can easily be reached from India by air and road. Bhutan is a favorite destination for Indian tourists and, as such, stimulates feelings of very high acceptability among Indians and the Government of India. Bhutanese companies are present in India, especially in the telecommunication, hospitality, tourism, and aviation sectors. Bhutan depends on India for most of its critical supplies and India had been its steadfast supporter. In sum, the country enjoys strategic relationship with India.

## Relations with Other Partners

Bhutan has been an active partner with Bangladesh, Benin, and Costa Rica under South-South cooperation.<sup>40</sup> With regard to complimentary and competing DRR programs and other international actors, the Royal Government of Bhutan (RGOB) is already implementing several disaster risk management initiatives with help from UNICEF, UNDP, WHO, WFP, and other UN agencies; the World Bank, ADB, and SAARC Development Fund;<sup>41</sup> the European Union, Australia, Japan,<sup>42</sup> Switzerland, and the United States, among others.<sup>43</sup> The U.S. government has been supporting the RGOB in several areas, including disaster risk management and heritage conservation.<sup>44</sup>

Bhutan also has several international NGOs, such as Save the Children and the Bhutan Foundation, that have also been working on

disaster risk management.<sup>45</sup> However, a “lack of funding for the Dzongkhags alongside their capacity, technical skills and available resources [including funding for DRR] limit the extent to which DRR and climate change adaptation can be mainstreamed in the local levels”, thus “international partners and donors also have a very important role in supporting the RGOB in its efforts to achieve resilient and sustainable development goals.”<sup>46</sup> Bhutan is a member of the Coalition for Disaster Resilient Infrastructure (CDRI) and the South Asian Association for Regional Cooperation (SAARC).

### Social Profile

Disasters have considerable impact on socioeconomic vulnerability, especially on the rural poor through loss of livelihoods and agriculture assets. Bhutanese women have been playing active role in various socioeconomic spheres, such as volunteering for disaster risk management and working in government service and the business sector. Gender issues received attention beginning with the Fifth Plan (1981-1987). Since then, the country has addressed various gender issues and currently there is no overt gender discrimination in Bhutan.<sup>47</sup> Gender sensitivities were not squarely addressed in the 2013 Disaster Management Act; however, there is an implied reference to vulnerable sections of society as the Act mentions equitable compensation.<sup>48</sup> To improve access to synthesized information for policy purposes, gender-disaggregated data may help.<sup>49</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Bhutan is no exception. As mentioned in the main report,

India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Bhutan could tap. Currently, the pandemic numbers are under control, but there some travel restrictions and travelers are expected to stay in a 14-day quarantine upon arrival. This will place a limitation on any face-to-face meetings and training until the situation is normalized and the restrictions withdrawn.

### Recommendations Under TrC

The following could be priority areas for Bhutan under TrC:

- Strengthening disaster-response and early-warning capacities by developing training modules and providing equipment for search and rescue, setting up and equipping a national emergency operations center, assisting with the institutionalization of an Incident Command System, and bolstering the GLOF early warning system.
- Creating and sharing risk assessment tools, techniques, training and technical support, including hazard mapping, risk and vulnerability assessment, risk -informed urban planning, and disaster management and contingency plans.
- Assisting with pandemic management through access to required medical and diagnostic resources.
- Focusing on gender-inclusive disaster management planning, training and capacity building, and developing gender-disaggregated data for policymaking.
- Suggesting additional gender sensitivities



that could be integrated into the 2014 Disaster Management Act.



## Cambodia

### Geographic, Economic and Disaster Risk Profile

The Kingdom of Cambodia is located between Thailand, Viet Nam and Lao PDR in Southeast Asia. It has approximately 181,035 sq. km of land area that is mostly covered by tropical forests (46 percent). Cambodia's topography includes mountains, forests, rivers, flood plains, and lakes. It has an estimated population of 16.2 million people (rural 78 percent and urban 22 percent).<sup>50</sup> Cambodia's economy relies heavily on agriculture, "however it has developed rapidly and reached lower middle-income threshold"; its average growth rate of 7.7 percent between 1995-2019" makes it one of the fastest growing economies in the world.<sup>51</sup>

Cambodia is vulnerable to natural hazards such as floods, droughts, cyclonic storms (typhoons), landslides, epidemics, pandemics, lightning, and earthquakes. Cambodia is among the most exposed countries to disasters in the world and ranks 15th in a global comparison that measures average disaster occurrences per million people and per thousand sq. km of land area.<sup>52</sup> Riverine flooding poses the highest risk in terms of average annual losses to the capital stock in Cambodia.<sup>53</sup>

Between 1996-2013, 2050 Cambodians died in multiple disasters. Flood was the primary reason and contributed to 53 percent of the total lives lost. Some major disasters include the 2002 SARS and the 2004 Avian Flu pandemics that affected the country; 37 people died due to

Avian flu.<sup>54</sup> Cambodia also experienced floods in 2011 that claimed 250 lives and affected more than 1.77 million people. In 2013, floods again affected 377,354 households and 1.8 million people, killing 168 and causing more than USD 355 million in losses. In 2015, 20.5 million Cambodians were directly affected by one of the country's worst droughts ever.<sup>55</sup> In 2016, storms destroyed 1997 homes and killed 21 people and lightning strikes killed 108 and injured 105 people. Drought also marked 2016, affecting nearly the entire country.<sup>56</sup> In 2017, 514 fire incidents were reported, and in 2018, 553 fires were reported.

### Institutional and Policy Profile

Cambodia has a parliamentary constitutional monarchy and consists of 24 provinces and the municipality of the metropolitan area of Phnom Penh, the capital city. The National Assembly comprises elected representatives. The government set up National Committee for Disaster Management (NCDM)<sup>57</sup> in 1995 to administer and coordinate all DRM activities. The government has also established sub-national-level disaster-management committees. The Government of Cambodia formulated a Strategic National Action Plan (SNAP)<sup>58</sup> for DRR for the period 2008 to 2013, focusing on vulnerability reduction. It further established a National Strategic Development Plan (NSDP)<sup>59</sup> for 2014-2018, addressing climate change, natural resources, environmental management, climate change adaptation and mitigation, capacity building and mainstreaming DRR. Cambodia enacted the Disaster Management Law<sup>60</sup> in 2015; it provides institutional mechanisms, frameworks, governance, corresponding rights and obligations, resources and funds for disaster risk management; the law also defines the roles and responsibilities

of various stakeholders. The government has a disaster management budget, as stipulated by the 2015 Disaster Management Law. “However, it is not clear how much of the government’s budget has been set aside for disaster management activities, especially for disaster response and long-term recovery.”<sup>61, 62</sup> The law also indicates the need for mainstreaming DRR by incorporating it into sectoral development policies and plans. The Climate Change Action Plan (2016-2018)<sup>63</sup> also sought to address climate-related hazards. The Ministry of Water Resources and Meteorology (MOWRAM) is responsible for managing river basins, and surface and groundwater resources.

### **Disaster Management Capacities, Capabilities and Challenges**

“Climate information and EWS [early warning systems] in Cambodia have been improved through a series of initiatives under a four-year project (2015-2019) led by the Ministry of Water Resources and UNDP. The initiatives aim to enhance the institutional capacity for weather monitoring, to increase the availability of weather information, and to strengthen the capacity to operate early warning systems based on the information provided by stations monitoring hydrological and weather data. The Drought Monitoring InfoHub is among these initiatives, bringing together the Ministry of Water Resources and Meteorology, Ministry of Agriculture, Forestry and Fisheries and the NCDM, to identify vulnerabilities and to improve coherent monitoring to prepare communities to droughts. Thus, the project is currently being scaled up to cover more provinces and to increase the capacity of provincial officials.”<sup>64</sup> While the country has improved its early warning system for floods and droughts, “the lack of cross-country early

warning systems remains an issue.”<sup>65</sup>

Cambodia is characterized by an over dependence on agriculture, a high number of settlements in flood plains, and malnutrition. These features make the country highly vulnerable to weather-related events. Furthermore, unplanned urbanization also contributes to disaster vulnerability. The country suffers from large-scale poverty due to the concentration of population in rural areas that have limited economic opportunities or resources. Cambodia is predominantly an agrarian economy; about 90 percent of Cambodians engage in agricultural activities, of which 80 percent rely on subsistence crops. Therefore, the potential impacts of climate change, particularly heavy rains and flooding, are likely to have significant consequences on Cambodians’ lives, livelihoods, and food security.

### **Bilateral Relations with India**

Cambodia and India have a long history of good relations, “sustained by regular interactions of political leaders, exchange of bilateral visits, aid and assistance, capacity building, cultural exchanges, concessional loans for developmental projects” and heritage restoration.<sup>66</sup> In the 1980s, India was among the first to recognize Cambodia’s new People’s Republic of Kampuchea government and reopened its Embassy in 1981. “There exists abundance of goodwill for India in Cambodia, which has been sustained by regular interactions of political leaders, exchange of bilateral visits, aid and assistance, capacity building, cultural exchanges, concessional loans for developmental projects and restoration and conservation of old temples in Cambodia.”<sup>67</sup> “In the context of India’s ‘Act East’ policy and the Association

of Southeast Asian Nations (ASEAN), Cambodia is an important interlocutor and a good partner. Contemporary times have witnessed expansion of cooperation in diverse fields such as institutional capacity building, human resource development and extension of financial assistance in infrastructure projects, social security projects and capacity building in defense.”<sup>68</sup>

### Relations with Other Partners

UN agencies, such as the World Food Programme, and international nongovernmental organizations (INGOs), such as the Red Cross, CARE, and ActionAid, are actively implementing disaster risk reduction activities in the country. Cambodia is a member of ASEAN.

### Social Profile

Cambodian women play an active role in various socioeconomic spheres, but they face disproportionate economic inequality and discrimination and lack access to political and decision-making processes. Cambodian women and children are also disproportionately affected by natural disasters such as floods and storms, particularly because women comprise 51 percent of the workforce in subsistence agriculture and 57 percent in market-oriented agriculture.<sup>69</sup> While Cambodia has made good progress in narrowing gender gaps in economic participation and educational attainment for women and girls, in a “2018 gender gap index, Cambodia has a score of 0.683, placing it 93<sup>rd</sup> among the 149 measured countries.”<sup>70</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Cambodia is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Cambodia could tap. Currently, there is a resurgence in pandemic numbers and travel restrictions that change from time to time.

### Recommendations Under TrC

The following could be priority areas for Cambodia under TrC:

- Conducting risk assessments and hazard mapping.
- Strengthening weather forecasting and early warning systems.
- Strengthening search and rescue capacities with an emphasis on flood rescue and Incident Command System training.
- Providing need-based training and capacity building of various stakeholders, including community-based disaster preparedness.
- Providing support for building resilient infrastructure, such as roads and other social infrastructure.
- Identifying mitigation and adaptation solutions for climate change and exploring possibilities for implementing eco-DRR solutions, such as increasing green cover and fortifying riverbanks.

- Strengthening the participation of women in all administrative levels of disaster management planning, training, and capacity building.



## Fiji

### Geographic, Economic and Disaster Risk Profile

The Republic of Fiji consists of 322 islands in the Pacific Ocean. The capital city is Suva. Fiji has a population of 0.9 million, of which 90 percent live on the two main islands of Viti Levu and Vanua Levu. About 56 percent of the population lives in urban areas. Most are indigenous Fijians, a mixture of Melanesians and Polynesian ancestry. Indo-Fijians form a sizable minority. The total land area of the islands covers 18,274 sq. km over a geographical area of approximately 50,000 sq. km. Fiji has rich biodiversity. Approximately 50 percent of the landmass is covered with forests. The islands are surrounded by reefs that support a distinctive marine ecosystem.<sup>71</sup>

Fiji is one of the most developed and fastest growing economies among the Pacific Island nations. Tourism is one of the leading economic sectors, contributing more than 10 percent to total GDP. Sugarcane also contributes significantly to the GDP. Fiji is also a hub for regional and global trade, shipping, and aviation. Around 35 percent of the Fijians live below the poverty line.<sup>72</sup>

Fiji is prone to earthquakes, tsunamis, and landslides.<sup>73</sup> There are two active volcanoes. Additionally, Fiji is prone to cyclones, heavy rainfall, and flooding, which are annual features. Its islands also have exposure to sea

level rise and shore inundation. Climate change is one of the most prominent threats to the lives, livelihoods, security, and well-being of Pacific Islanders, including Fijians. Climate change impacts, such as sea level rise, ocean acidification, precipitation changes, and extreme weather events especially threaten Fiji because the population and infrastructure are mainly located near the ocean.

Floods in 2004 caused damages worth Fijian dollars (FDJ) 13 million, while 2009 floods affected approximately 15 percent of Fiji's sugarcane farms and caused estimated damages of USD 13.4 million. The combined economic damages of floods in 2012 reached an estimated USD 37.7 million. Flood severity has been increasing and is expected to worsen.<sup>74</sup>

Recent disasters include category 5 Cyclone Winston in 2016, which caused damage and losses estimated at USD 1.3 billion, compromising 60 percent of livelihoods and costing about 20 percent of GDP. In December 2020, another category 5 storm, Cyclone Yasa made landfall on Bua district of Vanua Levu (part of the Northern division), Fiji's second largest island with a population of over 135,900 people. The same day, the Fiji Government declared a 30-day nationwide state of disaster.<sup>75</sup> Considered the strongest storm to hit the country since 2016, with sustained wind speeds of up to 240 km/hour and gusts of up to 345 km/hour. Cyclone Yasa caused severe damage to essential infrastructure, including electrical power, water, public buildings, schools, health facilities, and agricultural areas. In addition, over 4,200 houses were damaged or destroyed and 93,000 people – more than 10 percent of the country's population – were affected.<sup>76</sup>



## Institutional and Policy Profile

Fiji is a constitutional democracy. The country is divided into four administrative divisions: Northern, Eastern, Southern, and Western. Each is governed by a commissioner. There are 14 provinces under these four divisions, each headed by a provincial officer. The village is the lowest administrative level, and village councils are vested with authority to administer issues related to community management.<sup>77</sup>

The Government of Fiji has enacted a law on disaster management and set up National Disaster Management Office (NDMO).<sup>78</sup> The National Disaster Management Act (1998)<sup>79</sup> institutionalized a disaster management system. The government formulated the National Humanitarian Policy for Disaster Risk Management in 2017;<sup>80</sup> it seeks to protect people during humanitarian crises. The government also formulated the National Disaster Risk Reduction Policy for 2018-2030,<sup>81</sup> a National Adaptation Plan (2018)<sup>82</sup> for addressing the concerns of climate change risks, and is revising the 1995 Disaster Management Plan. Ministries and departments have also formulated their own sectoral disaster management plans and strategies. The National Disaster Management Council is the apex-body for coordination of disaster risk management policies, plans, strategies, and activities. The institutional mechanism for disaster risk management at sub-national levels is governed by the Local Government Act, which is coordinated by the Ministry of Local Government, Urban Development, Housing and Environment.

## Disaster Management Capacities, Capabilities and Challenges

Fiji developed a Climate Vulnerability Assessment in 2018,<sup>83</sup> which has been used to guide various development policies and frameworks; it also identifies detailed cross-cutting issues that affect sectors and well-being of the population. Fiji has also developed a National Notifiable Disease Surveillance System<sup>84</sup> and the Fiji Syndrome Surveillance System, which track epidemics like dengue. With support from UNESCAP, Fiji established a centralized geospatial platform known as "GeoNode" for managing risk information; it is an open mapping tool and platform for sharing data for the purposes of DRR and sustainable development. It is currently being managed by the National Disaster Management Office (NDMO), and contains documents, data and maps of Fiji's disaster risk, climate, topography, demography, and farming activities.<sup>85</sup>

## Bilateral Relations with India

India's relations with Fiji date back to 1879, when Indian laborers were brought to the country to work on sugarcane farms. Between 1879 and 1916, around 60,553 Indians were taken to Fiji. Currently, about 40 percent of the Fijian population belongs to Indian diasporas. Indian Prime Minister Shri Narendra Modi visited Fiji on 19 November 2014, marking a watershed moment for India-Fiji relations and India's relations with all Pacific Island countries by creating the Forum for India Pacific Islands Cooperation (FIPIC) and organizing the first FIPIC Summit meeting, to strengthen India's relationship with Fiji and other FIPIC members.<sup>86</sup> During the November 2014 visit, India signed three memorandums of

understanding (MoUs) with Fiji: (i) for India to extend a line of credit so Fiji could set up a co-generation power plant, (ii) on cooperation in training diplomats, and (iii) an earmark for diplomatic missions in Fiji's and India's respective capitals.<sup>87</sup> As a follow-up, India organized a second FIPIC Summit at Jaipur in 2015, hosted by Prime Minister Shri Narendra Modi. Building upon the success of the first FIPIC, India announced major initiatives to boost cooperation with the 14 Pacific Island countries. A Fijian delegation, led by Prime Minister Josaia Vorenqe Bainimarama, attended the Forum.<sup>88</sup> India also has several ongoing bilateral development initiatives in solar energy and supports capacity development through human resource development and training. India has provided humanitarian assistance from time to time, including after Cyclone Yasa.<sup>89</sup>

## Relations with Other Partners

Australia is actively involved in supporting disaster risk management activities in Fiji, including humanitarian assistance: AusAid<sup>90</sup> has supported training and capacity building efforts. In addition, the European Union,<sup>91</sup> World Bank<sup>92</sup> and ADB<sup>93</sup> have been providing support for various disaster risk management activities. The United States also provides humanitarian assistance in the aftermath of disaster events from time to time. Fiji is a founding member of the Global Coalition for Disaster Resilient Infrastructure (CDRI).<sup>94</sup>

## Social Profile

The social structure in Fiji is largely clan-based. There are hierarchies and gender inequalities among various clans and tribes. Inadequate sexual and health education combined with

traditional perceptions about women's role in a household affect the education and employment of women and girls. However, commitment to gender inequalities is well mainstreamed in institutional structures, planning and budgeting. In the aftermath of Cyclone Winston, women reportedly experienced the threat of violence at the evacuation sites. Even though the Fijian constitution guarantees equality, the cultural norms, social environment, and lack of capacity to enforce the legislature obstructs the achievement of gender equality at the grass-roots level.<sup>95</sup>

## Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Fiji is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Fiji expressed an interest in and could tap.

Currently, the pandemic situation is still a concern; citizens and residents are allowed to travel back, but need to quarantine upon arrival. Tourism is partially allowed, but the travelers must quarantine upon arrival. Travel restrictions and quarantine protocols may place limitations on face-to-face meetings and training.

## Recommendations Under TrC

The following could be priority areas for Fiji under TrC:

- Promoting community-based disaster risk management practices with a focus on gender mainstreaming.
- Mainstreaming disaster risk reduction and

climate change adaptation into development planning.

- Supporting disaster recovery design, especially with a focus on the inclusion of women and other marginalized peoples.
- Supporting disaster impact and climate impact assessments.
- Supporting infrastructure risk assessments and designing resilient infrastructure.
- Piloting engineering and nature-based solutions for coastal protection, such as developing mangroves, growing trees on the coastline, and installing permeable pavement to absorb rainwater.
- Sharing private sector disaster cooperation practices from India, such as medical services, and informing how the private sector can support disaster response efforts and rehabilitation.
- Providing a psychosocial methodology, psychosocial training curriculum, and telemedicine psychosocial first-aid counselling after disaster events.
- Providing gender-inclusive disaster management planning, training, and capacity building, including creating data disaggregated by age, sex, and disability.
- Developing Fiji into a springboard for launching TrC initiatives for all Indo-Pacific Island countries.



## Lao PDR

### Geographic, Economic and Disaster Risk Profile

The Lao People's Democratic Republic "is a landlocked country situated in Southeast Asia, bordering Thailand, Viet Nam, Cambodia, Myanmar, and China. The total land area is approximately 236,800 sq. km with varying levels of elevation. Due to the mountainous topography, only about 6.2 percent of the total land area is classified as arable. In 2015, the total population was 6.49 million, out of which 32.9 percent lived in urban areas."<sup>96</sup>

Lao PDR, due to its tropical weather conditions, is exposed to a range of hazards. Hydro-meteorological disasters, especially droughts, floods, heavy rainfall, and storms are considered the country's main disaster risks,<sup>97</sup> regularly damaging transport and water infrastructure. Climate change is likely to exacerbate these hazards, posing risks to people living in low-lying areas, livelihoods, and the socioeconomic development of an agrarian economy.<sup>98</sup> In addition to hydro-meteorological disasters, "Lao PDR is also exposed to epidemics and earthquakes. A majority of the people living in rural areas depend on subsistence agriculture, and agricultural activities employed 72 percent of the working age population in 2015."<sup>99</sup>

Some recent disaster events include Typhoon Ketsana (2009), which hit the southern parts of Lao PDR and resulted in damages of USD 94.2 million, mainly on account of damaged roads, irrigation networks, and public infrastructure<sup>100</sup> and affecting more than 180,000 people and nearly 30,000 households. "Typhoon Haima

in 2011 resulted in damages and losses of USD 66 million, mainly on account of damages to transportation and agriculture. Localized flooding was reported in 2013, 2015, 2016 and 2018. Major rivers, such as the Mekong and Sekong, contribute to the flood hazard since a significant number of settlements are located on the flood plains. 2018 witnessed three consecutive disasters: Tropical Storm Son-Tinh, the Xe pien-Xe Nam Noy hydropower dam breach, and Tropical Storm Bebinca. Collectively, over 600,000 people in 90 districts were affected and resulted in losses of approximately USD 371.1 million mainly on account of damages to transportation and agriculture sectors.”<sup>101</sup>

### **Institutional and Policy Profile**

Lao PDR is a single-party socialist republic that has three administrative tiers comprised of 17 provinces, and one municipality, which hosts the capital city of Vientiane. The provinces are divided into 142 districts comprised of 11,390 villages.<sup>102</sup> “The Prime Minister’s Decree No 158 (1999) created the National, Provincial and District Disaster Management Committees (DMCs). It provided the basis for the development of a disaster management policy.” The National Disaster Management Committee, which consists of representatives of key ministries, institutions and provinces, coordinates disaster prevention and protection activities and efforts. It promotes disaster reduction activities by educating line ministries and provinces on natural disaster management and protection. The National Disaster Management Office (NDMO) is a policy implementation organization under the Ministry of Labour and Social Welfare (MLSW). There are local-level committees at the levels of provinces, districts, and villages.<sup>103</sup>

### **Disaster Management Capacities, Capabilities and Challenges**

“Hazard maps and provincial risk profiles have been developed by some provinces. A disaster database has also been created; however, it has not been updated regularly.”<sup>104</sup> Furthermore, Lao PDR has limited technical knowhow, institutions, and human resources for weather forecasting and early warning systems. The national Department of Meteorology and Hydrology has been building on its nation-wide weather observation and forecasting capabilities, which need further augmentation.<sup>105</sup> Disaster risk management, prevention, and control committees created in provinces, districts, and villages need to be strengthened.<sup>106</sup> Taking note of the susceptibility of the agriculture sector to recurring natural disasters, the Government formulated an Action Plan for Disaster Risk Reduction and Management in Agriculture (2014-16).<sup>107</sup> The government is working on identifying the focal point in all sectors (state and privation); developing and establishing early warning and information systems in all 142 districts in the country; setting up information networks in disaster-prone villages; constructing warehouses for storing emergency assistance materials in all provinces and some disaster-prone districts; continuing public awareness activities with media; widely organizing training on DM for all sectors and levels; organizing simulation exercises with the involvement of rescue team units in sectors and communities; and raising capacity through cooperation with other countries in the framework of Asian, Regional and United Nations cooperation to exchange information and experiences on disaster management.<sup>108</sup>



## Bilateral Relations with India

India and Lao PDR share a longstanding bilateral relationship and similar views on issues pertaining to mutual interest. The two countries have established several bilateral agreements since the 1990s, including a MoU for setting-up a center for English-language training (2007), an agreement for Indian grant assistance to implement quick impact projects (QIPs) (2015), and an agreement between the Foreign Service Institute of India and Foreign Affairs Institute of Laos (2019). The QIP agreement led to signing MoUs for three agricultural projects in 2017.<sup>109</sup>

## Relations with Other Partners

The Government of Lao PDR has implemented disaster management projects in partnership with the World Bank and ADB. In addition, about 160 international NGOs operate in the country, of which 75 are members of the INGO Network. INGOs invariably work on development programs in agriculture, rural development, health, education, natural resource, management, and environment sectors. A number of UN agencies are also active development partners in the country.<sup>110</sup> Lao PDR is a member of ASEAN.

## Social Profile

“Gender gaps have been narrowing in Lao PDR” but “women are still facing challenges in attaining secondary education and in 2015, only 79 percent of women were literate as opposed to 90 percent of the males. Early marriages are leading to higher dropout rates for women, which is one of the obstacles for attaining secondary qualifications. Women are often disproportionately affected due to

traditional practices and systems which might prevent land ownership.” The disparities in access to education, health and infrastructure, along with unequal distribution of poverty between rural and urban regions, result in an increased vulnerability of people in hard-to-reach areas.<sup>111</sup>

## Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Lao PDR is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Lao PDR could tap. Currently, the pandemic situation is still a concern, and travel restrictions and quarantine protocols may place limitations on face-to-face meetings and training until the situation is normalized.

## Recommendations Under TrC

The following could be priority areas for Lao PDR under TrC:

- Conducting risk assessments for various sectors and expanding the existing comprehensive disaster database.
- Strengthening weather forecasting and early warning systems.
- Mainstreaming disaster risk reduction, with a focus on the agriculture sector.
- Supporting the building of resilient infrastructure, such as roads and community centers, schools, and government offices.
- Strengthening response capacities through search and rescue training with an emphasis on

flood rescue and Incident Command System training.

- Providing training and capacity building for local communities, the government, and nongovernmental organizations.
- Strengthening community-based disaster preparedness, particularly provincial, district, and village disaster prevention and control committees.
- Expanding the use of local languages in disaster communications.
- Providing gender-inclusive disaster management planning, training, and capacity building, including creating data disaggregated by age, sex, and disability.



## The Maldives

### Geographic, Economic and Disaster Risk Profile

The Republic of Maldives is a small island developing state. Located in the Indian ocean, it has a land area of 298 sq. km in a territory of over 90,000 sq. km. This makes the Maldives the most geographically dispersed nations in the world comprising of about 1200 islands within 26 naturally formed atoll system. Out of the 1200 islands, 187 islands are inhabited while another 128 islands are exclusively occupied by resort hotels. With a 2014 population of 402,071, the Maldives is the smallest Asian country in terms of both population and land area. With an average ground-level elevation of 1.5 meters (4 ft 11 in) above sea level, it is also the planet's lowest country. It is also the country

with the lowest natural highest point in the world, at 2.4 meters (7 feet 10 inches). Over 99 percent of the Maldives is made up of the sea and only 0.331 percent (115 sq. miles) of its 35,000 sq. mile surface area is dry land.

The Maldives has experienced rapid economic development in recent years, largely driven by tourism.<sup>112</sup> In 2018, it ranked as a middle-income country.<sup>113</sup> Tourism remains the main economic driver, contributing 23 percent of GDP. Fisheries, construction, transportation, and trade count as other major contributors to GDP.

The Maldives is exposed to natural hazards such as droughts, storms, heavy rainfalls, cyclones, storm surges, coastal erosion, and tsunamis.<sup>114</sup> Over 90 percent of the Maldives islands have reported annual flooding and 97 percent report shoreline erosion. Hydro-meteorological disasters accounted for 45 percent of deaths and 79 percent of economic losses between 1988-2007. The most common hazard is flooding. Coastal storm surges are the main culprit; they are often prolonged during swell wave conditions. Other culprits include astronomical tides, high winds, and gradually rising sea levels. With the exception of the Indian Ocean Tsunami in 2004, the country has not experienced major natural disasters in the recent past. However, small-scale, recurrent hazards, such as increased rainfall, cyclonic winds, storm surges, saltwater intrusion, and coastal floods, have been causing damages and losses recently. Climate change may increase risks from hazards of meteorological and hydrological origin.<sup>115</sup>

Human-caused hazards include fires, aviation accidents, and especially oil spills, a major environmental and security concern for most Indo-Pacific islands.<sup>116</sup> For example, in

September 2020, a bulk carrier carrying about 270,000 tons of crude oil caught fire off the Maldives' coast, posing a threat to the corals, fish and other marine life.<sup>117</sup> In April 2021, an oil barge carrying 60,000 liters of diesel fuel sank near the Maldives's Embudu Lagoon, posing a threat to marine life and human health.<sup>118</sup> Fire is another risk in the Maldives: records for four years (2012-2016) show a total of 111 fires occurred in 2012, 109 fires in 2013, 54 in 2014, 97 in 2015, and 98 in 2016, most commonly because of human or electrical causes.<sup>119</sup> For example, a catastrophic fire broke out on 4 December 2014 inside the Maldives water and sewerage system, which supplies drinking water in the capital city of Male. The incident required relief operations from neighboring countries, including India, and "the loss and cost of the operation was estimated as USD 20 million."<sup>120</sup> "Addu Atoll in the south of the Maldives was hit by severe flooding after several hours of torrential rainfall in November 2015. Homes and businesses in Addu City were inundated by floodwaters and the damages caused were described as the worst in 40 years. Feydhoo and Maradhoo island households were severely affected. About 297 houses got flooded and losses estimated at USD 0.3 million."<sup>121</sup>

### **Institutional and Policy Profile**

There are 20 administrative atolls and three city councils in the Maldives, with over 653 council members on 186 administrative islands. There are also 135 resort islands and 128 industrial islands. "In April 2010, the Decentralization Act was passed by the parliament. This act formalized the roles and responsibilities of atoll and island councils and required that they be democratically elected. A Local Government Authority was established in late 2010, and the first local council elections were held in

February 2011."<sup>122</sup>

The Government of Maldives enacted a Disaster Management Act in 2015; it articulates a holistic approach to disaster risk management and provides an institutional framework for disaster coordination and management, the National Disaster Management Authority (NDMA). The NDMA assumes most of the operational functions of its predecessor, the National Disaster Management Commission (NDMC), such as drafting regulations, setting up local committees, and aligning disaster response plans at every level. During 2014-2015, the government mainstreamed local-level DRR and climate change adaptation into local development programs as the main goal of a project implemented by the ADPC. The project also formulated a national guideline on integrating community-based disaster risk management activities into local government authorities' programs through a national framework and training handbook.<sup>123</sup> The government has also implemented a strategic National Action Plan for Disaster Risk Reduction and Climate Change Adaptation (2010-2020)<sup>124</sup> aimed at integrating DRR and climate change adaptation into all development work.

### **Disaster Management Capacities, Capabilities and Challenges**

The NDMC and the UNDP implemented a project, "Scaling up the National Capacity for Disaster Risk Reduction and Management in Maldives" from 2016 to 2018.<sup>125</sup> The project implemented several activities towards enhancing communities' capacity for disaster response, strengthening early warning systems, and bolstering capacity in disaster statistics production and analysis. UN

Agencies are also supporting Maldives with the implementation of a Low Emission Climate Resilient Development (LECReD) Programme to support low carbon lifestyles,<sup>126</sup> climate change adaptation, and DRR. Maldives has also implemented Resort Resilience Program<sup>127</sup> as a public-private partnership (PPP) model where NDMC provides technical support to resorts to develop disaster management plans and build disaster preparedness, reduction, and relief capacity. An NDMC-implemented Community-based Disaster Risk Reduction Program (CBDRM)<sup>128</sup> aims to reduce vulnerabilities and strengthen people's capacities to cope with hazards. In doing so, it contributes to the progressive realization of safety, disaster resilience, and development of all. According to the ADPC, the CBDRM Program is one of the most successful programs run by NDMC.<sup>129</sup>

The Maldives has developed a multi-hazard warning system which is operated by the Maldives Meteorological Service. Currently, it has five monitoring offices, 20 automated stations, and three tide gauges for collecting and providing real-time data related to tsunami, earthquake, and wind. Common alerting protocols have been developed for various atolls to optimize emergency response. The alert system facilitates the exchange of emergency information via mobile technology that is shared by all entities in government and private sector. Currently, the government is setting up the Emergency Operations Center and the NDMA is working on developing capacities and resources in each island community. The author has observed that the Disaster Management Council, Disaster Management Steering Committee, National Emergency Operation Center, and National Emergency Response Force have been working with community emergency response teams, and other atoll-

island- and local-level committees, to enhance disaster response capabilities. The Maldives Meteorological Service also runs their own numerical weather prediction models to generate short-range forecasts. However, there is a lack of human resources and hardware support in the field of meteorology.<sup>130</sup>

### **Bilateral Relations with India**

The Maldives and India have longstanding and cordial relations. The Maldives has been the beneficiary of Indian development aid and emergency relief. For example, in 2018, India announced a financial assistance package of USD 1.4 billion, offered 1000 student scholarships for a period of five years, and committed USD 50 million as budgetary support to the Maldives government.<sup>131</sup> In 2020, India signed a USD 100 million grant for the Greater Male Connectivity Project (GMCP)<sup>132</sup> had the Indian Air Force airlift 6.2 tons of medicines from various Indian cities through Operation Sanjeevani, had a Navy ship deliver 580 tons of food aid under Mission Sagar,<sup>133</sup> provided a Dornier aircraft that will be operated by the Maldives National Defense Forces, and created South Asia's first air travel bubble with the Maldives,<sup>134</sup> and launched a direct ferry service between both countries.<sup>135</sup> India thus became the largest source for tourists in Maldives in pandemic-hit 2020. In January 2021, India sent 100,000 doses of Covishield vaccines to the Maldives as grant assistance.

### **Relations with Other Partners**

The Maldives government is working with various governments bilaterally, and through UN agencies, the SAARC, SAARC Disaster Management Center (SDMC), national NGOs (C.A.R.E. Society), and the World



Bank because the lack of financial and human resources in Maldives' remote atolls poses a major issue to DRR; the remoteness of islands and atolls, inadequate availability of fresh water, fuel supplies and communication are major considerations. The Maldives is a member of the Coalition for Disaster Resilient Infrastructure CDRI and the SAARC.

### Social Profile

Women in the Maldives are not considered equal and gender imbalances and disparities are a social constraint. Women's political participation is minimal, and gender-based violence is prevalent. In addition, a significant proportion of country's working population are foreign immigrants, mainly from Bangladesh (almost 50 percent), which has implications for social inclusion.<sup>136</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and the Maldives is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that the Maldives could tap. Currently, the pandemic situation is a concern, but the visitors are allowed to travel provided they produce a Covid-19 negative certificate. However, due to the pandemic concerns officials travel may be highly need based which may affect any face-to-face meetings, and face to face training till the pandemic situation is normalized and the restrictions are completely withdrawn.

### Recommendations Under TrC

The following could be priority areas for the Maldives under TrC:

- Strengthening the National Emergency Response Force to build search and rescue capacities firefighting capabilities.
- Designing and equipping a national emergency operations center and providing related training and capacity building.
- Adapting and institutionalizing an Incident Command System.
- Building capacities and providing equipment for managing oil spills.
- Providing a psychosocial training curriculum and methodology and psychosocial first aid after disaster events.
- Piloting context-based, nature-based solutions, such as growing trees for shoreline protection.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community level.



### Nepal

#### Geographic, Economic and Disaster Risk Profile

The Federal Democratic Republic of Nepal is a mountainous landlocked country in the Himalayas. It has a diverse and complex topography and geology with a highly variable

climate. Nepal is bordered by China and India, which shares approximately 1850 km of open border.<sup>137</sup> The population of Nepal is approximately 29 million,<sup>138</sup> of which 80 percent is dependent on agriculture for their livelihoods. Tourism, hospitality, forest-based agriculture, and hydropower generation are the primary economic activities.

More than 80 percent of the population is exposed to the risk of natural hazards, such as earthquakes, droughts, avalanches, epidemics, pandemics, floods, landslides, extreme temperatures, and glacial lake outburst floods (GLOFs).<sup>139</sup> A high-risk country, Nepal ranks 46<sup>th</sup> in exposure to disasters and humanitarian crisis according to the INFORM Risk Index 2019,<sup>140</sup> and 10<sup>th</sup> on the 2021 Global Climate Risk Index, which assesses the impact of meteorological event in relation to economic losses and human fatalities.<sup>141</sup> Kathmandu Valley is the world's most at-risk urban area to seismic activity. Between 1990 and 2019 seismic events have caused over the USD 5 billion in damages and affected nearly six million people. Recurrent, large-scale disasters have further increased the country's reliance on agriculture by obstructing critical infrastructure, such as transport and electricity production, thus delaying the development of other industries. This high-risk environment also deters foreign investment, which contributes to the country's slow growth.<sup>142</sup>

The country also suffers regularly from flood damage. "Most of the monsoonal precipitation during June and September triggers regular flooding in the low-lying Terai Plains. In 2017, 80 percent of the Terai region and some surrounding districts suffered inundation triggered by monsoonal rains, causing USD 584.7 million in damages" and "unusual

patterns of rain and droughts have caused yearly crop production losses ranging between 5 and 35 percent in 2001-2010 (apart from the years 2003 and 2007). The total value of crops lost due to extreme weather amounts to around USD 1.5 billion."<sup>143</sup>

## Institutional and Policy Profile

Nepal is a democratic republic. Historically, Nepal followed a relief-focused approach to disasters guided by the 1982 Natural Calamity (Relief) Act.<sup>144</sup> To pursue a more holistic and proactive approach to disaster risk management, the Government of Nepal passed the National Risk Reduction and Management Act (DRRMA) in 2017, which provided for the establishment of a National Disaster Risk Reduction and Management Authority (NDRRMA).<sup>145</sup> The DRRMA further identified responsibilities for all aspects of the disaster management cycle at the national, provincial, district, and local municipal levels. Further, the 2015 Nepal Constitution devolved power from federal to provincial and local levels and designated disaster management a joint responsibility of all three levels of government. The Government of Nepal also developed a DRR National Strategic Plan of Action (2018-2030), which is aligned with the priorities of Sendai Framework for Disaster Risk Reduction (SFDRR). The Plan of Action articulates a need for assessing multi-hazard risks, building capacity, strengthening institutional structures, enhancing public investments, promoting public and private investments for DRR, and other priorities. It focuses on strengthening disaster preparedness; developing multi-hazard early warning, communication, and dissemination systems; strengthening search and rescue capacity; and promoting community-based disaster risk management systems.<sup>146</sup>

## Disaster Management Capacities, Capabilities and Challenges

The Nepalese Ministry of Home Affairs is developing disaster information management system and online databases,<sup>147</sup> including the National Emergency Operation Center Sahana Disaster Management System (SAHANA)<sup>148</sup>, Nepal's disaster risk reduction portal. The Ministry of Home Affairs is also engaged in developing methods for conducting risk assessments. The Department of Hydrology and Meteorology is developing water and flood monitoring systems. District and municipal authorities have also prepared local disaster response plans to complement the National Disaster Plan; they have also earmarked funds for emergency response and relief. The Government of Nepal has developed multi-hazard risk maps and an urban risk atlas.<sup>149</sup> It has also developed an early warning system for water-related hazards that uses automatic sensors and mobile communications technology for real-time climate and hydrological data collection and warning dissemination.<sup>150</sup>

### Bilateral Relations with India

Nepal enjoys good diplomatic relations with India<sup>151</sup> and can easily be reached by air and road. There is a significant movement of people through the open borders between India and Nepal. As a landlocked country, Nepal depends heavily on India for supply-chain logistics and goods to meet day-to-day needs. While relations are normally warm, recently there was some confusion about cartographic details for some locations in some border areas.<sup>152</sup> In consonance with India's Neighborhood First Policy, there is a considerable momentum in bilateral ties between India and Nepal. Under South-South cooperation, India provides

development assistance to Nepal, focusing on building infrastructure for transport, health, water resources, education, and rural and community development.<sup>153</sup> Nepalese citizens can work in India because of the open border, so people move without need of permits or visas to take up work; some Nepalis are employed by the Indian Military. India supported Nepal in search and rescue, relief, and recovery after a 2015 earthquake (see Box 4 in the main report). To bolster Nepal's disaster resilience, Indian government and NGO experts have played an advisory role in helping the country design and implement earthquake recovery programs. To assist with the Covid-19 pandemic, in January 2021, India sent 1 million doses of the Covishield vaccine as grant assistance to Nepal.<sup>154</sup>

### Relations with Other Partners

With regard to complimentary and competing DRR programs and other international actors, the Government of Nepal is already working with several UN agencies and bilateral donors, such as the Foreign, Commonwealth and Development Office (FCDO), United States Agency for International Development (USAID), Department of Foreign Affairs and Trade (DFAT), Japanese International Cooperation Agency (JICA), Swiss Agency for Development and Cooperation (SDC); multilateral donors, such as the European Union, World Bank, and ADB; and INGOs, such International Red Cross, CARE, Oxfam, ActionAid, World Vision, Catholic Relief Services, among others. Nepal is also home to The International Center for Integrated Mountain Development (ICIMOD), a reputed research and technical agency supported by several international organizations. "ICIMOD is an intergovernmental knowledge and learning

center that develops and shares research, information, and innovations to empower people in the eight regional member countries of the Hindu Kush Mountains – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan.”<sup>155</sup> The National Society for Earthquake Technology (NSET) is another reputed agency based in Nepal that has been working on reducing earthquake risk and increasing earthquake preparedness in Nepal and other earthquake-prone countries.<sup>156</sup> Nepal is a member of the Coalition for Disaster Resilient Infrastructure CDRI and the SAARC.

### Social Profile

Nepal is a predominantly patriarchal society where women are considerably marginalized in the socioeconomic sphere, particularly in rural areas. There exist “persisting inequalities between genders in Nepal” and “women still continue to suffer from physical violence and structural discrimination. Inequality manifests itself in plethora of ways, often as a limited access to education, employment, and opportunities, and can result in increased gender-based violence especially in the aftermath of disasters. Social dynamics may increase the vulnerability of people of different castes and ethnic groups.”<sup>157</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Nepal is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Nepal could tap. Currently, although pandemic cases are under control, people from India need to register and have a negative Covid-19 test to travel to Nepal.

Face-to-face meetings and training programs may be a challenge until the pandemic situation normalizes.

### Recommendations Under TrC

The following could be priority areas for Nepal under TrC:

- Developing institutions at national, provincial, and district levels, and supporting and strengthening the NDRRMA.
- Strengthening firefighting services for both structural and forest fires.
- Designing, establishing, and equipping a national emergency operations center, and providing related training and capacity building.
- Adapting and institutionalizing an Incident Command System.
- Bolstering pandemic management, especially in the area of public health management, risk communication, vaccination management.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community levels.



### The Philippines

#### Geographic, Economic and Disaster Risk Profile

The Republic of the Philippines, with a population of approximately 105 million people, is an archipelago consisting of



approximately 7,100 islands and islets, covering a land area of about 300,000 sq. km. The country's islands are divided into three groups: the Luzon group in the north and west, consisting of Luzon, Mindoro, and Palawan; the Visaya group in the center, consisting of Bohol, Cebu, Leyte, Masbate, Negros, Panay and Samar; and the Mindanao Island in the south. Manila and nearby Quezon City, the country's most populous cities, are part of the National Capital Region (NCR), also called Metro Manila, located on the largest island of Luzon. Approximately 51 percent of the population lives in urban areas and the remaining 49 percent in rural areas.<sup>158</sup> Agriculture, mining, forestry, fishing, and services are major sources of livelihoods.<sup>159</sup> The Philippines' climate is tropical, characterized by relatively high temperatures, high humidity, and abundant rainfall.

The Philippines is highly vulnerable to earthquakes, typhoons (cyclones), volcanic eruptions, floods, landslides, tsunamis, and forest fires. About 60 percent of the country's total land area is exposed to multiple hazards, and 74 percent of the population is susceptible to the impact of these hazards. Since the 1990s, the Philippines suffered 565 disaster events resulting in an estimated USD 23 billion in damages. Much of the damages were due to recurrent super typhoons, including Ondoy and Pepeng in 2009, Washi in 2011, Bopha in 2012, Haiyan in 2013, Koppu in 2015, Haima in 2016, and Mangkhut in 2018. Hydro-meteorological disasters, such as typhoons and floods, account for approximately 80 percent of disaster events in the last 50 years. Typhoon Haiyan (2013) was one of the most severe disasters events in the country. It impacted approximately 16 million people, destroyed more than 1.1 million houses, and

damaged hundreds of thousands of crops in 41 provinces.<sup>160</sup> The total damages were USD 12.9 billion.<sup>161</sup> Nearly 6,300 people died as a result of the typhoon, 4.1 million people were displaced, and more than 1,000 people are still "missing."<sup>162</sup>

## Institutional and Policy Profile

The Philippines is a democratic country, led by a president. The islands are divided into four main divisions consisting of 17 autonomous regions, 81 provinces, 1,489 municipalities, and 42,044 Barangays (wards). The Philippines regularly updates its legal foundations for disaster risk reduction and management, focusing on a holistic approach to disaster management. In 2010, the Philippine Disaster Risk Reduction and Management Act of 2010 (or Republic Act 10121) became the country's apex legal instrument for disaster risk reduction actions across various governance levels. The 2010 DRRM Act, along with the Climate Change Act of 2009, made several provisions for environmental protection. The National Disaster Risk Reduction and Management Council (NDRRMC), comprised of members from various departments, government agencies, local governments, civil society groups, and the private sector, serves as the decision-making body at the national level. The NDRRMC, Department of Interior and Local Government (DILG), and the Department of Environmental and Natural Resources (DENR) monitor implementation of environmental activities. The Office of Civil Defense (OCD) of the NDRRMC provides leadership for comprehensive national civil defense and disaster risk reduction and management programs.<sup>163</sup>

## Disaster Management Capacities, Capabilities and Challenges

The Philippines has formulated a national disaster response plan for various disaster scenarios. The administration and implementation of disaster risk management consists of multi-tiered bodies, including Disaster Risk Reduction and Management Offices (DRRMO) in every province, city, and municipality, and a Barangay Disaster Risk Reduction and Management Committee (BDRRMC) in every ward; all are jointly responsible for operations requiring vertical coordination, as mandated by the DRRM Act.<sup>164</sup>

The NDRRMC Operation Center coordinates disaster responses. The Office of Civil Defense (OCD) conducts pre-disaster risk assessments, including action programs and protocols (PDRA-APP), and capacity building for emergency preparedness, Incident Command System (ICS), search and rescue, and post-disaster needs assessments (PDNAs). OCD also supports local government units (LGUs) on disaster risk management. LGUs and members of the Regional Disaster Risk Reduction and Management Council (RDRRMC) establish operational plans to properly respond to different disaster scenarios. Some LGUs have also established local emergency operations centers. The Philippines uses 74 seismic stations for earthquake monitoring, 36 tsunami detection stations, and six volcano observatories in order to strengthen early warning systems. There are also 19 sea-level monitoring stations, 1000 automated weather stations, and water level sensors. The Philippines also enacted the Nationwide Operational Assessment of Hazards (NOAH) Program under the Department of Science and Technology (DOST), which

produces sophisticated hazard maps.<sup>165</sup>

While the Philippines has highly evolved capacities for physical damages, the government has given post-disaster mental health far less attention. Although the country recently passed its first Mental Health Act and Universal Health Care Law, only 5 percent its healthcare expenditure is directed toward mental health in normal times.<sup>166</sup>

## Bilateral Relations with India

Diplomatic relations between India and the Philippines date back to 26 November 1949. Although the two countries share long-held values and commonalities, such as anticolonialism, South-South cooperation, a strong democratic polity, an independent judiciary and press, and wide use of the English language, the full potential of a relationship between the two countries has not been realized and reflects a lack of knowledge about one another.<sup>167</sup>

The Government of the Philippines has acknowledged the strides made in bilateral relations with India. As part of India's USD 100 million line of credit offered to ASEAN countries, India approved a USD 15 million credit line for the Philippines for gems, jewelry cutting and polishing machinery, and other equipment.<sup>168</sup> India and the Philippines have also begun cooperation in the health sector, signing memorandums of understanding for collaboration in the fields of health and medicine.<sup>169</sup> India has also provided disaster support to the Philippines for humanitarian emergencies. For example, India sent an Indian Air Force flight with relief material for the victims of Typhoon Haiyan in 2013. That same year, India also provided USD 100,000 in

disaster relief assistance following an earthquake in Bohol, and USD 500,000 for relief and rehabilitation efforts in the city of Marawi in 2017 after it was besieged by ISIS terrorists.<sup>170</sup>

### Relations with Other Partners

Several multilateral, bilateral, nongovernmental and private sector organizations actively collaborate with the Philippines in managing its disasters. Prominent multilateral agencies include the UN Office for the Coordination of Humanitarian Affairs (OCHA), UNICEF, UNDP, UNFPA, FAO and the World Food Programme, World Health Organization, Asian Development Bank, International Organization for Migration, and the Global Facility for Disaster Reduction and Recovery. Prominent bilateral agencies include USAID/BHA, JICA, and Australian Aid. NGOs include ActionAid, Adventist Development and Relief Agency (ADRA), CARE, the Philippines Red Cross, Plan International, Save the Children and World Vision<sup>171</sup>.

### Social Profile

The vulnerability of men and women to disasters is influenced by cultural norms and perceptions influencing gendered behavior. For example, evidence from the Central Philippines suggests that cultural norms and perceptions of modesty significantly lower the swimming capabilities of women and girls. Nonetheless, the Philippines has established legal provisions for securing, protecting, and promoting human rights of women and children, persons with disabilities, and indigenous people, guaranteeing the access to education, health, public services and social services for vulnerable populations.<sup>172</sup>

### Covid-19 Coda

The Covid-19 pandemic situation in the Philippines remains very critical as it is experiencing the third wave of the pandemic, putting pressure on the fragmented public health system. India has considerable experience in providing remote access to health services during such situations. Although travel is currently allowed in the country, strict Covid-19 protocols remain in place, such as mandatory quarantine and complete vaccination. These restrictions will limit in-person training and meetings for the training until the situation improves.

### Recommendations Under TrC

The following could be priority areas for the Philippines under TrC:

- Strengthening the National Emergency Response Force to build search and rescue and firefighting capabilities.
- Designing and equipping a national emergency operations center and providing related training and capacity building.
- Exchanging lessons learned in India and other South Asian countries on Incident Command System institutionalization.
- Piloting nature-based solutions for shoreline protection, such as growing trees.
- Training in community-based disaster risk management practices with a focus on gender mainstreaming.

- Mainstreaming disaster risk reduction and climate change adaptation or mitigation into development planning.
- Supporting disaster impact and climate impact assessments.
- Improving data management systems and the efficient and timely use of data.
- Exploring possibilities for financing disaster risk and increasing insurance coverage.
- Supporting solutions for health-related disasters through telemedicine, including psychosocial care.
- Establishing enhanced inter-agency collaboration to address psychosocial care practice and delivery.
- Training and building capacity for teachers and other frontline workers to provide better psychosocial care.
- Strengthening the participation of women in disaster management planning, training, and capacity-building initiatives at the central government and community levels.



## Timor-Leste

### Geographic, Economic and Disaster Risk Profile

The Democratic Republic of Timor-Leste lies on the eastern half of mountainous Timor Island within the Malay-Indonesian archipelago in Oceania, 400 km north of Australia. The country has two islands, Atauro and Jaco,<sup>173</sup> and

Oecusse, an exclave on the northwestern side of Timor Island. Timor-Leste is prone to flooding, landslides, drought, earthquakes, tsunamis, and tropical cyclones. Flood is Timor-Leste's most frequent natural disaster, followed by drought and storms. Rapid deforestation and climate change may cause a hotter, drier, climate, which may in turn lead to harsher and longer drought conditions and heavier rainfall, increasing flood and landslide hazards.<sup>174</sup>

In June 2001, eastern Timor-Leste reported heavy flooding that lasted three days, leaving about 1,000 people homeless. Heavy rains in June 2003 resulted in severe flooding in the districts of Cova Lima, Manufahi and Viqueque, caused substantial damage to infrastructure including roads, bridges, stores, livestock, and affect approximately 450-600 villages and 125 homes. The flood also damaged 381 hectares of rice fields, 672 hectares of farmland, and affected over 7,000 people in south-western districts of Timor-Leste.<sup>175</sup> Several storms caused floods from December 2005–January 2006, resulting in damage to 1209 homes and affecting 8400 people. Timor-Leste suffered from severe drought during 2015-2017. In addition in 2015, a 6.3 magnitude earthquake struck Dili, the capital, causing minor damages to some buildings and damaging the telephone lines.

Hydro-meteorological disasters such as floods, heavy rains, and tropical cyclones pose risks to livelihoods and food security since the country's economy is highly dependent on agriculture and forestry. Climate change is likely to exacerbate these hydro-meteorological hazards and risks.



## Institutional and Policy Profile

Timor-Leste is a young country, having become independent only in 2002. It has a democratic, semi-presidential, parliamentary system of governance. The president is the head of state, and the prime minister is the head of government. A unicameral legislature, the National Parliament, and the president are directly elected by popular vote for a five-year term. "Administratively, the country is divided into 12 municipalities and one special region. Each municipality is divided into sub-districts and *sucos* (villages), the smallest administrative unit."<sup>176</sup>

Disaster risk management is coordinated by a National Disaster Management Directorate (NDMD), the lead agency under the joint responsibility of the Ministry of Social Solidarity (MSS) and the Ministry of the Interior. The MSS is responsible for coordinating emergency preparation and response. The NDMD is responsible for providing disaster risk management coordination and technical support to the government and communities; it also supports the National Disaster Coordinator (NDC) office during disaster response operations. The NDMD comprises the Disaster Operations Center (DOC), the departments of Preparedness and Formation, Prevention and Mitigation, Response and Recovery, district-level agencies, and district disaster management commissions (DDMC). At the sub-district level, there is a sub-district disaster management commission (SDDMC), and at the village (*suco*) level, there is a *suco* disaster management commission (SDMC). DDMCs, SDDMCs and SDMCs work mostly in response and relief after the disaster events. SDMCs are responsible for verifying disaster sites and report observations

to the district level.<sup>177</sup>

## Disaster Management Capacities, Capabilities and Challenges

Timor-Leste has developed institutions, systems, and programs for disaster management. The Joint National Disaster Operation Center can stand up to function on a 24-hour basis, equipped with communications equipment, a secure power supply, and disaster-proof structures.<sup>178</sup> Its interventions had been primarily focused on post-disaster humanitarian assistance.<sup>179</sup> The country needs to develop a long-term DRR strategy that focuses on capacity building, mainstreaming risk reduction, and strengthening its institutions.

## Bilateral Relations with India

India was one of the first countries to establish diplomatic relations with Timor-Leste. A high-level delegation represented India in Timor-Leste's Independence Day celebrations in May 2002. Dignitaries have made several bilateral visits and meeting during various international summits. India has offered to cooperate in various sectors, including oil and gas, agriculture, health, defense, information technology. India has already supported projects in the fields of health, information technology, and the development of the bamboo industry, education and computer skills, and sustainable fisheries and agriculture. For example, through the IBSA Fund, India, Brazil, and South Africa granted USD 1.4 million to a project to enhance food and nutrition security and reduce disaster in Timor-Leste.<sup>180</sup>

## Relations with Other Partners

UN Agencies, INGOs, ADB, and the World

Bank have been working with the Government of Timor-Leste, creating disaster risk management capabilities including community-based ones. Several bilateral agencies, such as USAID and DFAT, are active development partners in Timor-Leste.<sup>181</sup> The International Federation of Red Cross (IFRC) and Timor-Leste Red Cross have a wide presence in the country and carry out disaster preparedness and relief operations.<sup>182</sup> Other INGOs are also very active in the country, including organizations such as CARITAS, CARE, Oxfam, ADRA International, Catholic Relief Services, World Visions, PLAN, The Asia Foundation, and Marie Stopes. Timor-Leste has observer status in ASEAN, while waiting for membership.

### Social Profile

The poverty rate in Timor-Leste is nearly 50 percent. Anti-poverty efforts are mostly in the form of assistance and subsidies with an expectation that long-term change will come from improved education and employment as the country develops. Poverty is seen in both rural and urban areas. Timor-Leste offers social protection in the form of a pension to elderly, disabled, women-headed poor households, and conflict veterans.<sup>183</sup>

Immediately after independence in 2002, the Timor-Leste constitution established legal equality for women. This was followed by significant efforts to improve gender equality, including policy reform, legislation, institutional mechanisms, and public awareness campaigns. However, challenges for women remain, such as domestic violence, disproportionate poverty, and a lack of recognition for women's political, economic, and social contributions. One key concern the country faces in terms of women's welfare is a large population of widows due to

civil conflicts that widowed nearly half of all women, who then became the sole providers for their families.<sup>184</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Timor-Leste is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Timor-Leste could tap. Currently, though the pandemic numbers are under control, people from India need to register and have a Covid-19 negative report to travel to Timor-Leste. Face to face meetings and training programs may be a challenge in such a circumstance before normalization of the pandemic situation.

### Recommendations Under TrC

The following could be priority areas for Timor-Leste under TrC:

- Strengthening weather forecasting and early warning communication systems.
- Mainstreaming disaster risk reduction in the agriculture sector, including the application of remote sensing and geographic information system (GIS)-based tools.
- Strengthening and developing institutions and technical capabilities in the areas of early warning systems, flood forecasting and management, and search and rescue.
- Supporting the building of resilient infrastructure, such as roads, and social infrastructure, such as schools, hospitals, and flood shelters.

- Strengthening response capacities through search and rescue and Incident Command System training.
- Focusing on gender-inclusive disaster management planning, training, and capacity building.



## Viet Nam

### Geographic, Economic and Disaster Risk Profile

The Socialist Republic of Viet Nam is located on the east side of Indochina Peninsula. It borders China, Lao PDR, and Cambodia. It has a total area of 331,236 sq. km. characterized by mountains and hilly terrain that covers about three-fourths of the total area. There are two major river systems: the Red River in the north, and the Mekong River in the south. Viet Nam has a tropical climate, and the country receives copious rainfall during monsoon season (June and August).<sup>185</sup>

Viet Nam has a population of 94.7 million people, of which 35.7 percent lives in urban areas.<sup>186</sup> Agriculture, fisheries, forestry, energy, mining, minerals, manufacturing, and tourism contribute significantly to the economy.<sup>187</sup> Viet Nam is an emerging and lower middle-income economy: 36.86 percent of GDP is produced in the industrial sector, 43.63 percent in the services sector, and 19.51 percent in the agriculture sector.<sup>188</sup>

Viet Nam is prone to a number of natural hazards, such as tropical cyclones, floods, droughts, landslides, forest fires, coastal erosion, epidemics, and pandemics. Cyclones and floods

are the most frequent natural hazards.<sup>189</sup> On average, about 30 cyclonic storms originate in the western Pacific Ocean each year, of which about 10 are generated in South China Sea, and four to six hit Viet Nam. Cyclonic storms are accompanied by strong winds, tidal waves, storm surges and incessant rainfall.<sup>190</sup> Floods are also very frequent and devastating, affecting almost all provinces and cities with varying intensities and durations. “Most parts of the country receive an annual average of 2,000 mm of rainfall, apart from the highlands in the northern and southern regions, which have an average of 3,000 to 4,000 mm, respectively.”<sup>191</sup> Drought is also a recurrent feature in some parts of the country; the central regions are more prone to drought due to lack of adequate rainfall and limited water retention capacity.

Between 1980-2010, 58 flood events killed 4712 people, affected 26 million, and caused economic losses of USD 2.75 billion. Cyclonic storms caused largest number of deaths, 10,679, affecting 41.25 million people and causing economic losses of USD 4.016 billion.<sup>192</sup> Typhoon Damrey in 2017, with wind speeds reaching 135 km/hour, hit Nha Trang in Khánh Hòa Province. Heavy rainfall and floods led to economic losses and damage of USD 630.5 million. More than 100 people were killed, 315 people injured, and 16 were reported missing.<sup>193</sup> Floods in June 2019 impacted 5200 houses, 2800 hectares of crops, and 1600 hectares of aquatic farms.<sup>194</sup>

A notable drought affected southern Viet Nam in 2016. Hot and sunny summers aggravate the risk of forest fires. In the past, the country has also experienced many landslide events that affected a large number of people and caused economic losses and human casualties. Vector-borne diseases, such as dengue and malaria,

are prevalent in the country, which also faces typhoid, tuberculosis, and zoonotic diseases like swine flu, not to mention SARS CoV 2 (Covid-19).<sup>195</sup>

### **Institutional and Policy Profile**

Viet Nam is a single-party socialist republic divided into six regions for administrative purposes: (1) Red River Delta, (2) Northern Midlands and Mountain Areas, (3) North Central and Central Coastal Areas, (4) Central Highlands, (5) Southeast, and (6) Mekong River Delta.<sup>196</sup> The government of Viet Nam implemented a National Strategy for Natural Disaster Prevention, Response and Mitigation for 2008-2020<sup>197</sup> and enacted a law on Natural Disasters Prevention and Control in May 2014. This law lays down institutional mechanisms, mandates, and functions to various authorities.<sup>198</sup> The Central Committee for Natural Disaster for Natural Disaster Prevention and Control (CCNDPC) is the apex national body for disaster policy formulation and decision-making. The CCNDPC is steered by the Viet Nam Disaster Management Authority (NDMA) which acts as a standing office of the CCNDPC and operates within Ministry of Agriculture and Rural Development.<sup>199</sup> There is a Central Committee for Flood and Storm Control (CCFSC) under the Ministry of Agriculture and Rural Development that coordinates disaster risk management across various departments and agencies.<sup>200</sup>

### **Disaster Management Capacities, Capabilities and Challenges**

The Disaster Management Center (DMC) implements country's localized community-based disaster risk management operations. There is a multi-layered disaster risk governance

structure that operates from national to provincial to district to sub-district to village and commune levels. The Government of Viet Nam also works with domestic nongovernmental counterparts that include the Viet Nam Women's Union (with an estimated 13 million members), the farmers union, the Red Cross, and communal offices.<sup>201</sup> Recently, the Disaster Management Center was upgraded to a Disaster Management Policy and Technology Center (DMPTC). Viet Nam has also created a climate risk index, an online platform developed with support from UNDP, that collates updated climate and hazard-related information from various sources in all 63 provinces. It also developed a risk assessment methodology for local-level community-based disaster risk management interventions. Viet Nam has also developed hydro-meteorological models and risk assessment tools for major cities and river basins.<sup>202</sup> With support from the World Bank, Viet Nam developed the 'City strength diagnostic', a tool to assess the vulnerability of independent city systems to flooding and climate risk in the city of Can Tho. The tool helps with risk-informed urban planning and investments for climate resilient infrastructure.<sup>203</sup> The Government of Viet Nam has also undertaken modernization of its early warning systems with support from the World Bank.

However, "the understanding of the complex inter-linkages between development, human systems, the environment, climate and disaster risk still remains limited in the country. Emerging risks of slow-onset hazards, in particular, add to the challenges due to their nature that is difficult to estimate track and predict, especially in areas which lacks comprehensive monitoring systems."<sup>204</sup> Limited human resources at local levels are



one of the main challenges; at the national level, designated authorities also face financial constraints. The ADB has also highlighted significant funding gaps for disaster risk reduction based on the bank's risk modelling and climate projections.<sup>205</sup>

### **Bilateral Relations with India**

India and Viet Nam have a friendly and cordial relationship. There are regular high-level visits by both sides and an institutionalized mechanism for bilateral exchanges. "India's relation with Viet Nam is marked by growing economic and commercial engagement. India is now among the top ten trading partners of Vietnam."<sup>206</sup> Development partnership is an important pillar of India-Vietnam bilateral cooperation. The major areas of such cooperation include defense, science and technology, and renewable energy. The Government of India has also provided support for capacity building and has offered several lines of credit, including USD 19.5 million in 2013 for the execution of the Nam Trai IV hydropower project, and USD 300 million for the textile sector. In addition, Vietnamese students enrolled under a program for ASEAN students can apply for 1000 doctoral scholarships to study at technical institutes in India.<sup>207</sup> India also provided Viet Nam with more than USD 1 million in assistance for information and communication technology projects, including donations of high-performance computers.<sup>208</sup> As of August 2021, a total 26 Quick Impact Projects (QIP) have also been undertaken, with 13 already completed. In 2020-2021, 12 new QIPs were approved and are under implementation, including seven for water management in the Mekong Delta Region.

### **Relations with Other Partners**

In addition to working with the UNDP and the World Bank, the Government of Viet Nam has initiated measures for hazard mapping and risk modelling in collaboration with the Regional Integrated Multi-Hazard Early Warning System (RIMES), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), World Meteorological Organization (WMO), World Bank, UNDRR and JICA. UN agencies, the ADB, ASEAN, and other bilateral partners, such as JICA, German Agency for International Cooperation (GIZ), USAID, and the Netherlands aid agency, are also active in Viet Nam. INGOs and domestic NGOs also provide extensive support to community-based programs. More than 17 agencies have engaged in locally driven disaster risk management projects in 23 provinces, working directly with local committees for flood and storm control, search and rescue, or people's committees and local residents. The agencies include the ADPC, World Vision, Netherlands Red Cross, Spanish Red Cross, CARE International in Viet Nam, Center for International Studies and Cooperation (CECI), Save the Children Alliance, International Federation of Red Cross and Red Crescent Societies (IFRC), Church World Services, UNDP, World Bank, GIZ, ActionAid, and Oxfam.<sup>209</sup> In terms of humanitarian action, the Viet Nam Red Cross Society, with the help of the IFRC and partner national societies, is well established and working in communities to strengthen disaster response activities and resource mobilization to assist vulnerable people. Communities themselves are important stakeholders in mainstreaming DRR and climate change adaptation nationwide. Working through consultations and agreements is elemental for furthering whole-of-society

approaches in Viet Nam.<sup>210</sup> Viet Nam is a member of ASEAN.

### Social Profile

Viet Nam has been proactive in recognizing and promoting gender equality and women's leadership for disaster and climate change management. These efforts have been built on a government decree issued in September 2013 that provides an official space for the Women's Union on decision-making boards of the Committee for Natural Disaster Prevention and Control. This helps in ensuring the representation of women as key stakeholders in risk management and strives towards providing opportunities for women's meaningful participation at the national level.<sup>211</sup>

### Covid-19 Coda

The Covid-19 pandemic has caused severe disruptions across the world and Vietnam is no exception. As mentioned in the main report, India has considerable experience in, and suppliers for, telemedicine and psychosocial care services that Viet Nam could tap. Currently, while certain diplomatic and skilled persons travel is permitted, due to the pandemic concerns there are several restrictions for travelers and flight operations. The permitted travelers need to produce a Covid-19 negative certificate. Due to these restrictions, face-to-face meetings and training may be a challenge.

### Recommendations Under TrC

The following areas of cooperation could be explored in Viet Nam under the TrC:

- Modernizing early warning systems for floods and cyclones.
- Developing resilient infrastructure, including formulating codes and standards, training architects, and institutionalizing building codes.
- Expanding information and communications technologies for disaster risk management.
- Adapting and institutionalizing an Incident Command System.
- Enhancing gender-inclusive disaster management planning, training, and capacity building at all administrative levels.
- Training of search and rescue teams for flood rescue.

# Annexure 5

Disaster Risk Profile of Other Indo-Pacific Countries

This annexure presents brief disaster risk profiles for 16 Indo-Pacific Region countries that may become candidates for triangular cooperation in the future: Brunei, Cook Islands, Indonesia, Kiribati, Malaysia, Myanmar, Nauru, Palau, Papua New Guinea, Samoa, Singapore, Solomon Islands, Sri Lanka, Thailand, Tonga, and Vanuatu.

Among Pacific Island countries, Niue, the Marshall Islands, and the Federated States of Micronesia are not included here because they are allied with the United States. American Samoa, Northern Mariana Islands, and Guam are not included because they are dependencies of the United States. Non-sovereign French Polynesia and New Caledonia are not included because they are dependent on France.



## Brunei

Brunei, the Abode of Peace is a country on the island of Borneo. It has two distinct sections surrounded by Malaysia and the South China Sea. Brunei's western section is largely hilly, and eastern Brunei is predominantly mountainous. Brunei's coast is wide and swampy. The country's climate, being near the equator, is warm (ranging from 23 to 32 degrees Celsius), humid, and experiences frequent rainfalls, which annually average "2,500 mm on the coast to 7,500 mm in the interior."<sup>212</sup> Brunei has a total land area of 5765 sq. km and had a population of 417,256 in 2016.<sup>213</sup>

Brunei is vulnerable to various natural hazards, such as cyclonic storms, floods, landslides, and seasonal smoke and haze resulting from forest fires in Indonesia. Although the Southeast Asia Region falls in a high seismic hazard

zone, Brunei is not located in an earthquake-prone area, although occasionally earthquakes strike.<sup>214</sup> In recent history, Brunei suffered from one forest fire disaster in 1998, which caused an economic loss of USD 2 million with no reported casualties.<sup>215</sup> In 2007, Brunei witnessed damaging winds and floods, 2008 saw landslides, floods, and strong winds, and 2009 featured floods, haze, wildfires, landslides, and a pandemic.<sup>216</sup>

Brunei's political system is governed by a constitution and a sultan, who is also the prime minister, i.e., the head of government. Administratively, Brunei is divided into four districts and 38 sub-districts.<sup>217</sup> The country's estimated per capita annual income for 2019 in purchasing power parity was approximately USD 85,000. Brunei produces crude oil and natural gas, which make up approximately 95 of the country's exports and 65 percent of Brunei's GDP.<sup>218</sup> Substantial overseas investment income supplements Brunei's domestic production. Brunei has the second-highest Human Development Index among Southeast Asian nations, after Singapore, and is classified as a developed country.<sup>219</sup>

Disaster management in Brunei has been institutionalized under multi-stakeholder District Disaster Management Councils (DDMC) in all four districts. Their activities are coordinated by a National Disaster Management Center (NDMC), established by the Disaster Management Order of August 2006.<sup>220</sup> Brunei's government finances the country's national development plans, especially to improve drainage in frequently flooded areas. The government provided approximately USD 236 million to the 2001-2005 National Development Plan, USD 136 million to the 2007–2012 National Development Plans,

and USD 122 million to the Flood Action Plan 2012.<sup>221</sup> The NDMC has also focused on disaster response capacity building, formulating a Strategic National Action Plan (SNAP) for DRR, creating national standard operating procedures for response, and developing a Community-Based Disaster Risk Management Program.<sup>222</sup>

Brunei endorsed the Beijing Declaration and recognized the importance of women in socioeconomic development. It also acknowledges that gender equality and women's empowerment, besides being basic human rights, are important ends in themselves and crucial for the advancement of women. However, Brunei is one of 25 countries that denies women the right to confer nationality on their children on an equal basis with men. While citizenship is automatically conferred to children born to male citizens, the Brunei Nationality Act of 1961 does not grant female citizens this same right.<sup>223</sup>



## Cook Islands

The Cook Islands has a population of 18,700, spread across 15 miles and a land area of 240 sq. km. within over 2 million sq. km of the South Pacific Ocean.<sup>224</sup> A large economic challenge is its isolation from foreign markets. Its largest economic sector is agriculture, especially the production of copra and citrus fruits, and the manufacturing of clothing and handicrafts.<sup>225</sup>

The Cook Islands are commonly affected by natural disasters, including floods, drought, cyclones, storm surges, food insecurity, pests, invasive species, and epidemics. It is also highly vulnerable to climate change effects, especially

increased cyclonic activity and rising sea levels.<sup>226</sup>

The Cook Islands is in free association with New Zealand, and its head of state is the queen of New Zealand. The Cook Islands is self-governing, although its people are considered citizens of New Zealand.<sup>227</sup> The Cook Island's disaster management administration includes a Disaster Risk Management Council that supplies oversight for disaster policies, plans, and preparedness. The Council meets quarterly, but it will meet daily during states of emergency. Government agencies also meet quarterly through the Disaster Risk Management Platform.<sup>228</sup> The prime minister declares a disaster with inputs from the Emergency Management Cook Islands (EMCI) Agency, the police, and the meteorological services. In the event of an emergency, the police commissioner – as the national disaster controller – activates the national emergency operations center. All stakeholders are notified, including first responders; the Ministry of Health; the national telecommunications provider, Blue Sky; the Red Cross; and other relevant stakeholders. The Cook Islands recognizes New Zealand as the first international port of call in an emergency.<sup>229</sup>

The Country Preparedness Package of the Cook Islands Meteorological Services monitors the country's weather and hydro-meteorological threats and risks, sharing observations with government agencies and outer-island governments. The EMCI and police services are notified of any concerns. Early warnings to the outer islands are delivered through national radio, emailed bulletins, and, if necessary, mobile and satellite phone. A mobile communications network exists across all the outer islands.<sup>230</sup> The U.S. National Oceanic



and Atmospheric Administration and the U.S. Geological Survey also supports the Cook Islands' weather monitoring.<sup>231</sup>



## Indonesia

The Republic of Indonesia, with a population of approximately 264 million, is one of the most disaster-prone countries in the world. The country is spread across 6,000 inhabited islands and faces numerous natural hazards, such as earthquakes, tsunamis, landslides, volcanic eruptions, floods, and droughts.<sup>232</sup> Indonesia regularly experiences disaster events. During the 2004 Indian Ocean Tsunami, Indonesia accounted for 73 percent of the total deaths of 230,000<sup>233</sup> and suffered economic losses and damages of USD 4.45 billion, 78 percent of which were borne by private entities, including households.<sup>234</sup> Earthquakes have caused significant damages to the country's economy: 97 earthquakes between 1970 and 2015 caused USD 11.7 billion in losses and damage.<sup>235</sup> In 2020, the country had faced a total of 1,928 disaster events by the end of August.<sup>236</sup> These comprised 12 earthquakes, five volcanic eruptions, 256 forest fires, 16 droughts, 726 floods, 377 landslides, 521 tornadoes, and 24 tidal waves.<sup>237</sup>

Indonesia's economy primarily depends on the service sector (47 percent of total GDP), industry (39 percent), and agriculture, forestry and fisheries (14 percent).<sup>238</sup> Approximately 26 million Indonesians lived below the poverty line in 2018, and another 20 percent remained vulnerable of falling into poverty because of their low income.<sup>239</sup> Poverty, population growth, and rapid unplanned urbanization exacerbate existing vulnerabilities. Climate change and

the resulting changes in rainfall patterns, storm severity, and sea level further enhance disaster risks.

Over the years, Indonesia has developed capacities at different levels for responding to disasters. The 2004 Indian Ocean Tsunami triggered actions on various fronts. Indonesia enacted a Disaster Management Law in 2007 to bring a holistic perspective to disaster management. Subsequently, the country established the Badan Nasional Penanggulangan Bencana (BNPB or National Disaster Management Authority) in 2008 to coordinate disaster relief and management efforts of the government and other stakeholders.<sup>240</sup> All 34 Indonesian provinces have established provincial-level Badan Penanggulangan Bencana Daerah (BPBD or Regional Disaster Management Authority) and have prepared Rencana Penanggulangan Bencana (RPB or Provincial Disaster Management Plans).<sup>241</sup> More than 90 percent of the districts and cities in Indonesia have their own disaster risk management agencies. The BNPB continues to build the technical capacity of these BPBDs. In 2014, the BNPB deployed a hazard monitoring and early warning system called InAWARE.<sup>242</sup> In addition to following its national laws, regulations, and decrees, Indonesia also conforms to the legally binding ASEAN Agreement on Disaster Management and Emergency Response (AADMER).

Limited employment opportunities and inadequate pay, among other factors, contribute to higher poverty levels among women in Indonesia; many women work in the informal sector and receive lower wages than their male counterparts.<sup>243</sup> Women also experience longer periods of poverty because of their higher share of household responsibilities. Discriminatory

practices also contribute to their heightened economic vulnerability.<sup>244</sup> In times of disasters, when a household loses its main income, assets, or other monetary safety nets, a woman's role in society may increase her vulnerability if her access to temporary or long-term opportunities remains lower than that of men. Indonesians have historically used child marriage in an attempt to increase a household's economic status, and disasters frequently increase young girls' risk for early marriage.<sup>245</sup>



## Kiribati

The Republic of Kiribati is an atoll nation located in the central Pacific Ocean consisting of 33 scattered, mostly volcanic islands, grouped into three main groups: the Gilbert, Phoenix, and Line Islands. Currently, 21 of the 33 islands are inhabited. The country's total land area covers 800 sq. km, and almost all the islands are low-lying atolls, only two or three meters above sea level. Banaba Island, however, is a coral island that rises approximately 81 meters above sea level. The 2010 census recorded a total population of 103,058 people. Kiribati is more urban than rural. More than half of the population lives in the capital, South Tarawa, in the Gilbert Islands.<sup>246</sup>

Nearly the entire population of Kiribati, and much of its infrastructure, is located in low-lying coastal areas that are vulnerable to various natural hazards, such as droughts, tsunamis, flooding, and cyclones. Rising sea levels due to climate change also pose a significant risk. Tarawa is already experiencing sea level fluctuations of up to 0.5 meters, which have washed away a number of houses during high tides. The sea level is projected to rise by 5-15

centimeters by 2030, which will further impact coastal infrastructure.<sup>247</sup> Drought is another major risk in Kiribati. In the past 80 years, there have been 13 major droughts lasting 20 months on average. Long droughts lead to groundwater contamination, impacting Kiribati's coconut farms and water sanitation.<sup>248</sup> In 2015, Cyclone Pam damaged four atolls, affecting approximately 1,500 people, destroying 65 homes, and damaging 42. The cyclone also contaminated the island's water and increased the prevalence of vector-borne diseases.<sup>249</sup>

The government enacted the Disaster Management Act of 1993 and established the National Disaster Risk Management Office (NDRMO). The NDRMO is responsible for advising the NDRMC on government disaster risk management training requirements, developing an annual training plan, and reviewing disaster management arrangements at local and island levels. The government also constituted the National Disaster Risk Management Council (NDRMC), which is responsible for auditing disaster risk management strategies and making decisions during emergencies. The NDRMC comprises a national disaster controller, police commissioner, the director of the Meteorological Office, the secretary general of the Kiribati Red Cross Society, and the president of the Kiribati Association of Non-Governmental Organizations (KANGO). During times of disaster, the NDRMC is the main acting body. All island communities also have an Island Disaster Committee (IDC).<sup>250</sup>

Kiribati formulated a National Disaster Risk Management Plan (NDRMP) in 2012, which outlines the responsibilities of government agencies related to disaster management activities. It establishes the role

and responsibilities of various committees: emergency operations, community training and awareness, exercise management, and island disaster. Furthermore, the country implemented the Kiribati Joint Implementation Plan on Climate Change and Disaster Risk Management (KJIP) 2014 – 2023, which evolved from the National Disaster Risk Management Plan and National Framework for Climate Change and Climate Change Adaptation.<sup>251</sup>

Poverty underpins gender inequalities in Kiribati. Women do not have adequate access to employment, accounting for only 38 percent of paid workers. A 2006 national household survey indicated that 20 percent of households were headed by a single female. Women have very little representation in the government and non-agricultural sectors. Traditionally, Kiribati society is patrilineal, and, although the status of women has changed over the years, women are still often considered subordinate to men. Women are also often at risk of gender-based violence and disaster-related consequences.<sup>252</sup>



## Malaysia

Malaysia, located in Southeast Asia, consists of an area of 329,847 sq. km. The country is divided into two distinct regions, Peninsular Malaysia and East Malaysia that are separated by the South China Sea. East Malaysia contains 60 percent of the total landmass (198,446 sq. km), and Peninsular Malaysia covers a bit over a third (124,449 sq. km). About 60 percent of Malaysia is covered by tropical forests, and its climate is governed by tropical conditions. There are two distinct monsoon seasons, with regional variations according to temperature and altitude.<sup>253</sup> The Malaysian government

has pursued development programs to bridge inequality gaps among states and major ethnic groups since independence in 1957, but pockets of poverty remain, especially in rural areas. Poverty is one of the most important determinants of vulnerability to disasters. In 2010, the country's population was approximately 28.3 million, with 61.8 percent Malay, 21.4 percent Chinese, 6.4 percent Indian, and 13.8 percent indigenous people.<sup>254</sup>

Malaysia is vulnerable to multiple disasters, including cyclones, droughts, environmental degradation, epidemics, floods, and landslides. Approximately 29,800 sq. km flood annually, and flooding, along with landslides, are Malaysia's most common disasters.<sup>255</sup> A flood in Johor State between 2006 and 2007 resulted in losses that exceeded USD 1 billion. A 2014 flood event in the East Coast region of Peninsular Malaysia affected 500,000 to 1 million people and resulted in losses and damages exceeding USD 700 million.<sup>256</sup> Earthquakes are also common: in June 2015, a 6.0 magnitude earthquake in Ranau resulted in 18 casualties and minor damages.<sup>257</sup> With increasing development in Malaysia's hilly regions, landslides are a growing concern. Research from the University Teknologi Malaysia (UTM) identified a total of 21,000 landslides in 2013.<sup>258</sup> Climate change will likely exacerbate the impacts of vector-borne diseases and sea level rise; the latter will impact coastal infrastructure and groundwater availability.

Malaysia's federal government consists of a constitutional monarchy and parliamentary democracy. Malaysia is split into 13 states and three federal territories, of which Peninsular Malaysia contains 11 states and two territories. Malaysia's institutional disaster management mechanism consists of an apex body, the

National Disaster Management Agency (NADMA). The NDMA is supported by the Malaysia Civil Defense Force, the Royal Malaysia Police, Fire and Rescue Department, and the Social Welfare Department. Through committees at various levels, the NDMA offers multiple disaster management resources, including the Federal Disaster Management and Relief Committee, which formulates policies and strategies. State and district-level disaster management committees and offices are responsible for disaster management in their respective jurisdictions. Higher-level committees step in when a disaster event becomes too large for the lower-level committees.<sup>259</sup>

Malaysia has national guidelines for disaster management based on its National Policy, and a mechanism for disaster management and relief. The country also implemented many provisions drawn from the AADMER, such as the ASEAN Standard Operating Procedures for Regional Standby Arrangements and the Coordination of Joint Disaster Relief and Emergency Response Operations. The Eleventh Malaysia Development Plan for 2016-2020 highlighted the importance of addressing disaster and climate concerns for sustainable and resilient development.

Women, children, the elderly, the poor, and people with minority ethnicities, religions, and sexual orientations are vulnerable due to social and institutional hierarchies and discrimination. For example, in the case of the 2017 Kelantan flood, disaster response did not address women's specific concerns, such as private spaces for women in disaster response efforts. This is mainly on account of a lack of women's participation in disaster management planning. A study conducted after the Johor flood found that women had a greater propensity to suffer

a post-traumatic stress disorder (PTSD) than men, with 10-14 percent of women diagnosed with PTSD compared to 5-6 percent of men. Malaysians also suffer from a discontinuity of medical services during the disaster events.<sup>260</sup>



## Myanmar

The Republic of the Union of Myanmar, located in Southeast Asia, has a population of approximately 55 million people, of which about 30 percent lives in urban regions.<sup>261</sup> Myanmar's land area of 676,590 sq. km is characterized by hilly and mountainous topography. Based on its physical features, the country could be divided into five geographies: northern mountains, western ranges, an eastern plateau, a central basin and lowlands, and lower-lying coastal plains. Myanmar is a tropical country that experiences high temperatures, humidity, and copious rainfall.

Myanmar is one of the most vulnerable countries to natural hazards, including cyclonic storms, floods, earthquakes, tsunamis, forest fires, landslides, and epidemics. The western part of the country, with a long coastline on the Bay of Bay of Bengal, is vulnerable to cyclones. On account of heavy rainfall, Myanmar suffers from floods. Water scarcity and droughts are also common, often made worse by rural households' limited access to water. Due to its proximity to the southern Himalayas, Myanmar is also vulnerable to seismic events. The country is divided into five seismic risk zones, with the most dangerous located in the northern and central regions of the country. The country's tropical conditions increase the risks of vector-borne diseases, epidemics, and pandemics.<sup>262</sup>

Disasters contribute to extensive losses and damages in Myanmar. The 2004 Indian Ocean Tsunami killed 71 people and resulted in damages and losses of USD 500 million. In 2008, Cyclone Nargis resulted in damages and losses of USD 4.02 billion. In 2015, severe flooding and landslides damaged 2.9 million hectares of rice crops, affecting over 17 million people and resulting in a loss of USD 1.51 billion.<sup>263</sup> In November 2012, a 6.8 magnitude earthquake in northern Myanmar killed at least 16 people and injured 52, with over 400 houses, 65 schools, and 100 religious buildings damaged.<sup>264</sup>

The country is divided into 21 sub-divisions, seven states, seven regions, one union territory, five self-administered zones, and one self-administered division, as per the country's 2008 constitution. Districts operate at the second level, and the third, fourth and fifth levels comprise townships, wards, and villages, respectively.<sup>265</sup> Disaster risk management approaches and practices are guided by the 2013 Disaster Management Law and the 2015 Disaster Management Rules, which detail the Law's implementation; it gives consideration to all phases of disasters. Institutional mechanisms include the National Disaster Management Committee (NDMC), which serves as the apex body for policy formulation, decision making, and overall management before, during, and after disasters.

In response to climate change concerns, Myanmar's National Adaptation Programme of Action (NAPA) was established in 2012.<sup>266</sup> The NAPA outlines climate-conscious adaptations to strengthen the resilience of agriculture, industry, and local communities. In 2015, the Government of Japan supported Myanmar with USD 40 million to establish

three manned weather radar stations in Yangon, Mandalay, and Kyaukpyu, along with 30 automated weather observation stations across the country.<sup>267</sup> Myanmar also has an early warning system (SESAME) to report weather information to the country's agriculture sector.<sup>268</sup> Additional meteorological warning systems include the National Multi-hazard Early Warning Center (NMHEWC), established by the Department of Meteorology.<sup>269</sup>

Poverty adds significantly to the vulnerability of people in Myanmar. Poor people are disproportionately affected by disasters because of losses in the agriculture sector, one of the country's main livelihood sources. The poor are also affected in urban areas because they usually live in vulnerable and low-lying areas with limited legal tenure. Gender and social inclusion are also important dimensions of vulnerability. Significant inequalities between women and men exist in Myanmar, especially in rural regions, where women mainly tend to manage households, which hinders their access to gainful employment. Women are disproportionately affected by disasters; for example, in the aftermath of Cyclone Nargis, they were exposed to heightened risks of gender-based violence and sexual abuse.<sup>270</sup>



## Nauru

The Republic of Nauru is a single, isolated, raised phosphoric atoll. The country has a population of 11,288, and a landmass of 21 sq. km. The land area consists of a narrow 100-300 meter-wide coastal plain. There are no rivers or streams. Around 85 percent of the population lives in the coastal plain. Commercial, recreational, and government infrastructure,



including schools and hospitals, are also located along the coast. Nauru's soil is very porous, which limits agriculture; most crops are highly labor intensive and require the use of the country's limited potable water.

Nauru is vulnerable to natural hazards, such as droughts, tidal storm surges, coastal erosion, high velocity winds, heavy rainfall, and floods. At least 74 percent of Nauruan households have experienced one or more of those events. Climate change is predicted to lengthen droughts and increase flooding, coastal erosion and inundation, all of which will exacerbate existing socio-economic issues. The geographical isolation of the island also increases its vulnerability. Water scarcity is one of the main challenges. The only locally available fresh water is collected from roof catchment systems. Therefore, water is imported as ballast on ships arriving in Nauru to load phosphate, its main export.<sup>271</sup>

Nauru is divided into 14 districts.<sup>272</sup> In 2008, the government formulated a Disaster Risk Management Plan,<sup>273</sup> and in 2016, it updated the National Disaster Risk Management Act, establishing a National Disaster Management Council (NDMC) to coordinate all efforts related to disaster risk management. The NDMC largely consists of heads of government departments and agencies, and it coordinates with all sectors and agencies in case of a national disaster. The NDMC plans to establish a national emergency operations center for major natural disasters. The National Disaster Risk Management Act also established a Disaster Risk Reduction Committee chaired by the finance secretary. Furthermore, it established a Recovery Advisory Committee.<sup>274</sup>



## Papua New Guinea

The Independent State of Papua New Guinea (PNG) is one of the largest Pacific Island countries with a landmass of 462,840 sq. km. It comprises over 600 small islets and atolls, many of them of volcanic origin. The country's geography is characterized by vast valleys and mountain ranges, tropical forests, open plains, and coastal ecosystems. PNG is home to 7 percent of the world's biodiversity: most of its landmass is covered by dense forests, which count as one of the three largest tropical forests in the world. PNG's population was approximately 6.5 million in 2015, with 33 percent of the people living in urban areas.<sup>275</sup>

PNG is prone to various natural hazards, namely earthquakes, cyclones, storms, volcanic eruptions, riverine and coastal flooding, coastal erosion, epidemics, and droughts. There are 16 active volcanoes in PNG, six of which are classified as high risk. In association with seismic activity, tsunamis are always a concern in PNG. Sea level rise is another concern because it will likely inundate low-lying coastal areas. Climate change is also likely to aggravate the frequency and intensity of hydro-meteorological hazards.<sup>276</sup>

Between 1990 and 2015, floods affected almost half a million people across the country and resulted in large number of casualties. Associated with heavy precipitation and earthquakes, landslides and slope failures are common occurrences in the highlands and mountainous regions, causing significant economic losses and damages. Cyclones and storms are also potentially high-risk events in PNG. Vector-borne diseases, including

malaria and dengue fever, are a risk because of PNG's hot and humid conditions.<sup>277</sup> The social adaptive capacities of various communities differ: Approximately 80 percent of the population relies on agriculture, and frequent droughts are a significant risk to crops, resulting in food insecurities.

Administratively, the country consists of four regions, 22 provinces, and 87 districts. PNG's Disaster Management Act (1984) established disaster risk management frameworks, including the National Disaster Center (NDC), which bolstered governance and disaster management. The NDC, under the Department of Provincial and Local Level Government Affairs, acts as the national focal point for disaster risk management. The NDC has two divisions: Risk Management Division and Community Government Liaison Division. The former is responsible for research, analysis, raising awareness, disaster education, and training; and the latter manages rapid response and operations. During disasters, the NDC advises the National Executive Council, which is the apex disaster management decision-making body. At the provincial level, the Provincial Disaster Committee serves as the focal point for planning and executing all disaster management activities. The Provincial Disaster committees consist of representatives from provincial police offices, health offices, engineering offices, affairs offices, NGOs, and other members. The government formulated the National Disaster Risk Reduction Framework 2017-2030 (NDRRF), aligned with the Sendai Framework for Disaster Risk Reduction (SFDRR).<sup>278</sup>

Risk analysis and assessments, scenario building based on systematic data collection and analysis, and enhancing capacity for

emergency management are some of PNG's disaster management requirements. Disaster management and climate resilience are largely supported by capacity building initiatives to strengthen data management and applications for risk-informed decision-making.

Gender and social challenges stem from socio-economic factors.<sup>279</sup> For example, natural disasters displace communities that are already at-risk due to conflicts between tribes. This frequently results in food shortages. The local authorities also suffer from a lack of capacity to manage displacement. These conditions result in worse disaster scenarios, especially for vulnerable populations, such as the poor, people with disabilities, the elderly, women, and children.



## Palau

Located in the western Pacific Ocean, the Republic of Palau is comprised of 340 coral and volcanic islands divided into 16 states. Palau is vulnerable to natural hazards, including tropical storms, droughts, and tidal surges. It is particularly vulnerable to the impacts of climate change, including severe weather events and rising sea levels. It is threatened by increasing urbanization.<sup>280</sup> About 25 percent of the population is poor.<sup>281</sup>

Typhoon Bopha, which occurred in December 2012, and super Typhoon Haiyan, which occurred in November 2013, are two major disasters that hit the country in the last decade. Typhoon Bopha caused no loss of life, but did extensive damage to coastal houses and infrastructure. Similarly, Typhoon Haiyan devastated homes and infrastructure in Palau's

northern states.<sup>282</sup>

Palau has a three-branch constitutional government in free association with the United States. A president is directly elected and serves a four-year term. The Council of Chiefs, consisting of the highest traditional chiefs from each state, advises the president on traditional laws and customs. Each of Palau's 16 states also elects its own governor and legislature.<sup>283</sup>

Palau has a National Emergency Management Office (NEMO) that ensures implementation of the National Disaster Plan and provides support to national and state agencies. NEMO is also responsible for the coordination and implementation of preparedness, response, and immediate relief arrangements in times of crisis, and it works closely with all stakeholders.<sup>284</sup> Palau formulated the National Disaster Risk Management Framework (NDRMF) in 2010, which was modified in 2016. The NDRMF strengthens national disaster risk management structures and mechanisms in terms of climate change adaptation and the national budget. In 2015, the government adopted the Palau Climate Change Policy for Climate and Disaster Resilient Low Emissions Development 2015 (PCCP).<sup>285</sup>

A village is the social and political unit in Palau, and consists of ten clans. A male leader for each clan is chosen by that clan's ranking female members. A village council is then formed with the clan leaders chosen by the ranking female members of different clans.<sup>286</sup> The Palauan constitution provides for equality between women and men. However, the country is one of only seven countries in the world that is not a signatory to the 1979 Convention on the Elimination of all Forms of Discrimination against Women.<sup>287</sup>



## Samoa

The Independent State of Samoa is an island country with a land area of 2,820 sq. km and a population close to 200,000.<sup>288</sup> 70 percent of the country's urban areas are built in coastal areas.<sup>289</sup> Samoa is vulnerable to earthquakes, tsunamis, volcanic eruptions, floods, cyclones, droughts, forest fires, and biological and environmental hazards due to invasive plant and animal species.

Samoa has a long history of natural disasters. A tsunami in 2009 resulted in 143 deaths, the relocation of multiple villages, the destruction of hundreds of livelihoods, and an estimated USD 124 million in economic losses. A category 4 storm, Cyclone Evan hit Samoa in 2012, resulting in the displacement of 7,500 people, 12 deaths, and approximately USD 211 million in losses and damages. In 2018, Cyclone Gita resulted in widespread flooding.<sup>290, 291</sup>

Samoa is divided into 11 districts and 265 villages. In addition, the country's capital, Apia is composed of another 45 villages.<sup>292</sup> Samoa has a parliamentary system of government. The cabinet, comprising a prime minister and other ministers, is the central decision-making authority of the government. The cabinet answers to the head of state, parliament, and the people. When a natural disaster occurs, the cabinet meets to consider the provision of urgent relief and welfare assistance. Samoa's current National Disaster Management Plan (2017–2020) is supported by the Sendai Framework for Disaster Risk Reduction (SFDRR) and the Framework for Resilient Development in the Pacific (FRDP). Additionally, the 2007 Disaster Management

Act and Samoa's National Disaster Risk Management Action Plan implement guidance for disaster risk monitoring and evaluation.<sup>293</sup>

Samoa established the Disaster Management Office (DMO) in 2007. It collaborates with multiple stakeholders, including sectoral line departments, response agencies, CSOs, NGOs, the private sector, communities, and development partners. These stakeholders implement action plans designed under the National Disaster Risk Management Action Plan (NDRMAP), which focuses on building capacity for disaster management across Samoa's health, education, tourism, agriculture, energy, financial, transport, communication, water, community, environment, commerce and industry, law and justice, and public administration sectors.<sup>294</sup>

Samoa has improved its early warning systems through seismic and weather observation systems, communication systems, and warning-dissemination pathways that use smart technology and public outreach. Furthermore, the country strengthened its community preparedness through capacity building and the development of village disaster preparedness and response plans. The country emphasizes practice drills and trainings for basic skills to support village-wide warning and evacuation protocols, search and rescue, damage assessment, and emergency shelters for displaced villagers.<sup>295</sup>



## Singapore

The Republic of Singapore, located in Southeast Asia, is spread across 716 sq. km, comprising of a main island and 60 smaller islets. Although the sovereign state is classified as a tropical

rainforest region and, as such, does not have true seasons, it does have four monsoon seasons: the Northeast Monsoon, from December to early March; Inter-monsoon Period, from late March to May; Southwest Monsoon, from June to September; and a Second Inter-monsoon Period, from October to November.<sup>296</sup> Singapore is a multicultural, multi-ethnic nation. In 2019, it had a population of over 5 million. Over 76 percent of the population is ethnic Chinese, 15 percent Malay, and more than 7 percent Indian.<sup>297</sup> Singapore is classified as a high-income nation, with a gross national income exceeding USD 54,530 per capita as of 2017.<sup>298</sup> It has maintained an annual average GDP growth rate of 7.7 percent since 1965.<sup>299</sup> In 2019, key drivers of growth included manufacturing at 22 percent of the GDP (especially electronics and high-precision, engineering), services at 26.2 percent; and finance and insurance at 13 percent.<sup>300</sup>

Although Singapore is located within the world's most disaster-prone region, disaster risks are low. Singapore ranked 160th (very low risk) among 180 countries in the 2019 World Risk Report.<sup>301</sup> Singapore has a moderate risk of flooding due to its monsoonal climate and the fact that about 30 percent of the country is less than 5 meters above the sea level. Droughts also pose a risk.<sup>302</sup> Singapore is vulnerable to human-caused events, such as industry-related disasters, epidemics, and pandemics. However, Singapore has recorded no events that have caused significant deaths or damages. The country's adaptive capacity remains high.<sup>303</sup>

Singapore is divided into Northeast, Norwest, Southeast, Southwest, and Central Community Development Councils (CDCs), each consisting of four to six town councils. Based on the Urban Redevelopment Authority's

Master Plans, each CDC is also divided into 55 urban planning subdivisions, which help manage sustainable urban development across Singapore's main island.<sup>304</sup>

Singapore has no comprehensive disaster management law. However, sectoral laws, such as the Fire Safety Act (1986), Environmental Pollution Control Act (2002), and the Civil Defense Act (1986) aim to prevent and manage disasters. The government has put in place a comprehensive national Operation Civil Emergency Plan and has implemented the National Tsunami Response Plan and the Infectious Disease Act. Singapore acted on climate change concerns with the National Climate Change Strategy (2012), Climate Change Awareness Programme (2006), Sustainable Development Blueprint (2009), and the Singapore Green Plan (2012).

Over the years, the government has strengthened the Singapore Civil Defense Force (SCDF) capacity to respond to disasters and emergencies. The SCDF leads disaster response, operating through a three-tiered command structure consisting of four civil defense divisions (CDDs). The CDDs oversee 14 fire stations, providing resources for incident management on the ground. Satellite Fire Posts have also been established for firefighting purposes, enabling faster response times during emergencies.<sup>305</sup> While the country is highly developed, it has wealth inequality and inequities in access to opportunities and services. Because of Singapore's low public social spending, Oxfam ranked the country among the bottom 10 in efforts to reduce inequality.<sup>306</sup> Also, Singapore has no equal pay or non-discrimination laws for working women and no minimum wage, except for cleaners and security guards. According to the Ministry of

Manpower, women in Singapore were paid 9 percent less than men in 2017.<sup>307</sup>



## Solomon Islands

The Solomon Islands is a large archipelago in the western South Pacific Ocean comprised of six main islands (Guadalcanal, Malaita, Makira, Isabel, Choiseul, and New Georgia) and approximately 1,000 smaller islands. With a land area of 28,450 sq. km, the Solomon Islands consists mainly of mountainous, heavily forested, volcanic islands and a few low-lying coral atolls.<sup>308</sup> Approximately 532,617 people live on 347 inhabited islands. The capital city is Honiara.<sup>309</sup>

The Solomon Islands is highly vulnerable to climate change and geological, hydrological, meteorological, and human-caused disasters, including earthquakes, cyclones, tsunamis, floods, and drought. The population is spread across so many islands that the Solomon Islands faces significant coordination, logistic, and communication challenges during emergencies. Some recent disasters include a February 2013 8.0 magnitude earthquake that was followed by a tsunami that resulted in 10 deaths. In response, six UN Office for Humanitarian Affairs (OCHA) operations staff members were deployed in a Humanitarian Action Plan effort. OCHA also performed financial tracking, situation reports, mapping, and other recovery efforts.<sup>310</sup> In 2014, Cyclone Ita caused severe flooding, with 22 confirmed deaths and over 50,000 people affected, mainly in Honiara and other areas of Guadalcanal Province. At the peak of the crisis, approximately 10,000 people were displaced to nearly 30 evacuation centers. The government requested support from the



Pacific Humanitarian Team, which sent over 40 personnel. The UN Central Emergency Response Fund (CERF) provided USD 1.8 million to provide life-saving health, water, sanitation, and hygiene (WASH) activities. The Humanitarian Action Plan funding requirement for immediate response needs was USD 13.6 million. In December 2016, another very strong 8.0 magnitude earthquake occurred undersea, about 62 km west-southwest of Kirakira, Makira Ulawa Province. A tsunami was observed in Makira. According to government estimates, 9,769 people were impacted by the earthquake, 191 houses were destroyed, and 114 houses were damaged. A nine-year-old child died in a collapsed house. A total of 11 schools and a medical clinic were also damaged by the quake. OCHA provided support through coordination and information management.<sup>311,</sup>

<sup>312</sup>

The Solomon Islands is also highly susceptible to climate change: the country's drought index places the northeast islands in a "medium drought" risk category, while the southwest is in a "high-level drought" risk category.<sup>313</sup> A Pacific-wide El Niño-related drought also affects the Solomon Islands, forcing the islands to ration water and receive deliveries to compensate for losses due to drought.<sup>314</sup>

The Solomon Islands are divided into nine provinces governed through a "national cluster system" that provides administration frameworks to committees that represent relevant sectors across the islands.<sup>315</sup> One OCHA staff person assists the National Disaster Management Office (NDMO) with coordination and other key areas of disaster management. OCHA also helps the government build capacity for emergency response efforts, strengthen its Disaster Management Plan, and

establish a country preparedness package.<sup>316</sup>



## Sri Lanka

The Democratic Socialist Republic of Sri Lanka is an island nation in the Indian Ocean, with a land area of approximately 65,000 sq. km. It consists of a mountainous area in the south-central region and a surrounding coastal plain. The climate is wet and warm, and the country has a variety of ecological zones, ranging from tropical forests, highlands, and lowland plains to diverse coastal belts. The population of Sri Lanka is approximately 20.2 million, and consists of people from several ethnic origins, including Sinhalese, Sri Lankan Tamil, Indian Tamil, and Sri Lankan Moor. More than 70 percent of the people live in rural areas.<sup>317</sup>

Sri Lanka is exposed to natural hazards, such as cyclones, monsoonal rain-induced heatwaves,<sup>318</sup> floods, landslides, droughts, tsunamis, coastal erosion, epidemics, pandemics, and pollution events. Between 1990 and 2018, disasters have resulted in losses and damages worth USD 7 billion.<sup>319</sup> There are also significant unrecorded losses because of local disasters that occur regularly. The 2004 Indian Ocean Tsunami caused losses estimated at USD 1 billion. In 2016, rainfall from Cyclone Roanu caused floods in 24 districts across over 1,400 sq. km, resulting in a loss of USD 600 million and impacting half a million people.<sup>320</sup> In 2017, Cyclonic Storm Mora caused floods that resulted in significant damages in 15 southern districts and approximately USD 415.5 million of losses and damages.<sup>321</sup> In addition, in May 2021, a cargo ship caught fire, spilling oil and other pollutants into the sea and causing a significant environmental and humanitarian

disaster (see Box 2 in the main report).<sup>322</sup> Sri Lanka is a multi-party parliamentary democracy. The country has nine provinces divided into 25 districts, each divided into 331 Divisional Secretariats. The administration of Divisional Secretariats is carried out by 14,022 Grama Niladhari (village officers).<sup>323</sup> Sri Lanka has implemented several reforms to strengthen its disaster risk management capabilities. It enacted a Disaster Management Act in 2005 that mandated the establishment of the National Council for Disaster Management (NCDM) and its operative office, the Disaster Management Center (DMC). In 2007, a National Disaster Management Coordination Committee was established. In 2010, Sri Lanka adopted a National Disaster Management Policy as the main governing mechanism for disaster management. The National Disaster Management Plan of 2013-2017 guided a multi-sector approach, mandating that all sub-national levels of administration, NGOs, and grass-roots organizations have operational plans that conformed to with the national plan, thus translating policies into tangible actions. The government put in place a National Adaptation Plan for Climate Change Impacts (2016-2025) to strengthen the mainstreaming of disaster management and climate change adaptation into various sectors, such as agriculture, livestock, fisheries, water, health, human settlements, energy, and tourism. To build on this work, the government also began developing a National Disaster Risk Management Plan for 2018-2030.<sup>324</sup>



## Thailand

The Kingdom of Thailand lies in the heart of Southeast Asia, has a land area of 513,120

sq. km, and a population of approximately 67.1 million.<sup>325</sup> Thailand has four regions: The North, the Central or Chao Phraya River Basin, the Northeast or Korat Plateau, and the South or Southern Peninsula. The North region is mountainous and vulnerable to floods and landslides. The Chao Phraya River Basin consists of fertile land and is at risk of floods and urban inundation. The Korat Plateau is an arid region, vulnerable to drought or to flash floods during the rainy season. The Southern Peninsula, made up of a coastal plain on the east and hills on the west coast, is prone to floods, forest fires, landslides, and tropical storms.<sup>326</sup>

In recent years, Thailand's disaster losses have mainly stemmed from floods and drought. Floods in 2011, triggered by Tropical Storm Nock-ten, impacted the north-eastern and central parts of Thailand, and inundated large sections of Bangkok. The estimated losses were USD 46.5 billion.<sup>327</sup> The floods also contributed to lowering GDP growth from 4 percent to 2.9 percent by the end of the year.<sup>328</sup> Drought during 2015 and 2016 resulted in a loss of USD 2.5 billion, on account of a loss in rice, maize, and sugar cane crops.<sup>329</sup> Similarly, a 2019 drought resulted in the loss of approximately USD 312 million.<sup>330</sup>

Thailand is a constitutional monarchy and governed by a democratic system. His Majesty the King is the head of the state, supported by a prime minister, who is the head of the government and administration. The national government consists of elected representatives from different parties. At the sub-national levels, administration consists of three tiers: central, provincial, and local district. Thailand's disaster management efforts have a strong legal foundation and policy framework that outlines administrative responsibilities.<sup>331</sup>

Disaster risk management is guided by the Disaster Prevention and Mitigation Act of 2005 and its subsequent regulations. The National Committee for Disaster Prevention and Mitigation (NCDPM) is the apex body guiding disaster risk management policy development and decision-making. An inter-ministerial committee provides technical and managerial support for implementation activities. The Department of Disaster Prevention and Mitigation (DDPM) coordinates activities and facilitates capacity-building for emergency response. The DDPM consist of one central office with 16 departments, 18 Disaster Prevention and Mitigation Regional Centers, and offices in 75 provinces. Bangkok has a self-administered disaster risk management unit under the Bangkok Municipal Authority (BMA). The DDPM's training academy provides several capacity building trainings to DDPM and other relevant government officials. To strengthen mainstreaming, Thailand established a coordination mechanism to support unified action from its ministries, identified a DRR focal point in each ministry, and identified provincial agencies that are responsible for coordinating and implementing disaster risk management plans.<sup>332</sup>

The National Disaster Prevention and Mitigation Plan of 2015 lays out strategic objectives and emphasizes four inter-related objectives for inclusive DRR, integrated emergency management, effective recovery and resilience building, and strengthened international cooperation through the adoption of multi-agency and multi-sectoral approaches.<sup>333</sup> As of 2017, all of Thailand's provinces had a Disaster Risk Management plan in place and district and sub-district levels plans were in progress. All sub-national entities, provinces, and local administrative

bodies develop disaster management plans for their jurisdictions. Further, the National Plan also provides guidelines for formulating annual action plans. The National Plan is revised once every five years, so it underwent revision in 2020.<sup>334</sup>

Thailand established a National Disaster Warning Center to provide early warnings for storm surges, heavy rainfalls, and tsunamis; its technology includes digital seismic stations, a tidal gauge network, and a network of Indian Ocean Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys. Thailand also has several hazard maps and has constructed 268 warning towers in 76 provinces across the country.<sup>335</sup>

Thailand focused on legally advancing gender equality through signing the Convention on the Elimination of All Forms of Discrimination Against Women (CEDWA) in 2015.<sup>336</sup> In Thailand, women make up 32 percent of leadership positions in its mid-market companies, higher than the 27 percent global average and the 26 percent Asia-Pacific average.<sup>337</sup> 24 percent of chief executives and managing directors in Thailand are women, more than the worldwide 20 percent and 13 percent in the Asia-Pacific Region.<sup>338</sup> Women have a considerable presence in business, but are underrepresented in judicial, political, and senior administrative jobs. In rural Thailand, many women remain affected by poverty, discrimination, and exploitation. Most women are largely concentrated in insecure and vulnerable jobs in the informal sector, including in agriculture.<sup>339</sup>



## Tonga

The Kingdom of Tonga is a Polynesian country in the Pacific Islands. It consists of 170 volcanic and coral islands that create a land area of 650 sq. km, with a maximum elevation of 1,030 meters. Its current population is 100,651, spread across 36 inhabited islands.<sup>340</sup>

Tonga is vulnerable to extreme rain events, earthquakes, rising sea levels, storm surges, saltwater intrusion, inundation, coral bleaching, and higher intensity tropical cyclones and winds. Tonga has experienced three devastating tropical cyclones in the past eight years. Cyclone Ian in January 2014 resulted in the death of one person and estimated damages and losses of USD 48 million, which amounted to 11 percent of Tonga's GDP. Cyclone Winston in 2016 caused an estimated USD 12 million in agricultural losses. In February 2018, Cyclone Gita affected approximately 80,000 people – about 80 percent of Tonga's population – and resulted in estimated damages and losses of USD 64.1 million, or approximately 37.8 percent of Tonga's annual GDP.<sup>341</sup>

Tonga is the last constitutional monarchy in the Pacific. The Government of Tonga uses a cluster system for coordinating disaster response. The government is supported by UN interagency cooperation and bilateral support from Australia and New Zealand. Disaster coordination activities are led by the government and co-led by a humanitarian agency, supported by daily meetings to share information on needs and gaps and agree on common approaches and tools, including protecting gender diversity and equality in disaster response. During Cyclone Gita, several joint sectoral meetings were held,

bringing together key stakeholders in health; water, sanitation and hygiene; shelter; food security; essential services; protection; gender and inclusion; and response and recovery.<sup>342</sup>

The Government of Tonga recently upgraded the country's communication capacity by installing an 830 km fiber-optic cable to connect Tonga to Fiji via the Southern Cross Cable, which links with Australia, New Zealand, Fiji, Hawaii, and the continental United States. In 2018, fiber-optic cable connectivity was extended from Tongatapu to the islands of Eua, Ha'apai, and Vava'u. However, the cable was accidentally severed in early 2019, an event that underscored the vulnerability of Tonga's communication system. Some of the country's disaster risk management priorities include community preparedness training and mock drills, targeted early warning systems for communities, and disaster preparedness and early-warning system backup plans to ensure enhanced international and domestic coordination.<sup>343</sup> Community empowerment is another priority for Tonga, endorsed by the Anglican Church, the Mainstreaming of Rural Development Innovations Program, Live and Learn, and the University of the South Pacific's Pacific Center for Environment and Sustainable Development.<sup>344</sup>



## Vanuatu

Located in the South Pacific Ocean, the Republic of Vanuatu is an archipelago consisting of 13 principal islands and approximately 80 islands in total, making up 12,199 sq. km. 65 of the islands are inhabited by approximately 264,400 people, 74 percent of whom live in rural areas.<sup>345</sup> Most islands are mountainous or

covered by tropical forests. Agricultural areas are primarily filled with coconut plantations and other crops, such as maize, roots, tubers, and vegetables. The climate of Vanuatu is tropical; the north is hot, wet, and humid, whereas the south is warm and less humid.<sup>346</sup> Subsistence agriculture is the main economic sector in the country. The agricultural sector accounts for more than 75 percent of exports; the most important agricultural product is copra, the dried meat of a coconut used to extract coconut oil, which can then be used for fuel. Beef and timber have also become important exports. Coconut, cocoa, and squash are the main cash crops. Fishing, offshore financial services, and tourism are other main economic sectors. Tax revenues primarily come from import duties.<sup>347</sup>

Vanuatu is prone to cyclones, volcanic eruptions, floods, earthquakes, tsunamis, droughts, and rising sea levels. It is considered one of the most at-risk countries to natural disasters in the world.<sup>348</sup> Between 1980 and 2014, Vanuatu was hit by 16 tropical cyclones, resulting in 79 deaths, affecting 290,000 people, and resulting in economic losses and damages of USD 205 million. During the same period, eight earthquakes occurred, killing 12 people and impacting over 15,000 others. The country also witnessed one tsunami during the same period, in which 100 people died; two floods, impacting 4,000 people; and five volcanic eruptions, impacting 19,000 people.<sup>349</sup> In March 2014, Cyclone Lusi resulted in 10 deaths, damaged 117 houses, and displaced 149 people. In 2015, Cyclone Pam affected approximately 166,000 people, which is more than 50 percent of the population. It killed 15 people and damaged 90 percent of the shelters on Erromango Island and 50 percent of the shelters on Tanna Island. Disasters place a significant economic stress on the government

and households.<sup>350</sup>

Vanuatu has a unicameral form of parliament with 52 members who are elected by popular vote once every four years. The leader of the main party in parliament is usually elected as the prime minister and heads the government. A president, the head of state, is chosen every five years jointly by the parliament and the presidents of the six provincial governments. The Government of Vanuatu recently enacted a law on disaster management that shifts focus from relief and response to a holistic disaster risk management approach, including prevention, preparedness, and mitigation. Government line ministries act in clustered lead roles during emergencies and Vanuatu Humanitarian Team (VHT) members act as co-leads. The VHT is recognized as a key coordination mechanism in Vanuatu and is included in government plans. The VHT, a collaborative effort of Vanuatu-based NGOs, the Red Cross, the United Nations, and government agencies, was established to support the National Disaster Management Office (NDMO).<sup>351</sup>



## Annexure 6

Indicative Lists of Indian Search, Rescue and Disaster Management Equipment and Suppliers

This annexure presents abbreviated model lists of equipment inventories and supplier contacts needed for the effective management of a variety of disasters – equipment and suppliers that India can mobilize in India and, in some cases, other countries. Since equipment and suppliers necessarily change over time, these lists are indicative rather than permanent.

India's National Disaster Response Force (NDRF) mobilizes its stocks of search-and-rescue equipment and its trained search-and-rescue canine squads for disasters such as earthquakes; floods; medical first response, high-altitude rescue; and nuclear, biological and chemical emergencies. The NDRF also stocks supportive equipment, such as communications gear, flood lights, boats, rafts, safety equipment, and tents. In addition, each Indian State Disaster Response Force (SDRF) provides open-source specifications for equipment and information about vendors that it has evaluated for the attention of relevant procurement officers.

The NDRF website provides complete lists of current equipment stocks categorized by use: <http://ndrf.gov.in/equipment> (Table A.6.1) and detailed dropdown lists of SDRF equipment, purchase dates, specifications, and supplier names and addresses: <http://ndrf.gov.in/equipment/details-cssr-high-value-items> (Table A.6.2)

<b>Collapsed Structure Search and Rescue (CSSR)</b>	<b>Medical First Response (MFR)</b>	<b>Water Rescue (WR)</b>	<b>Personal Protective Equipment (PPE)</b>
Portable kerosene 2500W generator	Oxygen concentrator	Synthetic life jackets	PVC suits
Electric 2300W 4500-5500 mm angle cutter	Nebulizer	10-seat inflatable motor rescue boats	Fluorescent safety vests
Diamond-tipped 300 mm diameter angle-cutter blade	Portable anesthesia apparatus kit	Life buoys	Heavy-duty work gloves
Composite 300 mm diameter angle-cutter blade network	Semi-automatic blood analyzer	Inflatable boat with outboard motor	Face shields

M/S Birla Power Solution Ltd., 257 Okhla Industrial Estate, Phase III, New Delhi
M/S Hilti India Pvt Ltd, F-90/4, Okhla Industrial Area, Ph-I, New Delhi 110020
M/S Machinery Marketing Associates Pvt Ltd. 2e/24, Jhandewalan Extension, New Delhi 55
M/S Bosch Ltd., 85 A Dishamukh, Panchkuian Road, New Delhi 01
M/S Brij Basi Fire Safety Systems Pvt Ltd, A-28, Hauz Khas, New Delhi 16



<b>Table A.7.1 Indian DRR Capabilities and Suggested U.S. Partners</b>					
<b>No.</b>	<b>India DRR Capabilities</b>	<b>Suggested Indian Lead Agency(s)</b>	<b>Suggested Indian Support Agency(s)</b>	<b>Suggested U.S. Technical Support Partners</b>	<b>Suggested DRR Supply Actions</b>
1	Policy Formulation Disaster Risk Management Planning Recovery Planning	NDMA National Disaster Management Division, Ministry of Home Affairs	SDMAs SEEDS UNNATI People in Centre TISS	FEMA Emergency Management Institute	Institutional capacity building  Designing and develop disaster management policy, institutional frameworks, and plan frameworks  Providing planning capacity development and training
2	Disaster Early Warning Systems	IMD	NCMRWF	NOAA	Institutional capacity building  Human resource training Providing weather advisories  Setting up Early Warning Systems  Developing early warning protocols  Modelling weather and developing forecasts
		ISRO NRSC	N/A	NASA	Database management training  Satellite imagery analysis training  Satellite-based communication systems training

<b>Table A.7.1 Indian DRR Capabilities and Suggested U.S. Partners</b>					
<b>No.</b>	<b>India DRR Capabilities</b>	<b>Suggested Indian Lead Agency(s)</b>	<b>Suggested Indian Support Agency(s)</b>	<b>Suggested U.S. Technical Support Partners</b>	<b>Suggested DRR Supply Actions</b>
3	Search and Rescue	NDRF	NDRF Academy National Industrial Security Academy (NISA) Fire Training College Civil Defense College Nehru Mountaineering Institute	Miami-Dade County Johns Hopkins University School of Medicine	Post-disaster operations support Training Providing necessary equipment Holding drills and exercises
4	Incident Command System (Incident Response System)	Lal Bahadur Shastri National Academy for Administration (LBSNAA) NIDM NDMA	YASHADA Individual Trainers	USFS International Programs	Orienting policy makers Adapting system and curriculum Preparing guidelines Training in good practices



<b>Table A.7.1 Indian DRR Capabilities and Suggested U.S. Partners</b>					
<b>No.</b>	<b>India DRR Capabilities</b>	<b>Suggested Indian Lead Agency(s)</b>	<b>Suggested Indian Support Agency(s)</b>	<b>Suggested US Technical Support Partners</b>	<b>Suggested DRR Supply Actions</b>
5	Disaster Risk Management Training and Capacity Building	NIDM	TISS SEEDS Geo Hazards Society Other NGOs TBD BIMTPC Specialized IITs Academic institutions TBD	Emergency	Training for hazard-specific mitigation and management Assessing hazards and risk Preparing hazard maps and atlas Training for community-based DRM Planning community-based DRM Mainstreaming gender and social inclusion Assessing damage and losses Mitigating non-structural risk Assessing landslide risk Planning landslide-risk mitigation Multiagency coordination and simulation exercises
6	Joint Simulation Exercises	Disaster Management Division (DMD), Ministry of Home Affairs NDMA NDRF	NIDM National Industrial Security Academy (NISA) NDRF Academy	Emergency	Organizing joint multi-country simulation exercises, such as the South Asia Annual Disaster Management Exercise (SAADMEx)

<b>Table A.7.1 Indian DRR Capabilities and Suggested U.S. Partners</b>					
<b>No.</b>	<b>India DRR Capabilities</b>	<b>Suggested Indian Lead Agency(s)</b>	<b>Suggested Indian Support Agency(s)</b>	<b>Suggested US Technical Support Partners</b>	<b>Suggested DRR Supply Actions</b>
7	Forest Fire Management	NDRF	Forest Research Institute (FRI) National Fire College	USFS International Programs	Training firefighters  Developing training modules, tools and techniques for fire management  Training on the use of Incident Command System for forest fire management  Training on forest fire mitigation practices
8	Emergency Operation Center (EOC) Design and Development	Disaster Management Division (DMD), Ministry of Home Affairs	NDMA NIDM Andhra Pradesh State Disaster Management Authority Bihar State Disaster Management Authority Command and Control Centers in Vishakhapatnam, Chennai National Informatics Centre Emergency Management Research Institute (EMRI) HCL Foundation and others	USFS International Programs FEMA	Designing and developing an assessment workshop  Organizing EOC workshops and trainings Training for human resource development

<b>Table A.7.1 Indian DRR Capabilities and Suggested U.S. Partners</b>					
<b>No.</b>	<b>India DRR Capabilities</b>	<b>Suggested Indian Lead Agency(s)</b>	<b>Suggested Indian Support Agency(s)</b>	<b>Suggested US Technical Support Partners</b>	<b>Suggested DRR Supply Actions</b>
9	Resilient Infrastructure Development	CDRI NDMA	Specialized IITs ISRO NRSC	U.S. Geological Survey National Earthquake Information Centre, Boulder Geo Hazards International	Providing risk assessment Providing tools and techniques for project design, monitoring and audits Training and capacity building
10	Psychosocial and Mental Health Care Services	NIMHANS	NGOs such as CARE and ActionAid	N/A	Assessing psychosocial needs Preparing modules Training of trainers Providing monitoring tools and techniques
11	Gender Equity and Social Inclusion	NIDM	Tata Institute of Social Sciences NGOs such as CARE, SEEDS, ActionAid, and UNNATI	N/A	Strengthening the participation of women and migrants in disaster management planning, training, and capacity building initiatives

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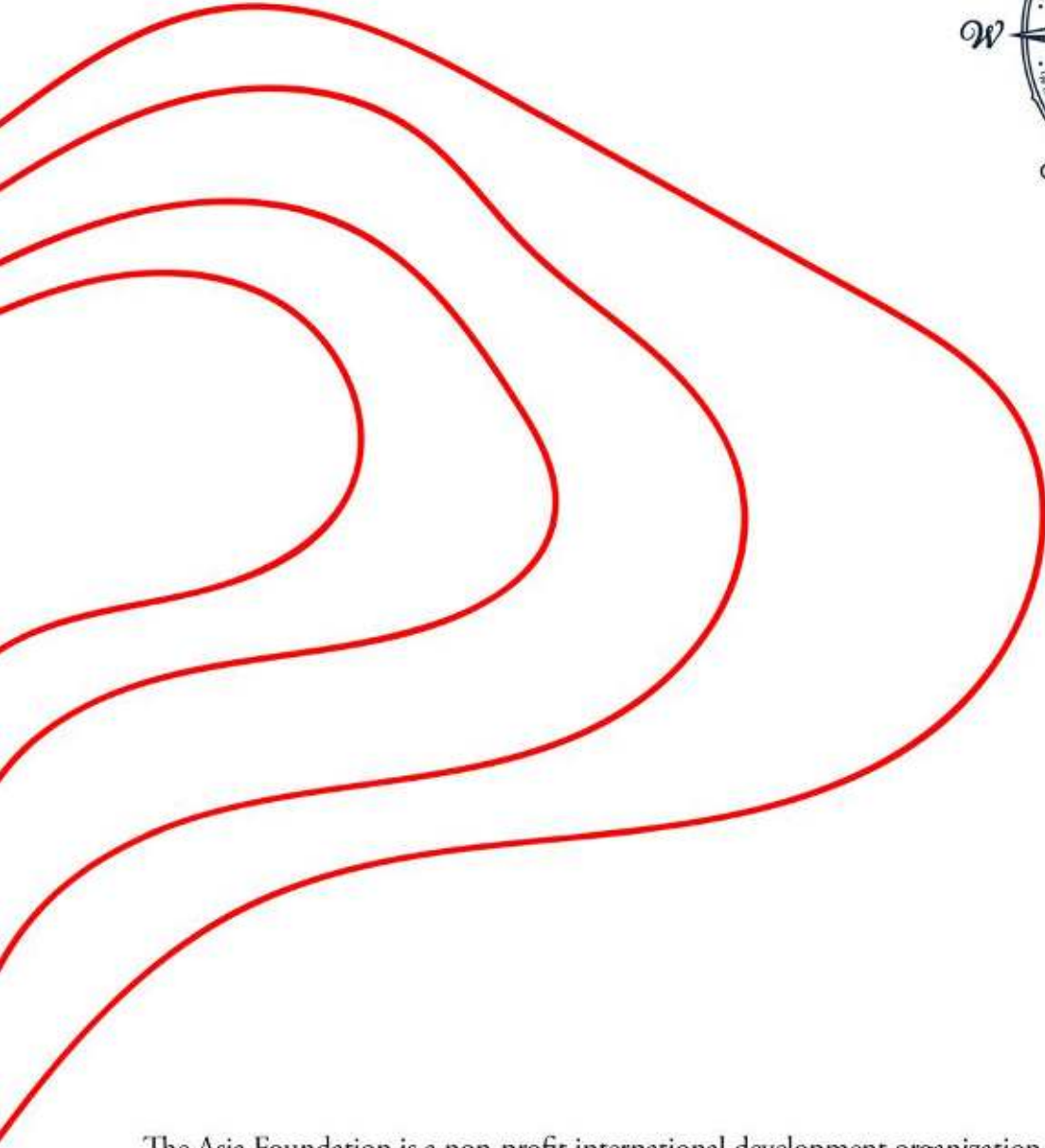
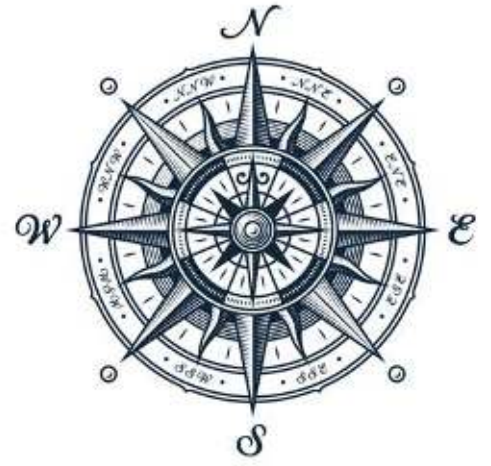
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The Asia Foundation is a non-profit international development organization committed to improving lives across a dynamic and developing Asia. Informed by six decades of experience and deep local expertise, its work across the region addresses five overarching goals – strengthen governance, empower women, expand economic opportunity, increase environmental resilience, and promote international cooperation.

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