### **RURAL DEVELOPMENT REPORT 2017**

## IMPACTS OF CLIMATE CHANGE ON RURAL LIVELIHOODS

IN CIRDAP MEMBER COUNTRIES



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**Edited by** Tevita G. Boseiwaqa Taginavulau M.H. Kawsar Rudro



CENTRE ON INTEGRATED RURAL DEVELOPMENT FOR ASIA AND THE PACIFIC

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CENTRE ON INTEGRATED RURAL DEVELOPMENT FOR ASIA AND THE PACIFIC

**CIRDAP Study Series No. 223** 

**Rural Development Report 2017** 

## Impacts of Climate Change on Rural Livelihoods in CIRDAP Member Countries

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## **Preface**

The Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) is an Intergovernmental Organization mandated to promote Integrated Rural Development (IRD) in Asia-Pacific through regional cooperation. CIRDAP has 15-member countries namely Afghanistan, Bangladesh (Host State), Fiji, India, Indonesia, Iran, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

The Centre's goal is to meet the felt needs of the developing states and act as a servicing institution for promoting Integrated Rural Development (IRD) in the region. CIRDAP promotes regional cooperation, operating through designated contact ministries and link institutions in member-states and plays a supplementary and reinforcing role in supporting and furthering the effectiveness of IRD programmes in Asia and the Pacific region.

Capturing emerging challenges in rural development, CIRDAP undertakes researches to identify gaps in rural development policies, practices and challenges amongst member countries. The Rural Development Report 2017, Impacts of Climate Change on Rural Livelihoods in CIRDAP Member Countries, the fourteenth in the series of CIRDAP's biannual reports, deals with the impact of Climate Change and provides the current status and future perspectives in connection with rural livelihood in Asia and the Pacific. The Centre prepares this publication as part of its efforts to share knowledge and experience, promote regional cooperation, and support and further the effectiveness of IRD programmes in the Asia-Pacific region.

### Foreword

The impacts of climate Change on the ecology and socio-economic spheres of people across the world is evident and it is a universal phenomenon that requires a global approach. This is reflected in the Sustainable Development Goals (SDGs) that highlight the need to step up efforts to address climate change in an integrated and multi-sectoral approach.

The global climate is changing and its impacts associated with the accumulation of greenhouse gases in the atmosphere from human activities, changes in mean temperature, shifts in seasons and an increasing intensity of extreme weather events are already occurring and is predicted to worsen in the future. Millions of people, particularly those in developing countries, are facing shortages of water and food and greater risks to health. Therefore, it is critically important to address these climate change challenges especially in many Asia-Pacific countries, which are highly vulnerable.

The Asia-Pacific region countries are considered especially vulnerable to the impacts of climate change due to geographical locations, huge and growing population, low-lying coastline and economy which is closely tied to natural resource base and high climate-sensitive sectors – notably crops, livestock, fisheries and forestry. For example, more than half of the population of CIRDAP member countries live in rural areas and mostly depend on climate sensitive livelihood sectors.

The range of sudden and slow onset events like changing rainfall, rising sea levels, coastal erosion, floods, salinity intrusion and droughts are major factors that affect rural livelihoods. There is a need to develop a holistic mechanism to mitigate the negative effects of climate change.

Most CIRDAP member countries have responded to the climate change challenges by formulating climate change strategy and action plans and have policies on disaster management and rural development. Number of institutions and funds have also been established to support policy implementation. Despite such significant initiatives and policy frameworks, CMCs are still facing challenges on the effects of climate change which need to be overcome for climate resilience and better livelihood.

As the climate change affects the people across the world, and as policies and capacity of countries to address the challenges are different, it is important that effective policies and good practices are shared so that all countries can strengthen their efforts to address the challenges of climate change.

This report therefore explores the cause-effect relationship between climate change and rural livelihood through analysing relevant data and policies of CIRDAP member countries. I hope this report will be useful for the policy makers, researchers, development practitioners and other stakeholders working for rural development in the Asia-Pacific region and beyond.

Dhaka, August 2018

Tevita G. Boseiwaqa Taginavulau Director General CIRDAP

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The Report has drawn extensively from the information and reports prepared by many international and regional organisations and research institutions. The preliminary ground-work of the report was done by Ms. Eva Benita A. Tuzon, Former Director Pilot Projects Division, Ms. Naziba Rashid, Intern, Pilot Project and Mr. Shafiqur Rahman, National Research Officer. Later, the report was shaped by the Editorial Team consisting of Mr. George Chandra Babu, Program Officer, Research, Mr. Shafiqur Rahman, National Officer, Research, Mr. Zakaria, Programme Coordinator, Mr. Nazib Neaz, Executive Officer, Ms. Nishat Farzana, former Assistant Programme Officer, Pilot Project, and Ms. Rafia Islam, Executive Assistant.

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## **Abbreviations and Acronyms**

ACAPS	:	Assessment Capacities Project (ACAPS)
ACPC	:	Agricultural Credit Policy Council
ADB	:	Asian Development Bank
ADP	:	Annual Development Plan
AF	:	Adaptation Fund
AFB	:	Adaptation Fund Board
AFMA	:	The Agriculture and Fisheries modernization Act
ALGAS	:	Asia Least Cost Greenhouse Gas Abatement Strategy
AMDP	:	Accelerated Mahaweli Development Programme
ANGOC	:	Asian NGO Coalition
ASEAN	:	Association of South East Asian Nations
AWD	:	Alternate Wet and Dry (a method of irrigation)
BARC	:	Bangladesh Agricultural Research Council
BARD	:	Bangladesh Academy for Rural Development
BARI	:	Bangladesh Agriculture Research Institute
BCCRF	:	Bangladesh Climate Change Resilience Fund
BCCSAP	:	Bangladesh Climate Change Strategy and Action Plan
BCCTF	:	Bangladesh Climate Change Trust Fund
BDRCS	:	Bangladesh Red Crescent Society
BFRI	:	Bangladesh Forest Research Institute
BIMSTEC	:	Bay of Bengal Initiatives for Multi Sectoral and Technical Cooperation
BMD	:	Bangladesh Meteorological Department
BRRI	:	Bangladesh Rice Research Institute
BWDB	:	Bangladesh Water Development Board
CARP	:	Comprehensive Agrarian Reform Program
CBA	:	Community Based Adaptation
CBDM	:	Community Based Disaster Management.
CBO	:	Community Based Organization
CC	:	Climate Change
CCA	:	Climate Change Adaptation
CCC	:	Climate Change Cell
CCGAP	:	Gender Action Plan on Climate Change
CCM	:	CIRDAP Contact Ministry
CDCs	÷	Community Development Councils
CDI	÷	Community-based Development Initiatives
	÷	Clean Development Mechanism
CDIVIP	÷	Comprenensive Disaster Management Programme
	÷	Centre for Disaster preparedness.
	:	Cantro for Environment and Congraphic Information Services
	:	Compact Elyprocent Lamps
	:	Contra on Integrated Pural Development for Asia and the Pacific
CIRDAF	:	CIPDAP Link Institutions
CMCs	:	CIRDAP Member Countries
CIVICS	:	Conference of Parties (to UNECCC)
CPP	:	Cyclone Preparedness Programme
CRA	:	Community Risk Assessment
CRI	:	Climate Risk Index
CSOs	:	Civil Society Organisations
DA	÷	Designated Authority (for Adaptation Fund)
DBSA	÷	Digital ISD in Action
DDAs	÷	District Development Assembly
DDM	:	Department of Disaster Management (erstwhile DMB)
DDP	:	Desert Development Programme
DER	:	Disaster and Emergency Response
DeSHARI	:	Developing & Strengthening Humanitarian Assistance and Risk Reduction
		Initiatives

DFID	:	Department for International Development
DG	:	Director General
Dipecho	:	Disaster Preparedness, The European Commissions' Humanitarian Office
DM	:	Disaster Management
DMB	:	Disaster Management Bureau
DMC	:	Disaster Management Committee
DNA	:	Designated National Authority (for Clean Development Mechanism)
DOE	:	Department of Environment
DOF	:	Department of Fisheries
DOFo	:	Department of Forest
DORR	:	Directorate of Relief and Rehabilitation
DPAP	:	Drought Prone Areas Programme
DPHE	:	Department of Public Health Engineering
DRR	:	Disaster Risk Reduction
DWA	÷	Department of Women Affairs
EC	÷	Executive Committee
FCB	÷	Emergency Capacity Building
FCO	÷	Economic Cooperation Organization
FF7	:	Exclusive Economic Zone
ENISO	:	El Nino Southern Oscillation
FP7	:	Export Processing Zone
FU	:	European Union
EW/S	:	Early Warning System
FAO	:	Eood and Agricultural Organization
FCI	:	Food and Agneticated organization
FFWC	:	Flood Enrecasting and Warning Centre
GB	:	Grameen Bank
GBM	:	Ganges-Brahmanutra-Meghna
GC	:	Governing Council
GCF	:	Green Climate Fund
GCM	:	Global Circulation Model
GDP	:	Gross Domestic Product
GIS	:	Geographic Information System
GIZ	:	German Development Cooperation
60	:	Covernment Organisation
GOB	:	Government of Bangladesh
GOD	:	Geological Survey of Bangladesh
020	:	Human Development Index
	:	Hyogo Framework of Action
HOs	:	Headquarters
	:	International Centre for Integrated Mountain Development
	:	Information and Communication Technology
	:	International Development Association
	:	International Development Research Centre
	:	International Eurod for Agricultural Development
	:	International Labour Organization
	:	Indusive Community Positionse for Sust Disaster Pick Management
	:	Inclusive Community Residence for Sust. Disaster Risk Management
INCO	:	International Non-governmental Organization
	:	
	:	International Organizations for Migration
	:	Inter-governmental Papel on Climate Change
	:	Integrated Pural Development
	:	Integrated Rural Development Programme
	:	Information Technology
	:	International Union of Concernation of Nature
	:	International Onion of Conservation of Nature
	:	Institute of Water and Flood Management
	:	Institute of water and Flood Wanagement
NCA	:	Japan memalional Cooperation Agency Krisbak Samabay Samiti
	:	NISHAK JahldUdy Jahlill Livesteck and Eicheries Development Pank
	:	Livestock and Fishenes Development Dank
	•	Local Non-Government Organizations
IVIQE	•	womoning and Evaluation

MADB :	Myanmar Agricultural Development Bank
MDGs :	Millennium Development Goals
MFI :	Micro-Finance Institutions
MODMR :	Ministry of Disaster Management & Relief
MOEF :	Ministry of Environment and Forest
MOFDM :	Ministry of Food and Disaster Management
MOHA	Ministry of Home Affairs
MOHEW	Ministry of Health and Family Welfare
MOLE	Ministry of Livestock and Eisheries
MOP ·	Ministry of Planning
MOWCA ·	Ministry of Momen and Children Affairs
MOWR ·	Ministry of Water Resources
NAM_CSSTC	Non-Aligned Movement - Centre for South-South Technical Cooperation
NAD ·	National Adaptation Plan
	National Adaptation Programme of Action
NAFA .	Non Covernmental Organization
	Non-Governmental Organization.
INREGP :	National Rural Employment Rural Guarantee Programme
	Nusa Tinggara Timur The United Netions Office for the Coordination of Unregisterion Affairs
OCHA :	The United Nations Office for the Coordination of Humanitarian Affairs
PA :	Poverty Alleviation
PDMF :	Philippines Disaster Management Forum.
PRSP :	Poverty Reduction Strategy Paper
RD :	Rural Development
SAARC :	South Asian Association for Regional Cooperation
SDC :	Swiss Development Corporation
SDG :	Sustainable Development Goals
SEEDS :	Sarvodaya Economic Enterprises Development Services
SEWA :	Self Employed Women's Association
SFS :	Small-holder Farming Sector
SHGs :	Self-Help Groups
SIDBI :	Small Industries Development Bank of India
SLR :	Sea Level Rise
SOCSEA :	Sub-Regional Office of CIRDAP for South East Asia
TC :	Technical Committee
UN :	United Nations
UNCRD :	The United Nations Center for Regional Development.
UNCT :	United Nations Country Team
UNDP :	United Nations Development Programme
UNESCO :	United Nations Educational, Scientific and Cultural Organizations.
UNICEF :	United Nations Children's Fund
USAID :	United States Agency for International Development
USD :	United States Dollar
VPA :	Vietnam people's Army
WB :	World Bank.
WFP :	World Food Programmes
WMO ·	World Meteorological Organization
WTO .	World Trade Organization
WWF :	World Wildlife Fund



# EXECUTIVE SUMMARY

### **Executive Summary**

The impacts of climate change are more evident in the countries of the Asia-Pacific region, which is characterised by low economic growth and high level of poverty. In particular, the rural livelihoods of the CIRDAP Member Countries (CMCs) are affected mostly since rural economy is significantly linked to climate change. In the absence of substantial mitigation and adaptation measures, human-induced climate change is predicted to amplify these risks and undermine the sustainability of development progress.

With frequent occurrence of natural disasters including tropical storms, flooding, landslides affecting millions of people every year, it is evident that climate change has serious implications in rural livelihood. It has been a major driver of change in rural areas resulting in urbanization, migration, technological change and globalization, which is making rural development a more complicated for policy makers.

Among many others, climate change is a major driver of changes in rural areas resulting in urbanization, migration, technological change and globalization, which is making rural development a more complicated for policy makers.

Given the context, this report explored the underlying dynamics of cause-effect relationship between climate change and rural livelihoods focusing on rural development in CMCs. The report is the outcome of a study which tried to identify the nature and extent of climate change in CMCs; determine the impacts of climate change in rural livelihoods in CMCs; and analyse relevant policies adopted by CMCs to address rural livelihood and climate induced disasters.

It is found that the CMCs are highly vulnerable to damaging impact of climate change mainly due to their geographic position. Climate change has implications on the structural shifts in the economy resulting into changing priorities in rural livelihood options.

There has been a significant structural shift in the economy towards the urban sector, and within the urban sector, towards the manufacturing and service sectors, especially in the informal sector from the rural agriculture sector. In the rural sector, the shift from agriculture sector has been basically towards the non-farm activities. The rural non-farm sector, especially rural industry, is not only associated with agriculture, but also has strong ties with urban sector.

It is also evident the distinction between rural and urban is faded. Migration and changes in livelihood as a coping mechanism of climate change can be observed at national and regional levels.

The rural development, disaster management and climate change policies varies in CMCs. Presently there is an inadequate level of policy intervention in most of the CMCs against the negative impact of climate change.

Existing policies seem to have attended only in a limited fashion to the role of local institutions in designing, supporting, and implementing adaptation. There is a need of better coordination between policies and measures adopted by institutions and decision makers at the national level, and their counterparts at the local level. Many countries in the region still lack capacity to reduce risk and respond to negative effects of climate change. As a result, it hampers agricultural production as well as other rural livelihood alternatives.

Climate change mitigation and adaptation should be supported by initiatives that are built on the multi-tiered evidences based on transboundary socioeconomic and environmental 'hotspots', hence, the case for collective action on adaptation requires long-term planning and decision making considering a broad range of climate and socioeconomic scenarios. As climate change and its impacts become more evident, it is important to integrate concerns for managing risks faced by households and communities with earlier concerns for growth, poverty alleviation, equity, and sustainability.

Similarly, there is an emergent need for adaptation to the climate change through the sustainable development practices which can include adapting agricultural practices to changes in temperature and precipitation; safeguarding forest areas, adapting coastal zone management etc. Moreover, development policies and practices are also need to reflect gender, disability, and other social issues of merginalisation as they have a strong influence on natural resources management in terms of difference in use, right and benefits.

Based on the findings of the study, the following ten key policy recommendations are suggested for the policy makers and other stakeholders:

Climate change is likely to have a negative impact on rural livelihoods and agriculture in different ways. Rural people are highly dependent on natural resources and ecosystem services and highly vulnerable to climate change including its effects on water availability, rainfall, the hydrological regime, natural disasters, and extreme weather events.

Rural development strategies can no longer be perceived in the same economic context as in the 1960s and 1970s. The rural development and livelihood strategies of the future have to be understood as a continuum of urbanized and globalised systems. Traditional behaviour and values will be mixed with completely new interpretations of the past.

Integration of rural economies in the national economy and globalisation are increasing the inter-penetration between rural and urban. This means that rural policies have to be justified not only by their impact in rural areas, but by their contribution to national wellbeing. Material aspects (food production in its widest sense), ecosystem services (water, biodiversity, clean air, recreational capacities), and the contribution of rural areas to the mitigation of climate change have to be validated in the national context.

The active commitment and leadership of local government is important for the implementation of any local disaster risk reduction measures to deal with different stakeholders and multiple layers of government. In many cases, a comprehensive disaster risk reduction measures takes long time to fully implement, and the leadership of the local government is particularly crucial to ensure the political momentum and support among external stakeholders throughout the process.

As the most immediate public service provider and interface with citizens, local governments are naturally situated in the best position to raise citizens' awareness of disaster risks and to listen to their concerns. Even the most sophisticated national disaster risk reduction measures (such as early warning systems) may fail, if communities are not properly informed and engaged. Likewise community preparedness measures are sometimes as effective as costly public investments in reducing casualties from disasters, and local government should play a central role in community and training.

2

1

The government should identify beforehand vulnerable areas and nature of disasters through research and studies. Relief and rehabilitation commodities should be stored according to the need or individual disaster prone areas. In this regard tentative need assessment for individual areas should be made. Essential supply viz., food. shelter. water. Medicine etc. need to be timely ensured by government agencies.

5

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Since the immediate help comes from the community, the community organizations should be equipped with knowledge and skill regarding disaster preparedness and management. In particular people should be made familiar with the warning system of disaster.

Regular documentation on national hazards is to be done by each country. Documentation and research outputs need to be circulated among the CMCs through CIRDAP.

Knowledge and information sharing, including early warning of natural disasters and climatic events are essential to build the resilience of local livelihoods and communities to climate change.

7 Meteorological department in each country should be suitably equipped with modern technologies to provide adequate forecast and warning about disasters. Exchange of technical information on weather and disasters among the CIRDAP member countries needs to be strengthened.

8 Each CIRDAP member country should develop capability of concerned government officials at various levels for disaster preparedness and management by organising periodical training courses and workshops. The existing institutional facilities and resource persons in some of the CMCs can be utilized by all member countries for human resource development in the field of disaster management.

9 Monitoring and evaluation of relief and rehabilitation activities are very much essential for each country for which proper planning should be made beforehand.

10

The issue of climate change cannot be addressed in solace, but, has to be integrated with the overall development plan. The challenges of climate change can be managed only if the identified limitations such as lack of awareness and capacity on climate change, absence of proper institutional coordination and management, erroneous priority setting and absence of appropriate implementation, monitoring and evaluation mechanism. These issues are need to be addressed to ensure sustainable and inclusive rural development in CIRDAP member countries.



# INTRODUCTION

## Introduction

Global climate has been changing throughout the history. Starting from the Pre-Cambrian Period, the atmosphere at the time of its origin, the change in climate took various directions and reached its present state. Essentially the main factor for temperature rise is the human activities which lead to the emission of a massive amount of carbon dioxide to the atmosphere.

With the advancement of science and technology, it has been possible to explore the impacts of climate change, not only on humanity but on all life forms existing on Earth. Over the past couple of centuries, temperature of the planet has increased dramatically resulting in floods, droughts, intense rainfall, heat waves, soil infertility, sea level rising and many other natural adversities.

The impact of climate change is more evident in the countries of the Asia-Pacific region, which is characterised by low economic growth, and high levels of poverty. In particular, the rural livelihoods of the CIRDAP Member Countries (CMCs) are affected since rural economy is significantly linked to climate change. In the absence of substantial mitigation and adaptation measures, human-induced climate change is predicted to amplify these risks and undermine the sustainability of development progress.

The Sustainable Development Goals (SDGs) has acknowledged the issue of climate change as one of the priority areas. Climate change has also a pivotal role in the attainment of other development agenda. In this circumstance, the effects of climate change have been reflected in the CMCs where 57% of total population live in rural areas.

### 1.1 Background and Relevance of the Study

The vulnerability of most rural people's livelihoods is commonly influenced by external environment, which is difficult to control. Climate change, currently being a major global concern, has huge influence on the unpredictable frequency and intensity of adverse natural phenomena across the globe.

The negative impacts of climate changes largely resulting in decrease of productivity and income, thus, directly affecting the livelihood and wellbeing of the rural people. Hence, climate change is indisputably one of the major factors that pulls back the rural development, particularly in the Asia-Pacific region.

Climate change has huge impacts on agriculture and food security that leads to many challenges related to rural livelihoods. For instance, the shortage of land areas for agriculture can be linked to the increased aridity and associated salinity, groundwater depletion and the rise of sea level. These phenomena changes the nature and scopes of livelihoods generally and gradually.

The rate of sea level rising has sped up. According to a research conducted by the University of Yale (Jones, 2013), it has been observed that the rate of sea level rising has nearly doubled since 1993 from 1.7 mm per year to 3.2 mm per year. Not only the rise of sea level, the constant increase of salinity in water has also become a major concern.

# 1 Chapter

Unexpected changes in the seawater salinity has alarmed the scientists regarding its potential impact on ocean current. Although ocean salinity remained stable for billions of years, scientists have observed that the salinity of seawater has been changing over the course of the last five decades. This change is capable of accelerating the water cycle which can cause extreme weather events like flood or drought.

All of these factors have direct or indirect impacts on the life forms of planet earth. As the earth is getting warmer day by day, the threat to seize of existing life forms is also becoming prominent. The rural and coastal areas are more vulnerable to disasters because of their geographic locations and lack of access to safety measures and services. The government investment in rural areas compared to urban areas is visibly negligible. Proper policies and implementations are urgent necessities to fill out this gap (Mathews: 2012).

### 1.2 Objectives

The principal objective of the study is to explore the underlying dynamics of cause-effect relationship between climate change and rural livelihoods focusing on rural development in CMCs. In addition, another objective of the study is to examine the efficacy of the policy and other adopted measures in response to the needs and based on the lessons and findings of the study, identifying important issues to be considered in future policy making.

The specific objectives of the study are:

- To identify the nature and extent of climate change in CMCs
- To determine the impacts of climate change in rural livelihoods in CMCs
- To analyse relevant policies adopted by CMCs to address rural livelihood and climate induced disasters

### 1.3 Methodology

In this research, relevant country specific data were collected in order to identify the socio-economic status of the study area. Key Informant Interviews (KII) and Focus Group Discussion (FGD) have been used as research tools. Additionally, secondary literature such as various reports and articles were reviewed. A panel of experts was formed to review the collected data.

Qualitative Comparative Analysis (QCA) has been followed in analysis of the collected data. Key policy issues have been reviewed to draw the country specific and comparative regional policy landscape.

### 1.4 Organisation of the Report

The Report is structured in seven chapters. After the brief introduction in Chapter 1, the Chapter 2 gives an overview on the CIRDAP member countries and emphasises on their socio-economic, geographic and climatic data.

Chapter 3 deals with the changes in climate that affect the natural order and climate change induced hazards followed by Chapter 4 that gives a thorough idea about the impacts of climate change and natural disaster on the livelihood of rural people. It touches the key areas affected by adverse climate such as agriculture, health, economy, education, local governance, food security and so on.

Chapter 5 draws a picture on the transition of the rural livelihood from time to time and how the boundary between rural and urban lifestyles are gradually fading away due to advancement of technology and globalisation, while Chapter 6 analyses the relevant key policies existing in CMCs to mitigate the natural hazards/disasters and non-climatic factors affecting livelihoods of the rural people. The report ends with Chapter 7 with conclusion and recommendations.



# COUNTRY PROFILE

## **Country Profile**

CIRDAP works within a boundary of Asia-Pacific region though the only member from the Pacific region is Fiji. All other 14 CMCs (CIRDAP Member Countries) are located in Asia. The CMCs are covering more than 11 million square Kilometres of land area, which is roughly 8.3% of total Worlds surface area. Total population of these countries are large and growing in fast pace, which are already bearing around one third of the population of the globe. According to the UN, eight out 28 megacities are in this area<sup>1</sup>. A large share of the region's population and a large share of the region's urban agglomerations are located within a short distance of the coast of the region. Moreover, Coastal populations are expected to increase significantly and approximately double in countries such as Bangladesh, India, the Philippines and Viet Nam by 2060<sup>2</sup>. From the high plateaus and mountains of Pakistan and the South Pacific, from Iran in North and Fiji in South, CMCs incorporate conditions of moist tropical to arid and semiarid desert. As would be expected by this geography, the human and social dimensions of the CMCs are equally diverse.



### 2.1 Afghanistan

Located between South Asia and Central Asia, Afghanistan is a landlocked mountainous country with plains in the north and southwest. This country has a continental climate with harsh winters and hot summers.

Despite having numerous rivers and reservoirs, large area of the country is dry. Aside from the usual rainfall, Afghanistan receives snow during the winter. However, two-thirds of the country's water flows into the neighbouring countries of Iran, Pakistan, and Turkmenistan.

2 Chapter

<sup>&</sup>lt;sup>1</sup> United Nations, The World's Cities in 2016, 2016

<sup>&</sup>lt;sup>2</sup> Asian Development Bank, A Region at Risk: The Human Dimensions of Climate Change in Asia And The Pacific, 2017

At 652,230 km2 (251,830 sq. mi), Afghanistan is the world's 41st largest country, slightly bigger than France and smaller than Myanmar. It borders Pakistan in the south and east; Iran in the west; Turkmenistan, Uzbekistan, and Tajikistan in the north; and China in the Far East.

The climate of Afghanistan is arid or semi-arid. Here winters are cold and summers are dry. Dust and whirlwinds are common phenomena during the summer months on the flats in the southern part of the country.

Afghanistan	
GDP per capita (in USD) (2016)	561.8
Rural Population, % of total population (2015)	73
Forest area (% of land area) (2015)	2.1
Agricultural land (% of land area) (2013)	58.1
Agriculture, value added (% of GDP) (2014)	23.5
Adult literacy rate, 15+ years (2015)	38.17

#### Source: World Bank

Temperatures often change greatly within a single day. Variations in temperature during the day may range from freezing conditions at dawn to the upper 30s °C (upper 90s °F) at noon. Temperature and precipitation are controlled by the exchange of air masses. The highest temperatures and the lowest precipitation prevail in the drought-ridden region.

During the winter, the snow is often more than two meters deep in the mountainous region. Most of the precipitation falls between the months of October and April. The deserts get less than 100 mm (4 in) of rain a year, whereas the mountains receive more than 1000 mm (40 in) of precipitation, mostly as snow. Precipitation is not the same in all parts of the country. It fluctuates greatly during the course of the year. Surprise rainstorms are also quite common. Nomadic and seminomadic Afghans are used to experience the sudden flooding of their camps.

Even in the 1970s, Afghanistan had one of the lowest standards of living in the world. In 1990, annual income was estimated to be \$714 per person. Afghans had to adopt different strategies to earn their living over the centuries. Most Afghans are settled farmers, herders, or both, depending upon ecological, economic, and off course political factors. They are usually self-reliant in foods and other needs.

### 2.2 Bangladesh

Bangladesh, a small country with a big number of populations makes it one of the most densely populated countries of the world. Almost 94% of its land border is with India and the rest is with Myanmar, in length, which is about 4,246 km. The country is bounded in the south by the Bay of Bengal. Unlike its area, Bangladesh has coastline of more than 580 km.

Straddling the Tropic of Cancer, Bangladesh's has a tropical climate. It has seasonal variations in rainfall, moderately warm temperature, and high humidity. Regional climatic differences in this flat country are not significant. Three seasons are generally evident with their presence: a hot, humid summer from March to June; a cool, rainy monsoon season from June to October; and a cool, dry winter from October to March.

From March to May, violent thunderstorms, produce winds of up to sixty kilometres per hour. During the heavy storms of the early summer and late monsoon season, southerly winds of more than 160 kilometres per hour cause waves to crest as high as 6 meters in the Bay of Bengal, which brings disastrous flood to coastal areas.

Bangladesh	
GDP per capita (in USD) (2016)	1358.8
Rural Population, % of total population (2015)	66
Forest area (% of land area) (2015)	11
Agricultural land (% of land area) (2013)	70
Agriculture, value added (% of GDP) (2014)	16.1
Employment in agriculture, % of total employment	48
Adult literacy rate, 15+ years (2015)	61.49

#### Source: World Bank

Heavy rainfall is characteristic of Bangladesh. Most parts of the country receive at least 200 centimetres of rainfall per year. About 80 percent of Bangladesh's rain falls during the monsoon season.

Bangladesh is on the verge of improving its status from Least Developed Countries (LDC) to Developing Country. Its economy has grown roughly 6% per year since last two decades. Bangladesh has achieved the first Millennium Development Goal on halving poverty five years ahead of time, with 20.5 million people rising out of poverty during the 1991-2010 period. In parallel, life expectancy, literacy rates and per capita food production have increased significantly. Yet the country is still facing daunting challenges with about 28 million people living below the poverty line.

Foreign remittances and garment exports are the backbone of Bangladesh's industrial sector, accounted for more than 80% of total exports. Steady export growth in the garment sector combined with remittances from overseas Bangladeshis is key contributors to Bangladesh's sustained economic growth and rising foreign exchange reserves.

### 2.3 Fiji

Located in the South Pacific Ocean, northeast of New Zealand's North Island, the island nation of Fiji is comprised of more than 300 islands, of which nearly 100 are inhabited, and an additional 500 islets.

150 million years ago, volcanic activity gave birth to these mountainous islands, which are covered in thick tropical forests. Most of Fiji's mountains are dormant or extinct volcanoes.

Fiji enjoys a tropical maritime climate without great extremes of heat or cold. By virtue of its location close to the equator and within the Pacific, the El Nino – Southern Oscillation (ENSO) has influence on Fiji's climate.

Fiji	
GDP per capita (in USD) (2016)	5233.5
Rural Population, % of total population (2015)	46
Forest area (% of land area) (2015)	55.7
Agricultural land (% of land area) (2013)	23.3
Agriculture, value added (% of GDP) (2014)	11.2
Adult literacy rate, 15+ years (2015)	

Trade winds are the predominant broad scale winds affecting Fiji and occur in all seasons with varying duration and intensity. This also affects rainfall to a large extent and temperatures to a lesser extent. Winds over Fiji are generally light or moderate; strong winds are far less common and are most likely to occur in the period of June to October when the trade winds are most persistent.

Temperatures at sea level near the coast around Fiji are fairly uniform. Due to the influence of the surrounding warm tropical ocean waters, changes in the temperature from day to day and season to season are relatively small. Monthly average sea surface temperatures range from 26°C to 29 °C.

Rainfall is highly variable in all over the Fiji. Much of the country's rain however falls in heavy, brief showers and thunderstorms. Rainfall is typically abundant during the wet season but not sufficient during the rest of the year.

Tropical cyclones are the common natural phenomena in Fiji. They are mostly confined to the period November to April. On average, some ten to fifteen cyclones per decade affect Fiji while two to four do severe damage.

Fiji enriched with forest, mineral, and fish resources. Earnings from the tourism industry and remittances from Fijian's working abroad are the country's largest foreign exchange earners.

### 2.4 India

The seventh-largest country by area, the second-most populous country (with over 1.2 billion people), and the most populous democracy in the world is India. It is bounded by the Indian Ocean on the south, the Arabian Sea on the southwest, and the Bay of Bengal on the southeast. It shares land borders with Pakistan, China, Nepal, Bhutan, Myanmar and Bangladesh.

India has the typical monsoon climate. It has three general climatic periods over much of the country: (1) hot wet weather from about mid-June to the end of September, (2) cool dry weather from early October to February, and (3) hot dry weather from about March to mid-June.

Usually about three-fourths of the country's total annual precipitation falls during the monsoon. Average annual rainfall is 300–650 millimetres (11.8–25.6 in), but with an ununiformed distribution. Heavy tropical cyclones occur in India during pre-monsoon, early monsoon, or post-monsoon periods.

India	٠
GDP per capita (in USD) (2016)	1709.6
Rural Population, % of total population (2015)	67
Forest area (% of land area) (2015)	23.8
Agricultural land (% of land area) (2013)	60.6
Agriculture, value added (% of GDP) (2014)	17.4
Employment in agriculture, % of total employment	51
Adult literacy rate, 15+ years (2015)	72.23

Source: World Bank

Temperatures in India generally are most warm in May or June. Because of its vast area, India is experienced in as low as sub-zero temperature to as high as 50°C+ temperature. The economy of India is the world's sixth-largest one by nominal GDP and the third largest by purchasing power parity (PPP). India has achieved 6-7% average GDP growth annually since the economic liberalisation of 1991.

India has become a major exporter of IT services, Business Process Outsourcing (BPO) services, and software services. This is the fastest-growing part of the economy. The IT industry continues to be the largest private-sector employer in India. The agricultural sector is still the largest employer in India but losing its share sharply in GDP.

### 2.5 Indonesia

Indonesia is a large country with 1.905 million square km area. It encompasses nearly 15 thousands islands only 6,000 of which are inhabited. Mountains ranging between 3,000 and 3,800 meters above sea level are common in Indonesia.

The main variable of Indonesia's climate is not temperature but rainfall and its distribution is uniform. Therefore, there is almost no massive difference in temperatures in the region. The area's relative humidity ranges between 70 and 90 percent. Winds are moderate and generally predictable, too.

Indonesia is a tropical country with a wet, hot, humid climate the entire year, with high temperatures often in the range of 32°C to 20°C. Cooler temperatures prevail in the highlands. The humidity is usually between 70 and 90 percent.

The extreme variations in rainfall are linked with the monsoons, which may range between 2000 millimetres to 100 millimetres or less.

Indonesia	
GDP per capita (in USD) (2016)	3570.3
Rural Population, % of total population (2015)	46
Forest area (% of land area) (2015)	50.2
Agricultural land (% of land area) (2013)	31.5
Agriculture, value added (% of GDP) (2014)	13.3
Employment in agriculture, % of total employment	38
Adult literacy rate, 15+ years (2015)	95.44

### Source: World Bank

The largest economy in Southeast Asia is Indonesia, the world's 10th largest economy in terms of purchasing power parity. Indonesia has shown tremendous progress in poverty reduction, cutting the poverty rate to more than half since 1999.

Out of a population of 252 million, more than 28 million Indonesians still live below the poverty line. Approximately 40% of the entire population is vulnerable of falling into poverty, as their income is very close to the national poverty line.

### 2.6 Iran

Iran has an area of 1,648,195 square km. It is one of the world's most mountainous countries. Its landscape is dominated by rugged mountain ranges and western part is the most mountainous.

The northern part of Iran is covered by dense rain forests. The eastern part consists mostly of desert basins, as well as some salt lakes.

Iran's climate is very much diverse, ranging from arid or semiarid, to subtropical and the northern forests. Summer temperatures rarely exceed 29 °C (84.2 °F). Annual precipitation is 680 mm (26.8 in) in the eastern part of the plain and more than 1,700 mm (66.9 in) in the western part. Water scarcity poses the most severe human security challenge in Iran today.

Iran	
GDP per capita (in USD) (2016)	5219.1
Rural Population, % of total population (2015)	27
Forest area (% of land area) (2015)	6.6
Agricultural land (% of land area) (2013)	28.3
Agriculture, value added (% of GDP) (2014)	9.3
Employment in agriculture, % of total employment	19
Adult literacy rate, 15+ years (2015)	87.17

Source: World Bank

West settlements experience lower temperatures, severe winters with below zero average daily temperatures and heavy snowfall. The eastern and central basins are arid, with less than 200 mm (7.9 in) of rain, and have occasional deserts. Average summer temperatures rarely exceed 38 °C. The annual precipitation ranges from 135 to 355 mm (5.3 to 14.0 in).

Iran's economy is characterised by the hydrocarbon sector, agriculture and services sectors, and a noticeable state presence in manufacturing and financial services. Iran ranks second in the world in natural gas reserves and fourth in proven crude oil reserves. Economic activity and government revenues still depend to a large extent on oil revenues.

### 2.7 Lao PDR

Lao PDR is the only landlocked country in Southeast Asia. Its thickly forested landscape consists mostly of rugged mountains. Only about four percent of the total land area is classified as arable. The forested land area has declined significantly since the 1970s because of commercial logging, farming.

Laos has a tropical monsoon climate. Generally, monsoons occur at the same time across the country. Rainfall also varies regionally, with the highest amounts-- 3,700 millimetres annually.

Lao PDR	
GDP per capita (in USD) (2016)	2338.7
Rural Population, % of total population (2015)	61
Forest area (% of land area) (2015)	81.3
Agricultural land (% of land area) (2013)	10.1
Agriculture, value added (% of GDP) (2014)	27.7
Employment in agriculture, % of total employment	71
Adult literacy rate, 15+ years (2015)	79.87

There is a distinct rainy season from May to November, followed by a dry season from December to April. Local tradition holds that there are three seasons (rainy, cold and hot) as the latter two months of the climatologically defined dry season are noticeably hotter than the earlier four months.

Lao PDR, a lower-middle income economy and is one of the fastest growing economies in the East Asia and Pacific region and globally. GDP growth averaged 7.8% over the last decade. Nevertheless, Laos remains a country with not so developed infrastructure, particularly in rural areas. Agriculture, dominated by rice cultivation in lowland areas, accounts for about 20% of GDP and 73% of total employment.

Lao PDR has made good progress on a number of Millennium Development Goals (MDGs), including halving poverty, reducing hunger, and improving education and health outcomes. Total fertility rates are high, with a high unmet demand for family planning. Lao PDR is one of the first countries in the world to localise the SDGs into the national development plan.

### 2.8 Malaysia

Malaysia has a land area of 329,613 square km. It has land borders with Thailand, Malaysia, Indonesia and Brunei. The country also has maritime boundaries with Vietnam and the Philippines.

The local climate is equatorial and characterised by the annual southwest (April to October) and northeast (October to February) monsoons. The temperature is moderated by the presence of the surrounding oceans. Humidity is usually high, and the average annual rainfall is 250 cm (98 in). The climates of the Peninsula and the East differ, as the climate on the peninsula is directly affected by wind from the mainland, as opposed to the more maritime weather of the East.

Malaysia	
GDP per capita (in USD) (2016)	9508.2
Rural Population, % of total population (2015)	25
Forest area (% of land area) (2015)	67.6
Agricultural land (% of land area) (2013)	23.9
Agriculture, value added (% of GDP) (2014)	8.9
Employment in agriculture, % of total employment	13
Adult literacy rate, 15+ years (2015)	94.64

Source: World Bank

Malaysia, an upper middle-income country, has transformed itself since the 1970s from a producer of raw materials into a multi-sector economy. Less than 1 percent of Malaysian households live in extreme poverty. Domestic demand is the driver of economic growth, supported mainly by private consumption, which accounts for 53% of GDP. Nevertheless, exports - particularly of electronics, oil and gas, and palm oil - remain a significant driver of the economy.

### 2.9 Myanmar

Myanmar is bordered in the northwest by the Bangladesh and India. It is bounded by Laos, Thailand, and China. Fertile plains exist in the valleys between the mountain chains.

Much of the country lies between the Tropic of Cancer and the Equator. It lies in the monsoon region of Asia, with its coastal regions receiving over 5,000 mm (196.9 in) of rain annually. The Northern regions of Myanmar are the coolest, with average temperatures of 21 °C (70 °F). Coastal and delta regions have an average maximum temperature of 32 °C (89.6 °F).

Since Myanmar began the transition to a civilian-led government in 2011, the country initiated economic reforms aimed at attracting foreign investment and reintegrating into the global economy. Now Myanmar is one of the fastest growing economies in East Asia. The country is continuously having growth rate between 6% and 7.2% during the past few years.

Myanmar	×
GDP per capita (in USD) (2016)	1195.5
Rural Population, % of total population (2015)	66
Forest area (% of land area) (2015)	44.5
Agricultural land (% of land area) (2013)	19.3
Agriculture, value added (% of GDP) (2014)	
Adult literacy rate, 15+ years (2015)	93.09

Source: World Bank

Despite many improvements, living standards have not improved for the majority of the people residing in rural areas. Myanmar remains one of the poorest countries in Asia – approximately 26% of the country's 51 million people live in poverty.

### 2.10 Nepal

Nepal, roughly trapezoidal shape country with an area of 147,181 square km. Nepal is commonly divided into three physiographic areas: Mountain, Hill and Terai.

Nepal has five climatic zones, broadly corresponding to the altitudes. Therefore, it experiences five seasons: summer, monsoon, autumn, winter and spring. The Himalaya blocks cold winds from Central Asia in the winter and forms the northern limit of the monsoon wind patterns. In a land once thickly forested, deforestation is a major problem in all regions, which in turn resulting erosion and degradation of ecosystems.

Nepal is among the least developed countries in the world, with about one-quarter of its population living below the poverty line. Agricultural sector is the backbone of the economy, providing a livelihood for almost two-thirds of the population but accounting for only one-third of GDP. Industrial activity mainly involves the processing of agricultural products, including pulses, jute, sugarcane, tobacco, and grain. Additional challenges to Nepal's growth include its landlocked geographic location, persistent power shortages, and underdeveloped transportation infrastructure.

Nepal	*
GDP per capita (in USD) (2016)	729.1
Rural Population, % of total population (2015)	81
Forest area (% of land area) (2015)	25.4
Agricultural land (% of land area) (2013)	28.7
Agriculture, value added (% of GDP) (2014)	33.7
Adult literacy rate, 15+ years (2015)	64.66

Source: World Bank

### 2.11 Pakistan

Pakistan covers an area of 881,913 square km. Pakistan has land borders with Afghanistan, China, India and Iran. It shares a marine border with Oman, and is separated from Tajikistan by the cold, narrow Wakhan Corridor.

The geography and climate of Pakistan are extremely diverse and is divided into three major geographic areas: the northern highlands, the Indus River plain, and the Baluchistan Plateau. The northern highlands contain some of the world's highest peaks

Pakistan	C*
GDP per capita (in USD) (2016)	1,443.6
Rural Population, % of total population (2015)	61
Forest area (% of land area) (2015)	1.9
Agricultural land (% of land area) (2013)	47.1
Agriculture, value added (% of GDP) (2014)	25
Employment in agriculture, % of total employment	45
Adult literacy rate, 15+ years (2015)	56.44

Source: World Bank

The climate varies from tropical to temperate, with arid conditions in the coastal south. There is a monsoon season with frequent flooding due to heavy rainfall and a dry season with significantly less rainfall or none at all. There are four distinct seasons: a cool, dry winter from December to February; a hot, dry spring from March to May; the summer rainy season from June to September; and the retreating monsoon period of October and November. Rainfall varies greatly from year to year, and patterns of alternate flooding and drought are common.

Pakistan economy is highly dependent on Agriculture. This sector accounts for one-fifth of output and two-fifths of employment. Textiles and apparel account for more than half of Pakistan's export earnings.

### 2.12 Philippines

The Philippines is an archipelago composed of more than seven thousands island with a total land area, including inland bodies of water, of 300,000 square kilometres.

The Philippines has a tropical maritime climate that is usually hot and humid. There are three seasons: the hot dry season or summer from March to May; the rainy season from June to November; and the cool dry season from December to February. Temperatures usually range from 21 °C to 32 °C although it can get cooler or hotter depending on the season. The coolest month is January; the warmest is May. The average yearly temperature is around 26.6 °C.

Philippines	*
GDP per capita (in USD) (2016)	2,951.1
Rural Population, % of total population (2015)	56
Forest area (% of land area) (2015)	27
Agricultural land (% of land area) (2013)	41.7
Agriculture, value added (% of GDP) (2014)	11.3
Employment in agriculture, % of total employment	33
Adult literacy rate, 15+ years (2015)	96.62
Annual rainfall measures as much as 5,000 millimetres (200 in) in the mountainous east coast section but less than 1,000 millimetres (39 in) in some of the sheltered valleys.

The Philippines is one of the most dynamic economies in the East Asia and the Pacific region. Sound economic fundamentals and a globally recognised competitive workforce reinforce the growth momentum.

The rapidly growing domestic economy has yielded substantial gains in poverty reduction. The unemployment rate declined from 7.3% to 5.5% between 2010 and 2016. At least 40% of the employed are working in the informal sector. Poverty afflicts more than a fifth of the total population but is as high as 75% in some areas of the southern Philippines. More than 60% of the poor reside in rural areas, where the incidence of poverty (about 30%) is more severe.

#### 2.13 Sri Lanka

Sri Lanka's total land area is 65,525 km. Palm fringed beaches surround the island and the sea temperature rarely falls below 27°C.

Sri Lanka generally offers warmth and sunshine throughout the year. Temperatures average between 27°C–30°C. Sri Lanka lies 400 miles north of the equator and is affected by two Southeast Asian monsoons. Rainfall is becoming increasingly unpredictable. On average, it varies from 1000mm (39in) - 5,000mm (197in) throughout the year. Humidity ranges between 70%–90% in Colombo, lowering the highlands and cultural triangle.

Rainfall pattern is influenced by monsoon winds from the Indian Ocean and the Bay of Bengal. Humidity is typically higher in the southwest and mountainous areas and depends on the seasonal patterns of rainfall.

Sri Lanka is a lower middle-income country of 21.2 million people with per capita GDP in 2016 of \$3,835. Since the civil war ended in 2009, the economy has grown on average at 6.2 percent a year.

Sri Lanka	
GDP per capita (in USD) (2016)	3,910
Rural Population, % of total population (2015)	82
Forest area (% of land area) (2015)	33
Agricultural land (% of land area) (2013)	43.7
Agriculture, value added (% of GDP) (2014)	8.6
Employment in agriculture, % of total employment	33
Adult literacy rate, 15+ years (2015)	92.61

#### Source: World Bank

Sri Lankan has made remarkable progress in its socio-economic and human development indicators. Social indicators rank among the highest in South Asia and compared with other Middle-Income Countries. The national poverty headcount ratio has declined from 6.7% in 2012/12 to 4.1% in 2016. (Household income expenditure survey, 2016)

The economy is transitioning from being predominantly rural-based to urbanised economy-oriented around manufacturing and services. The service sector has contributed more 60% of the total GDP in 2016. According to Central Bank Sri Lanka, the wholesale and retail trade contributed more than 20% to the service sector contribution, transport and communication segment contributed 14%, tourism sector 10 and the outcome of 9% from the banking sector for the service sector.

The industrial sector contributed more than 30% of the entire economic output of the country. Agriculture has always been one of the main contributors due to being the main livelihood of the majority of the population (24.3% of the total population). However, agriculture sector contribution has been considerably reducing over the years and was accounted less than 8.5% in 2017.

#### 2.14 Thailand

Totalling 513,120 square kilometres, Thailand is the world's 50th-largest country by total area.

Thailand's climate is influenced by monsoon winds that have a seasonal character. Thailand is divided into three seasons. The first is the rainy or southwest monsoon season (mid–May to mid–October), which prevails over most of the country. This season is characterised by abundant rain with August and September being the wettest period of the year. This can occasionally lead to floods. Nonetheless, dry spells commonly occur for 1 to 2 weeks from June to early July. Winter or the northeast monsoon starts from mid–October until mid–February. Most of Thailand experiences dry weather during this season with mild temperatures.

Most of the country receives a mean annual rainfall of 1,200 to 1,600 mm (47 to 63 in). However, certain areas on the windward sides of mountains receive more than 4,500 mm (180 in) of rainfall per year. The annual average rainfall of the driest area is less than 1,200 mm (47 in).

Thailand is highly dependent on international trade, with exports accounting for about two-thirds of GDP. Thailand's exports include electronics, agricultural commodities, automobiles and parts, and processed foods. The industry and service sectors produce about 90% of GDP. The agricultural sector, comprised mostly of small-scale farms, contributes only 10% of GDP but employs about one-third of the labour force. Thailand has attracted an estimated 3.0-4.5 million migrant workers, mostly from neighbouring countries. Over the last few decades, Thailand has reduced poverty substantially.

Thailand	
GDP per capita (in USD) (2016)	5,910.6
Rural Population, % of total population (2015)	50
Forest area (% of land area) (2015)	32.1
Agricultural land (% of land area) (2013)	43.3
Agriculture, value added (% of GDP) (2014)	10.5
Employment in agriculture, % of total employment	38
Adult literacy rate, 15+ years (2015)	93.98

Source: World Bank

Thailand's economy growth, creating millions of jobs that helped pull millions of people out of poverty. As of 2014, over 80% of the country's 7.1 million poor live in rural areas. Moreover, an additional 6.7 million were living within 20% above the national poverty line and remained vulnerable to falling back into poverty. Although inequality has declined over the past 30 years, significant and growing disparities in household income and consumption can be seen across and within regions of Thailand.

#### 2.15 Vietnam

Vietnam covers a total area of approximately 331,210 square km. Vietnam's land is mostly hilly and densely forested, with level land covering no more than 20%. Mountains account for 40% of the country's land area, and tropical forests cover around 42%.

Because of differences in latitude and the marked variety in topographical relief, the climate tends to vary considerably from place to place. The average annual temperature is generally higher in the plains than in the mountains and higher in the south than in the north with temperatures varying from 5 °C (41.0 °F) in December and January to 37 °C (98.6 °F) in July and August.

Vietnam is one of the fastest-growing nations in Asia. It is another densely populated developing country, which has experiencing transition from a highly agrarian economy to a more industrial and market-based economy, and it has raised incomes substantially. However, annual GDP growth of 6.3% reflects the strength of domestic demand and strong manufacturing exports.

Young, trainable and willing to work labour force at cheap rate are behind the deep attraction of investors to this country. About 60% of the 93 million Vietnamese are of working age.

Vietnam	*
GDP per capita (in USD) (2016)	2170.6
Rural Population, % of total population (2015)	66
Forest area (% of land area) (2015)	47.6
Agricultural land (% of land area) (2013)	35.1
Agriculture, value added (% of GDP) (2014)	17.7
Adult literacy rate, 15+ years (2015)	94.51

Source: World Bank



# NATURE OF CLIMATE CHANGE

### **Nature of Climate Change**

The CIRDAP member countries are vulnerable to climatic phenomena due to geographical characteristics. The frequency and intensity of floods, droughts, cyclones in the countries have increased manifold in last few decades. Most of the coastal areas are affected by tropical cyclones and their associated high winds, storm surges, and extreme rainfalls. These are common features, which can be attributed to anthropogenic climate change.

Records of natural disasters can be traced back to 430 B.C. when the Typhus epidemic was reported in Athens. Ten deadliest natural disasters recorded in the world are dated back to 1556 when an earthquake in Shaanxi province of China occurred on 23rd January, 1556 and 8,30,000 casualties were recorded. List of major disasters along with fatalities, which have occurred across the Asia-Pacific Region in the known history and in the last century, may be seen from the Table 1.



#### Major Disasters in the Asia-Pacific Region

SI#	Name of Event	Year	Country	Fatalities
1	Cyclone	1737	India	200.000
2	Yellow River Flood	1887	China	900,000-
				2,000,000
3	China Floods	1931	China	2,000,000-
				2,500,000
4	Floods	1954	China	
5	Cyclone	1970	India & Bangladesh	500.000
6	Bangladesh Cyclone	1991	Chittagong and Khulna	139,000
			of Bangladesh	
7	Cyclone Thelma	1991	Philippines	5956
8	Flood	1996	PRC	4.091
9	Cyclone Linda	1997	Vietnam and Cambodia	3.700
10	Flood	1998	PRC	4250
11	Cyclone	1998	India, Gujrat	3,471
12	Cyclone	1999	India, Odisha	10.378
13	Tsunami	2004	Indonesia, Sri Lanka, India, Malaysia,	230,210
			Bangladesh and Thailand	
14	Cyclone Sidr	2007	Bangladesh, India	10,000
14	Cyclone Nargis	2008	Myanmar, Sri Lanka	138,000
15	Flood	2013	India	6453
16	Cyclone Haiyan	2013	Philippines	7415

Source: 'Disaster Management in India', Ministry of Home Affairs, Government of India and the Red Crescent Society.



A Global Report published by Germanwatch showed also the prominent increases in the intensity and/or frequency of many extreme events such as heat waves, tropical cyclones, prolonged dry spells, intense rainfall, tornadoes, snow avalanches, thunderstorms, and severe dust storms in the Asia-Pacific region. It was estimated that the region accounted for 91% of the world's total death and 49% of the world's total damage due to natural disasters in the last century. Therefore, climate change poses a serious and additional threat to poor farmers and rural communities in the region who live in remote, marginal areas such as mountains, dry lands and deserts; areas with limited natural resources, communication and transportation networks and weak institutions.

The Global Climate Risk Index 2017 analysis to what extent countries have been affected by the impacts of weather-related loss events (storms, floods, heat waves etc.). The most recent data available – from 1996–2015 showed that Myanmar tops the list and is followed by the Philippines, and Bangladesh. Table 2 shows that the ranking of the CIRDAP Member Countries concerning the last two decades with their average weighted ranking (CRI score) and the specific results relating to the five indicators analysed. As per CRI, amongst the top 10 most vulnerable countries in the world, six are from CIRDAP Member Countries.

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CIRDAP Member Countries most affected from 1996 to 2015 (annual averages)

Country	CRI 1996–2015 (1995–2014)	CRI Score	Death toll	Deaths per 100 000 inhabitants	Total losses in million US\$ PPP	Losses per unit GDP in %	Number of events (total 1996–2015)
Afghanistan	12	36.17	278.6	1.02	1808.68	0.3638	51
Bangladesh	6	25.00	679.05	0.48	2283.38	0.732	185
Fiji	27	47.33	5.70	0.68	57.356	1.0083	-
India	14	37.50	3589.75	0.32	11335.170	0.2756	-
Indonesia	67	70.83	252.30	0.11	1902.918	0.1007	-
Iran	76	77.17	56.60	0.08	1 310.289	0.1284	-
Lao PDR	87	82.50	5.70	0.10	75.793	0.3389	-
Malaysia	103	94.00	29.50	0.11	271.755	0.0551	-
Myanmar	2	14.17	7145.85	14.71	1300.74	0.37	41
Nepal	24	44.33	235.40	0.92	107.814	0.2314	-
Pakistan	8	30.50	504.75	0.32	3823.17	0.647	133
Philippines	4	21.22	861.55	1.00	2761.53	0.628	283
Sri Lanka	54	64.33	44.50	0.23	234.341	0.1743	-
Thailand	9	34.83	140.00	0.22	7574.62	1.004	136
Vietnam	7	31.33	339.75	0.41	2119.37	0.621	206

Source: Global Climate Risk Index (GCRI, 2017) by Germanwatch

According to the Climate Risk Index, less developed countries are generally more affected than industrialised countries. CRI can be used as the red flag for highly vulnerable countries to predict the future extreme events which will become more frequent and severe due to climate change.

The major climatic factors are discussed as follows:

#### 3.1 Temperature and Rainfall Variations

One of the generally observed and accepted facts is that the global annual average temperature has been increasing steadily for more than a hundred years primarily due to human activities.





Source: World Bank 2010, Adapted from Karl, Melillo, and Peterson 2009.

The temperature rise has also been observed to be higher at higher elevations. The Hindu Kush-Himalayan region, including the Tibetan Plateau, has also experienced inconsistent trends in overall warming during the past hundred years. For example, the last 30 years witnessed an average temperature increase of 0.6°C per decade in the Nepal Himalayas, while in the Tibetan Plateau the average temperature increased by 0.3°C per decade (Liu and Rasul, 2007). The rise in temperature in the Hindu Kush-Himalayas has accelerated the melting of ice and snow; and areas covered by permafrost and glaciers are decreasing in many parts of the region. Growing evidence shows that the glaciers of the Himalayas are receding faster than in other parts of the world. For example, the rate of retreat of the Gangotri glacier over the last three decades has been more than three times the rates of retreat during the preceding 200 years.

A number of studies suggest that the Hindu Kush-Himalayan glaciers are retreating substantially, especially in China, India, and Nepal. The glaciers in the Karakorum Range are also in a general state of retreat, although some of these glaciers may be advancing. On the Tibetan Plateau, the glacial area has decreased by 4.5 per cent over the past 20 years and by 7 per cent over the past 40 years (CNCCC 2007). Twenty-seven per cent of the glacier area, equivalent to an ice volume of 16,184 km3, is expected to disappear by 2050, as will 10 to 15 per cent of the frozen soil area (Qin et al. 2002 as cited in Liu and Rasul 2007).



Source: Global Climate Risk Index (GCRI, 2017) by Germanwatch

Climate trends indicate temperature is predicted to increases in the Asia/Pacific region approximately 0.5-2°C by 2030 and 1-7°C by 2070. Temperatures are expected to increase more rapidly in the arid areas of northern Pakistan and India. Additionally, models indicate rising rainfall concentration throughout much of the region, including greater rainfall during the summer monsoon. Furthermore, winter rainfall is likely to decline in South and Southeast Asia, suggesting increased aridity from the winter monsoon. The region will be affected by an increase in global sea level of approximately 3-16 cm by 2030 and 7-50 cm by 2070 in conjunction with regional sea level variability. Other scientific studies have also indicated the potential for more intense tropical cyclones and changes in important modes of climate variability such as the El Niño-Southern Oscillation.

According to World Meteorological Organisation (WMO, 2011), among the warmest decadal ranking, the first decade of 21st century 2001-2010 topped the rank followed by 1990s and 1980s respectively placed at the second and third positions. Likewise, among the 16 warmest years recorded over the globe, nine occurred during the first decade of this century. The year 2010 tied for the warmest year in records dating back to 1880. The temperature increase in 2010 was recorded as +0.53°C (than long-term average) ranks just ahead of those of 2005 (+0.52°C) and 1998(+0.51°C). We may recall that El Nino event of 1998 was the severest one of the recorded history (Eastern equatorial Pacific sea surface temperatures rose by 4°C above mean) which disturbed the global weather pattern over a period of a couple of years.

#### **Country Level Situations**

Mean annual temperature of Afghanistan has increased 1.2°C since 1960, at an average rate around 0.20°C per decade. The frequency of hot days and hot nights has increased every season since 1960. The main annual temperature is projected to increase by 1.4 to 4.0°C by the 2060s and 2.0 to 6.2 degrees by the 2090s. The range of projections by 2090 under any one emissions scenario is around 1.5 to 2.5°C. The projected rate of warming is most rapid in spring and summer and relatively uniform across the country in the region.

Average rainfall over Afghanistan has decreased slightly (an average rate of 0.5mm per month (2% per decade) since 1960. This is mainly due to decrease of around 2.7mm per month (6.6%) per decade. The proportion of rainfall that occurs in heavy events has not changed with any consistent trends since 1960. The observed maximum 1 and 5 days rainfalls generally show small decrease, but increase slightly in other season. Much of the drying is due to decrease in spring rainfall.

#### 3.2 Glaciers and Sea level Rise

Glaciers are the most sensitive indicators of the global warming which give quick response in the form of volume of melted water, which finally increases the sea level. Global warming causes sea level rise in two ways; firstly by thermal expansion of water and secondly by addition of melt water from mountain glaciers. Because of inverse relationship between temperature and snow/ice, the glaciers all over the world have been losing their mass due to increase in interacting air temperature. A sharp decline in the mass balance of all the glaciers can be observed since 1990s.

Countries in South Asia, Southeast Asia, and the Pacific Islands are highly vulnerable to rising sea levels, which increase the risk of floods. The global sea level gradually rose during the 20th century and continues to rise at increasing rates (Cruz et al. 2007). In Asia and the Pacific, the sea level is expected to rise approximately 3–16 centimetres (cm) by 2030 and 7–50 cm by 2070 in conjunction with regional sea level variability (Preston et al. 2006).

Under a conservative scenario of a 40 cm rise in sea level between today and the end of 21st century, the number of people facing floods in coastal areas will increase from 13 million to 94 million annually, with 60% of which is occurring in South Asia (the coasts of Bangladesh, India, Pakistan, Myanmar, and Sri Lanka) and 20% in Southeast Asia (the coasts of Indonesia, the Philippines, Thailand, and Viet Nam) (Cruz et al. 2007).

Studies on the vulnerability of coastal zones to rising sea levels and storm surges are severely hampered by lack of data on coastal protection, including both natural and artificial protection systems. It is likely, however, that the low-lying river deltas of Bangladesh, the China, India, Vietnam, and the small island states in the Pacific face the largest risk of coastal inundation, soil erosion, displacement of communities, loss of agricultural land, intrusion of saline waters into surface and groundwater, and other consequences of a rise in sea level (Preston et al. 2006). For example, if sea levels rise Eustatically<sup>1</sup> and Bangladesh sinks Isostatically<sup>2</sup> because of the loading of sediment on the delta there will be major impacts on the people of Bangladesh. A 1.5m rise in sea level would affect 17 million people and 22000km2 of land (16%). Major fishing villages will be affected and agricultural land and paddy fields will suffer the effects of salinization. Coastal cities such as Chittagong face inundation and greater threats from cyclones (hurricanes).

Rising sea levels may submerge most of the Maldives and inundate around 18 per cent of Bangladesh's land. This is also of dire concern in many other countries of the region. Millions of people in coastal areas may lose their homes due to sea level rise. It is estimated that over the next several decades 200 million people may become permanently displaced due to rising sea levels, heavier floods, and more intense droughts (Stern 2007).

Besides melting Himalayan glaciers, water resources are likely to be affected by climate change through its effect on the Indian monsoon, which provides 70 per cent of annual precipitation over a four-month period (World Bank 2010).

<sup>&</sup>lt;sup>1</sup> Eustatic sea-level changes are global sea-level changes related either to changes in the volume of glacial ice on land or to changes in the shape of the sea floor caused by plate tectonic processes.

<sup>&</sup>lt;sup>2</sup> Isostatic sea-level changes are local changes caused by subsidence or uplift of the crust related either to changes in the amount of ice on the land, or to growth or erosion of mountains.





Source: World Development Report team based on IPCC 2001

#### 3.3 Extreme events and Natural Disasters

Global warming may cause increased weather variability, more frequent and intense extreme events such as droughts, floods, and forest fires, and greater exposure to coastal storm surges. Asia-Pacific countries are more exposed and less resilient to climate hazards.

Developing countries are particularly reliant on ecosystem services and natural capital for production in climate-sensitive sectors. Much of their population lives in physically exposed locations and economically precarious conditions. In addition, their financial and institutional capacity to adapt is limited.

Many of the Asia-Pacific countries are vulnerable to natural hazards including floods, droughts, glacial lake outburst floods, landslides, and tsunamis. Floods are a recurring phenomenon in Bangladesh, India, Nepal and some other Asia-Pacific countries. The frequency of high intensity floods and other natural disasters is increasing. Asia-Pacific countries have to incur huge economic and social costs as well as loss of human life due to natural disasters. Frequent natural disasters have put enormous constraints on the development potential of these countries and have become a serious concern for rural development.

In 2015, Asia Pacific countries continued to be world's most disaster prone region. About 160 disasters were reported in the region, accounting for 47 per cent of the world's 344 disasters. The region bore the brunt of large-scale catastrophic disasters with over 16,000 fatalities-more than a two-fold increase since 2014. South Asia accounted for a staggering 64 per cent of total global fatalities—the majority was attributed to the 7.6 magnitude earthquake that struck Nepal in April 2015 which caused 8790 deaths. Asia and the Pacific incurred more than US\$46.1 billion in economic damage in 2015 even higher indirect losses. These numbers, however, are gross underestimates as there is no systematic assessment procedures of the cost of all disasters that struck the region, especially slow-onset disasters such as droughts, heat waves, forest fires and haze.

The range of disasters that affected the region includes earthquake in Nepal, Afghanistan and Pakistan, tropical cyclones that struck South-east Asia and the Pacific, floods in India, Indonesia, Myanmar, Pakistan and Sri Lanka, and droughts that affected many countries in the region. Out of 90 storms reported across the globe, 43 hit Asia Pacific countries, of which 33 were high intensity cyclones. The year 2015 was also the hottest year on record and saw several intense heat waves striking India and Pakistan between May and June that resulted in 2,248 and 1m 229 deaths respectively. The El Nino phenomenon triggered droughts in several parts of the region, while producing severe rainfall in other places.

Nepal is one of the CMC that faces more natural disasters. Table 3 describes major disasters and their prevalence in Nepal.

### Table 3

#### Major disasters and their prevalence in Nepal

Disasters	Prevalence
Flood	All over Nepal, esp. Tarai (sheet flood) and middle hills during monsoon season
Landslide	Most part of the country, esp. hills and mountains during monsoon season
Earthquake	All Nepal is a high-hazard earthquake zone
Epidemics	All over Nepal, esp. Tarai, hills and lower parts of mountain region throughout the year;
	particularly common types occur during summer and rainy season
Fire	Mostly in Tarai and hills on forest belt at foot of southern most hills (April to June)
Drought	All over Nepal, esp. mountainous region due to irregular monsoon rainfall
Windstorm	All over Nepal, severe during March to May
Hailstorm	Severe in hills during the beginning and end of monsoon
Thunderbolt	All over Nepal, severe during monsoon
Heat wave	Tarai region, May and June
Cold wave	Tarai region, mid-winter
Debris flow	Hills and mountains, frequent in the mountainous parts
Avalanche	Mountainous terrain and Higher Himalayas
Glacier lakes	Origin at the tongue of glaciers in Higher Himalayas, Higher Mountains, flow reach
outburst floods	down to middle hill regions

Source: UNDP 2009, MoHA & DPANet-Nepal 2015

Damages ('000 US\$)

409,832

15.000

6,200

10.000

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123

5,921,155

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5.480.000

As shown in Tables 4, over 24,000 disaster events are reported in Nepal from 1971 to 2013 (DesInventar 2013). Since 2000 onwards, over 15,000 events are reported, with an equivalent to an average of 1,128 events per year. These disasters have caused heavy loss of human lives as well as huge impact on economic, social, psychological and environmental dimensions. According to the Ministry of Home Affairs, since 2000, each year, an average of 329 people lost their lives due to various disasters and property loss of more than 1 billion rupees (MoHA & DPNet-Nepal 2015). Furthermore, the increased stress and fear among the public due to the loss of relatives, uncertainty and insecurity from the frequent disasters have not been accounted.

Human and economic losses due to large-scale natural disasters in Nepal during 1900 – 2016

10

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25,200

15,778,639

Disasters	No. of events	Deaths	Affected population
Flood	54	8,977	3,901,810
Landslide	20	1,787	443,130
Earthquake	8	18,905	6,372,100
Epidemics	16	2,549	79,214
Forest fire	3	106	54,000
Drought	6	-	4,903,000
Storm	3	153	175

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217

246

32,940

Source: CRED/EMDAT 2017

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6

5

122

#### 3.3.1 Flood

Heat wave

Cold wave

Avalanche

Table

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As in other years, many of the large-scale floods that affected the region were transboundary in nature. For example, in July 2015, heavy torrential monsoon rains flooded Pakistan and India, In addition, outbursts from glacial lakes led to flash floods and the flooding of the Indus river in several locations across Pakistan. Similarly, the State of Assam in India and parts of Bangladesh were affected by flooding in the Brahmaputra river basin. While no estimates of economic impact from the transboundary floods are available, ESCAP's 2014 Year in Review highlighted that transboundary floods in the Indus river basin across India and Pakistan attributed to 30 per cent equivalent to US\$18 billion of the economic impacts in the sub-region. The Trans boundary nature of the river basin floods calls for stronger regional cooperation to coordinate response measures and assess impacts accurately,

In Afghanistan, 21 out of 34 provinces are vulnerable to floods The Western region and central belt are at risk of floods. However, the South West and few Northern provinces of Afghanistan (Hirat, Ghor, Urozgan, Jozjan, Balkh and Faryab) can severely affected by both, flood and drought. On the other hand, Flood is a natural phenomenon in Bangladesh and occurs on an annual basis. The rivers are huge by global standards, and can inundate over 30% of the land mass at a time. The notes below should help you to understand the causes and consequences of flooding in Bangladesh.

Bangladesh is prone to serious and chronic flooding. Even in an average year, 18% of the landmass is inundated and previous floods have affected 75% of the country (as in 1988). About 75% of the country is below 10m above sea level and 80% is classified as floodplain as Bangladesh is principally the delta region of South Asia's great rivers. Bangladesh floods on a regular basis, recent notable and catastrophic floods have occurred in 1988 (return period of one in every 50 to 100 years), 1998, 2004, 2007 and 2010.

The 2004 flood lasted from July to September and covered 50% of the country at their peak. At the time of the July 2004 floods 40% of the capital, Dhaka was under water. About 600 deaths were reported and 30million people were homeless. About 100,000 people alone in Dhaka suffered from diarrhoea from the floodwaters. Bridges were destroyed, the death toll rose to 750 and the airport and major roads were flooded. This hampered relief efforts. The damage to schools and hospitals was estimated at \$7billion. Rural areas also suffered, the rice crop was devastated, as were important cash crops such as jute and sugar.

Fiji suffers from flood during the days of torrential rain caused severe flooding in parts of Fiji as towns lie underwater, and flood warnings remain in place across much of the country's main island of Viti Levu.

India also is one of the most flood prone countries in the world. The principal reasons for flood lie in the very nature of natural ecological systems in this country, namely, the monsoon, the highly silted river systems and the steep and highly erodible mountains, particularly those of the Himalayan ranges. The average rainfall in India is 1150 mm with significant variation across the country. The annual rainfall along the western coast and Western Ghats, Khasi hills and over most of the Brahmaputra valley amounts to more than 2500 mm. Most of the floods occur during the monsoon period, are usually associated with tropical storms or depressions, active monsoon conditions, and break monsoon situations.

Twenty-three of the 35 states and union territories in India are subject to floods and 40 million hectares of land, roughly one-eighth of the country's geographical area, is prone to floods. The National Flood Control Program was launched in the country in 1954. Since then sizeable progress has been made in the flood protection measures. By 1976, nearly one third of the flood prone area had been afforded reasonable protection; considerable experience has been gained in planning, implementation and performance of flood warning, protection and control measures.

The main causes of floods are heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/ rivers. Ice jams or landslides blocking streams; typhoons and cyclones also cause floods. Flash floods occur due to high rate of water flow as also due to poor permeability of the soil. Areas with hardpan just below the surface of the soil are more prone to, floods as water fails to seep down to the deeper layers.

Vulnerability to floods and other natural disasters is caused by the high population density, widespread poverty, unemployment, illiteracy, enormous pressure on rural land, and an economy traditionally dominated by agriculture. Children and women are particularly vulnerable. Eighty five percent of the deaths during disasters are of women and children (Centre for Research on the Epidemiology of Disasters, CRED 2000). Presently there is an inadequate level of protection in the country against floods. Though non-structural measures improve the preparedness to floods and reduce losses, the necessity of structural measures would always remain to reduce the extent of physical damage caused by floods. In future, programme, flood control and management planning along with climate change need to be integrated into development planning for the country (GOI, 2011).

#### 3.3.2 Droughts

Drought is a prolonged, continuous period of dry weather along with abnormal insufficient rainfall. It occurs when evaporation and transpiration exceed the amount of precipitation for a reasonable period. Drought causes the earth to parch and a considerable hydrologic (water) imbalance resulting water shortages, wells to dry, depletion of ground water and soil moisture, stream flow reduction, crops to wither leading to crop failure and scarcity in fodder for livestock. Drought is a major natural hazard faced by communities directly dependent on rainfall for drinking water, crop production, and rearing of animals. Since ancient times, droughts have far-reaching effects on humankind. Large land areas often suffer damages from dust storms and fire. Drought could be the reason for migration of early human communities. It has long been considered to be a natural hazard responsible for ups and downs of many civilisations of the world.

In Afghanistan, there have been several seasons of drought in recent decades. Asian Development Bank conducted an analysis of climate and drought records found that localised

droughts have a periodicity of three to five years, and droughts covering large areas recur every 9-11 years. South and central areas are more affected from July through September. In fact, that Afghanistan began experiencing unusual droughts beginning in 1995. Drought combined with conflict has created internally displaced populations that are living in extremely poor conditions. Many communities continue to depend on meagre incomes derived by migrating outside their farmlands. Inadequate rains and snowfall during 2008 to 2010 in parts of Afghanistan caused significant failure of the rain-fed crops in the provinces six provinces: Herat, Jawzjan, Balkh, Badghis, Faryab and Sar-e-Pul. The situation affected the most vulnerable populations and their access to food and water, negatively affecting communities' health and nutrition status. However, in 2012 Afghanistan's long drought has ended due to heavy snow.

In Bangladesh drought is defined as the period when moisture content of soil is less than the required amount for satisfactory crop-growth during the normal crop-growing season. Droughts are common in the north-western districts of Bangladesh. Some of these droughts usher in famine. One definite manifestation of the onset of the drought is the 'top burning' of the bamboo and betel nut trees that is, they lose green foliage and the fresh leaves turn brown because of lack of moisture in soil and air. The condition often culminates to their death, if there is no rain or irrigated water for a substantially long time. However, drought can also occur in areas that usually enjoy adequate rainfall and moisture levels. Due to drought severity, crop loss ranges between 20 and 60 percent or even may be more for transplanted aman and other rice varieties. Depending on the intensity of drought, the estimated yield reduction of different crops varies from 10% to 70%. The yield loss may considerably be reduced through judicious and limited irrigation at the critical stages of crop growth (Dey et al, 2011).

Drought has become a recurrent natural phenomenon of north-western Bangladesh (i.e. barind tract) in recent decades. Barind Tract covers most parts of the greater Dinajpur, Rangpur, Pabna, Rajshahi, Bogra, Joypurhat and Naogaon districts of Rajshahi division. Rainfall is comparatively less in Barind Tract than the other parts of the country. The average rainfall is about 1,971 mm, which mainly occurs during the monsoon. Rainfall varies aerially as wells as yearly. For instance, rainfall recorded in 1981 was about 1,738 mm, but in 1992, it was 798 mm. The distribution of rainfall is rather variable from one place to another. Thus, this region has already been known as drought prone area of the country.

The average highest temperature of the Barind region ranges from 35'C to 25'C for the hottest season and 12'C to 15'C for the coolest season. Generally, this particular region of the country is rather hot and considered as a semi-arid region. In summer, some hottest days experience the temperature of about 45'C or even more in the Rajshahi area, particularly at Lalpur. Again, in the winter the temperature even falls at 5'C in some places of Dinajpur and Rangpur districts. Therefore, this older alluvium region experiences the two extremities that clearly contrast with the climatic condition of the rest of the country.

Meteorologically drought can be classified into three types: permanent drought - characterised by arid climate; seasonal drought - caused by irregularities in recognised rainy and dry seasons; and contingent drought - caused by irregular rainfall. In Bangladesh, the last two types are more prevalent.

Drought mostly affects Bangladesh in pre-monsoon and post-monsoon periods. From 1949 to 1979, drought conditions had never affected the entire country. The percentage of drought affected areas were 31.63% in 1951, 46.54% in 1957, 37.47% in 1958, 22.39% in 1961, 18.42% in 1966, 42.48% in 1972 and 42.04% in 1979. During 1981 and 1982, droughts affected the production of the monsoon crops only. During the last 50 years, Bangladesh suffered about 20 drought conditions. The drought condition in north-western Bangladesh in recent decades had led to a shortfall of rice production of 3.5 million tons in the 1990s. If other losses, such as, to other crops (all rabi crops, sugarcane, tobacco, wheat etc.) as well as to perennial agricultural resources, such as, bamboo, betel nut, fruits like litchi, mango, jackfruit, banana etc. are considered, the loss will be substantially much higher.

The United Nations Office for the Coordination of Humanitarian Affairs (OCHA) reported that many communities experiences the effects of an El Niño-induced drought in 2015 in Fiji, with farmers lost crops and water supplies dried out and water trucking underway. A drought warning was in place and the Government reported at least 30,000 people were affected.

Other El Niño effects include a drought declaration in Tonga after extremely dry weather for nearly a year and further low rainfall expected for the rest of the year. Emergency water supplies were distributed to the outer islands and water desalination services had to start. (OCHA, 14 Sep 2015)

Current estimates suggest that 4.3 million people in 12 Pacific countries could be at risk from changed rainfall patterns caused by El Niño (drought and increased rainfall). Fiji are reliant on water deliveries because of the country's El Niño-related drought in Western, Eastern and Northern divisions of Fiji.

Fiji is suffering its worst drought in 56 years because of the El Niño weather phenomenon, the Daily Post reports. People living in the west of the main island of Viti Levu have been hit by water shortages since last year and now consumers in Suva and Nausori are experiencing the same fate. In Suva, the Savura Reek Pumping Station will soon have to shut down, for varying lengths of time, due to dwindling water reserves.

Drought in India has resulted in tens of millions of deaths over the course of the 18th, 19th, and 20th centuries. Indian agriculture is heavily dependent on the climate of India: a favourable southwest summer monsoon is critical in securing water for irrigating Indian crops. In some parts of India, the failure of the monsoons result in water shortages, resulting in below-average crop yields. This is particularly true of major drought-prone regions such as southern and eastern Maharashtra northern Karnataka, Andhra Pradesh, Odisha, Gujarat, Telangana and Rajasthan All such episodes of severe drought correlate with El Niño-Southern Oscillation (ENSO) events. In India around 68 percent of the country is prone to drought in varying degrees. Of the entire area, 35 percent receives rainfalls between 750 mm and 1125 mm, which is considered drought prone while 33 percent, which receives rainfalls between less than 750 mm, is considered to be chronically drought prone.

In Indonesia, drought associated with El Niño is reported in 16 of 34 provinces, while 43 districts in eight provinces are facing an extreme drought. The Ministry of Health reported that ten people have died and more than 272,000 people have suffered from acute respiratory infection from August to September 2015 (OCHA, 2015). El Niño meant that the rainy season did not start in December as expected: after a short period of average rain in the first days of January, rainfall returned to well below average in February. Nusa Tenggara Timur (NTT), one of the poorest provinces, is one of the most affected, and makes up almost half of the people in need, as high poverty and malnutrition exacerbate the impact of the drought. In NTT, besides the 500,000 people in need of food assistance, an additional 700,000 are considered at risk of food insecurity (ACAPS, 2016).

An estimated 3 million Indonesians live below the poverty line in severely drought impacted districts with 1.2 million of these reliant on rainfall for their food production livelihood. The late onset of rains and subsequent delays in planting have two critical cascading effects: extension of the lean season and increased exposure of the second rice planting to peak dry season which increases the probability of crop damage or failure. (WFP/Govt. Indonesia)

In Iran, as many as nine cities, including the capital Tehran, face water shortages as dams, and much of the lakes in both the east and south, have dried up. The drought is posing a serious threat to millions of people and many Iranians could even be forced to migrate. Iran have had a huge challenge to deal with lack of water and a severe drought. Lakes and dams have dried up and many cities are on the brink of running out of water. In some remote regions, the catastrophe is also threatening the local economy. The drought has become a main concern for many Iranians. For those living and working in Iran, it is a topic impossible to escape. Environmental experts are sounding the alarm for what they say could become one of the worst natural disasters in the Middle East in recent history.

Temperatures have been increasing in Lao PDR due to influence of El Nino on average between 0.1 to 0.3°C per decade between 1951 and 2000. The year 1998 was the highest in temperature in the past two decades with average temperatures of 30°C. This was also the driest year on record with average rainfall of 800 mm. drought affected Malaysia until June 2016. The heat wave was compared to the one in 1997-1998. Sabah and northern Sarawak districts was affected badly. Fires in Sabah have destroyed several hundred hectares of crops. Ten villages were affected. The drought caused water pollution and water scarcity. (ECHO, 20 Mar 2016) In Myanmar, the drought situation is a matter of concern having a total of 146

villages suffered from water shortages during 1915's summer season, while on 2016 those figures increased to roughly 300 villages, with the majority of those villages located in the townships of Ngapudaw, Thabaung, Kyaunggone and Yekyi, according to the records of the Directorate of Water Resources and Improvement of River Systems. (Gov't of Myanmar, 2016) According to the Myanmar Department of Meteorology and Hydrology, since mid-February 2016, Myanmar has been experiencing a severe impact of El Niño including extreme temperatures, unusual rainfall patterns, dry soil, high risk of fires and acute water shortages (OCHA, 2016).

There were no significant distinct trends of precipitation for mean annual, monsoon and winter rainfall of the central Nepal, but there is large inter annual variation. The years 1991, 1992, 2005, 2006 and 2009 were found to be rainfall deficient years. Due to large topographical variation and the presence of the Himalaya, there is large spatial variation within the region. Although there is no overall trend in average precipitation, the area receiving large amount of precipitation showed an increasing trend of precipitation, while dry areas have decreasing trend of precipitation. In addition, the driest months for Nepal, November and December, have significant decreasing trend of precipitation. Trend analysis of SPI reveals a clear tendency toward more droughts over the past decades and is more evident at the longer time scale. Both drought frequency and intensity in recent years were found to have increased. Among the drought years, summer season of year 2004, 2005, 2006, 2009 and winter of year 2006, 2008 and 2009 are the worst since 1981 and have been experienced by almost all areas of central Nepal. Other sources confirm that this drought condition has been severely affecting agricultural production in central Nepal.

Drought has become a frequent phenomenon in Pakistan. The drought of 1998–2002 is considered worst in 50 years. According to a report issued by the Economic Survey of Pakistan, the drought is one of the factors responsible for poor growth performance. Baluchistan especially the western and central parts of the province remain in the grip of drought almost all year round. Drought in the country is common; if the monsoon season fails to deliver rains then drought emerges. In the Philippines on 7 June 2016, the Province of Davao del Norte, in Mindanao, declared a state of calamity due to El Niño-induced drought. An estimated 57,240 families (229,000 people) were affected. Agricultural damage in the province is estimated at US\$19.2 million. A total of 17 provinces across the Philippines were under a state of calamity. (OCHA, 13 June 2016). For the first seven months of 2016, El Niño contributed to about US\$ 258M in crop losses across the country, affecting the production of rice, vegetables and high-value crops. There were some 285,000 affected farmers. (OCHA, 31 Jan 2017) Sri Lanka is suffering its worst drought in four decades, according to officials, with more than a million people experiencing acute water shortages. The lack of rain in 2016 has lowered water levels in rivers in parts of the country. With less water available to drain the sea salt, supplies have been contaminated, especially in the town of Kalutara, south of the capital, Colombo. In the village of Kaluganga, more than 200,000 people were affected, as they lacked access to clean drinking water. It is one of the worst droughts since the 1970s. Farmers have been badly hit by the dry spell as they have managed to plant only a third of the usual 800,000 hectares of paddy fields - the lowest in 30 years.

The Government of Thailand announced 28 provinces throughout the country were at risk of water shortages in February 2016 (Government of Thailand, 26 Feb 2016), In June, a government official said that continuous rainfall that came with the start of the monsoon season had alleviated the country's drought situation.

The worst drought has seen in 2016 in Vietnam in 90 years has been attributed to the El Niño weather event, with 52 out of 63 provinces having been affected. Coupled with the drought's impacts, salt-water intrusion has extended up to 90 km inland in some coastal areas, leaving river water too salty for human or animal consumption, or to irrigate crops and continue fish-farming production (FAO, 23 August 2016).

In the most affected 18 provinces, 2 million people including 520,000 children and 1 million women were in need of humanitarian assistance, as of August 2016. Of the total 2 million people affected, some 500,000 live in the drought-affected South Central and Central Highlands Regions, and 1.5 million live in the Mekong Delta. (UNICEF, 15 Aug 2016) In terms of forecast for the 2016/17 dry season (November to April), river water levels are expected to be: 15-35% lower than average in the Mekong Delta; 20-60% lower than average in the Central

Highlands and 70% lower than average in the South-Central region. For all three regions, rainfall will be slightly higher than average in the coming months (Nov. 2016-Feb. 2017), but lower in the months after. Drought conditions are expected for the coming dry season in the Central Highlands, but not as severe as in 2015/16. The Mekong Delta will also be affected by higher than normal rates of salinity intrusion, but less severe than the previous dry season reported by UN Country Team (UNCT, 16 Sep 2016).

During the peak of the drought (February-May 2016), an estimated 2 million people did not have access to water for consumption and domestic use, 1.1 million were food insecure and more than 2 million people lost incomes due to damaged or lost livelihoods. Risks of water-related diseases and severe acute malnutrition also significantly increased. The total costed recovery needs from October 2016 until 2020, as calculated by the 18 drought affected provinces, is estimated at VND 27,241.2 billion (equivalent to US\$1,221 million) (Govt. Viet Nam/UNCT/OCHA,2016).

#### 3.3.3 Cyclone and Storm Surge

A storm surge or storm tide is a coastal flood or tsunami-like phenomenon of rising water commonly associated with low pressure weather systems (such as tropical cyclones and strong extra tropical cyclones), the severity of which is affected by the shallowness and orientation of the water body relative to storm path, as well as the timing of tides. Most casualties during tropical cyclones occur as the result of storm surges. It is a measure of the rise of water beyond what would be expected by the normal movement related to tides.

The major natural disaster that affects the coastal regions of India is cyclone and as India has a coastline of about 7516 kms; it is exposed to nearly 10 percent of the world's tropical cyclones. About 71 percent of this area is in ten states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Puducherry, Andhra Pradesh, Orissa and West Bengal). The islands of Andaman, Nicobar and Lakshadweep are also prone to cyclones. On an average, about five or six tropical cyclones form in the Bay of Bengal and Arabian sea hit the coast every year. Out of two or three are severe. When a cyclone approaches to coast, a risk of serious loss or damage caused by severe winds, heavy rainfall, storm surges and river floods. The effect of a storm surge is most pronounced in wide and shallow bays exposed to cyclones such as in the northern part of Bay of Bengal. On an average, five or six tropical cyclones occur every year, of which two or three are severe. Most cyclones occur in the Bay of Bengal followed by those in the Arabian Sea and the ratio is approximately 4:1. The incidence of cyclonic storms, with wind speeds between 65 Km/h and 117 Km/h and severe cyclonic storm with wind speeds between 119 Km/h and 164 Km/h, reaching Tamil Nadu and Andhra Pradesh is high during the north east monsoon season i.e. October - December, whereas the highest annual number of storms, severe storms occur in the Orissa - West Bengal coast (GOI, 2011). A severe super cyclonic storm with winds of up to 250 km/hour crossed the coast in Orissa on October 29, 1999. This may have been the worst cyclone of the country in the Orissa region and was responsible for as many as 10,000 deaths, rendering millions homeless and extensive damage to property and environment. Some of the disastrous tropical storms of India and Bangladesh are given in Table 5.

The deadliest storm surge on record was the 1970 Bhola cyclone, which killed up to 500,000 people in the area of the Bay of Bengal. The low-lying coast of the Bay of Bengal is particularly vulnerable to surges caused by tropical cyclones. The deadliest storm surge in the twenty-first century was caused by the Cyclone Nargis, which killed more than 138,000 people in Myanmar in May 2008. The next deadliest in this century was caused by the Typhoon Haiyan (Yolanda), which killed more than 6,000 people in the central Philippines in 2013 and resulted in economic losses estimated at \$14 billion (USD).

Table 5

#### Major Cyclones in India and Bangladesh

Year	Name of the Country	No. Of Deaths	Storm surge (Height in ft.)
1737	Hooghly, West Bengal (India)	3,00,000	40'
1876	Bakerganj (Bangladesh)	2,50,000	10'-40'
1885	False point (Orissa)	5,000	22'
1960	Bangladesh	5490	19"
61	Bangladesh	11,468	16′
1970	Bangladesh	2,00,000	13-17'
1971	Paradeep, Orissa (India)	10,000	7'-20'
1977	Chirala, Andhra Pradesh	10,000	16'-18'
1990	Andhra Pradesh	990	13'-17'
1991	Bangladesh	1,38,000	7'-20'
1998	Porbander cyclone	1,173	
1999	Paradeep, Orissa (India)	9,885	30'

Source: IMD Disastrous weather Events annual reports

#### 3.3.4 Coastal and River Erosion

The archipelagos and peninsulas of Southeast Asia are perceived as areas of active erosion and high sediment yield, an observation borne out by a substantive part of the instrumented case studies from the region. The natural explanations for the high erosion rate include location near active plate margins, pyroclastic eruptions, steep slopes, and mass movements (Milliman & Syvitski, 1992).

Furthermore, parts of Southeast Asia display striking anthropogenic alteration of the landscape resulting in accelerated erosion rates, although such acceleration may be only temporary, operating on a scale of several years. The combination of anthropogenic alteration and fragile landforms gives rise to very high local yields. Sediment yields of more than 150001km" a year" have been estimated from such areas.

The very high rates of sediment yield reported for Southeast Asia have prompted an investigation of the effect of such sediment on channel form and behaviour; its effects on deltas, beaches, mangroves and coral reefs; and whether it leads to a general lowering of environmental quality. The area covered is western Southeast Asia, consisting of parts of Myanmar, Thailand, Lao PDR, Cambodia, Malaysia, Singapore and Indonesia.

For the last decade, many families in this south-western Vietnamese province have been uprooted at least once every two years – but this is not due to economic or political upheaval. Rather, extreme weather has forcibly turned many of these coast-dwellers into unwilling travellers, as raging storms and a rising sea level lead to continued loss of land – and home.

Vietnam has long been subject to typhoons that would typically lash the central coast and the Mekong River Delta. However, in the last several years those typhoons have become even more intense and, accompanied by a rising sea level; have put coastal areas and communities in the Mekong Delta at great risk.

Indeed, a December 2010 World Bank report said that Vietnam experiences longer typhoon and flood seasons while "storms are tracking into new coastal areas". It also noted that Vietnam "may be one of the top five countries in the world likely to be most affected by sea level rise", adding that records already show a sea level increase of about three millimetres annually from 1993 to 2008.

The report lists coastal erosion among the effects of these changes, with some areas already experiencing erosion of about five to 10 metres a year, while others are suffering erosion of as much as one kilometre annually. Increased salinity of coastal aquifers and inundation can also be expected from significant sea level rise, it warned. "Five out of six hamlets in the commune are directly affected by sea water." Already, says Tran Van Giang, vice chairman of Tay Yen commune,

#### 3.3.5 Landslides

Landslides constitute a major natural hazard in South Asian countries, which accounts for considerable loss of life and damage to communication routes, human settlements, agricultural fields and forestlands. Landslides mainly affect the Himalayan region and the western ghats of India. Landslides are also common in the Nilgiri range in southern India. It is estimated that 30 percent of the world's landslides occur in the Himalayas. The Himalayan Mountains, which constitute the youngest and most dominating mountain system in the world, are not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for 3400 kilometres. Due to its unique nature, the Himalayas have a history of landslides that has no comparison with any other mountain range in the world. Landslides are also common in western ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about one hundred landslides, which caused severe damage to communication lines, tea gardens and other cultivated crops. A valley in Nilgiris is called "Avalanches Valley". Scientific observation in north Sikkim and Garhwal regions in the Himalayas clearly reveal that there is an average of two landslides per sq. km. The mean rate of land loss is to the tune of 120 meter per km per year and annual soil loss is about 2500 tonnes per sa. km.

#### 3.3.6 Thunderstorm, Hailstorm and Dust Storm

As winter season transforms into spring, the temperature rises initially in the southern parts of India and most part of Bangladesh faching thunderstorms and squally weather, which are hazardous in nature. While the southernmost part of the country is free from dust storms and hailstorms, such hazardous weather affects the central, north-eastern, north and north-western parts of the country. The hailstorm frequencies are highest in the Assam valley, followed by hills of Uttarakhand, Jharkhand and Vidarbha Maharashtra. However, thunderstorms also occur in Kolkata, Delhi, Jaipur and Ahmedabad. Even though, Tornadoes are rare in India, some that occure are quite devastating.

#### 3.4 Salinity and Soil Quality

Salinity intrusion is an increasing problem in the coastal areas around the world. Climate Change and its associated hazards like sea level rise, cyclone and storm surge have been increasing the salinity problem in many folds. The coastal zone of Bangladesh is already under the constant threat of salinity. Any further increase in sea level may intrude much longer distance in inland as the topography of the coastal zone in Bangladesh is relatively low-lying. It is also observed in Pakistan and Mekong Basins.

In Bangladesh, the coastal zone, more appropriately, exposed coast has come into focus in a number of policy and academic studies for land desertification and loss in agricultural production due to salinity. Although the salinity extends from the exposed to the interior coast with increased land coverage and puts its negative impact in the crop production over the years, the impact of salinity in the interior coast in terms of loss in crop production has been overlooked so far.

A household survey conducted by BCAS (Rabbani et al, 2013) in 2012 in one of the coastal district of Bangladesh demonstrated that salinity caused by extreme events (e.g. cyclone and storm surge) has not only engulfed new farm lands but also intensified during the last decade and particularly over the past five years. The incidence of high salinity in the rice field has undergone a rapid rise since 2009, the year of the cyclone Aila. High Salinity in the rice field being experienced by more than 80 percent farming households compared to 2 percent and 13 percent households that were having high salinity 10 years and 5 years ago respectively. The survey reveals that salinity free farm reduced from more than 60 percent to nil over the past 20 years. Both salinity free and low salinity farmland have turned into high salinity, thus affecting agricultural productivity.



## IMPLICATIONS OF CLIMATE CHANGE ON RURAL LIVELIHOODS

## Implications of Climate Change on Rural Livelihoods

Main features of climate change are increase in temperature, rise in sea level, and extreme weather events, which can harm economy of a country, natural and physical assets and even its developmental efforts, which include poverty alleviation, food and energy security and health care.

The CMCs are highly vulnerable to damaging impact of climate change mainly due to their geographic position. Any development program in these countries should give due consideration to climate change in order to achieve sustainable development and protect from the threat to health and livelihood of millions of people especially those who are poor.

Climate change is likely to have a negative impact on rural livelihoods and agriculture in different ways. Rural people are highly dependent on natural resources and ecosystem services and highly vulnerable to climate change including its effects on water availability, rainfall, hydrological regime, natural disasters, and extreme weather events such as extreme heat waves, cold waves, floods, droughts, hurricanes, tropical cyclones, heavy rain, and snowfalls.

#### 4.1 Impact of climate change on the source of rural livelihoods

Climate change affects resources available for livelihood especially of rural poor. It affects various aspects of natural resources. An account of analysis of impact of climate change on some resources of rural livelihood is given in the proceeding section.

The Himalayan Mountains play a significant role in agriculture and food security in South Asia through water supply, climate and wind regulation, groundwater recharge, and in sustaining wetland ecosystems. The Himalayan glaciers are the headwaters of ten major rivers in Asia. The glaciers store the water from precipitation in the form of ice and release it slowly over time. Glacier contribution to river flow is most important in the dry season when there is no rainfall and in areas of generally low precipitation. The amount of melted water depends on the mass of ice available for melting. This melt water is the major source of dry season water for several large river systems, including the Indus, the Ganges, and the Brahmaputra, which provide the main basis for surface and ground water irrigation. These three rivers form the largest river basins (Indo-Ganga-Brahmaputra), which are the major source of rice and wheat in South Asia. Besides surface water, the contribution of mountain discharge to groundwater is also significant, which makes it an important resource for agriculture and food security in South Asia. In addition to providing surface and groundwater, the Himalayan mountain system provides huge inputs to agriculture by regulating microclimates, as well as wind and monsoon circulation, and by supporting river and wetland ecosystems in South Asia (Eriksson et al. 2009).

Climate change may further reinforce the pressure on available resources and ecosystem services and trigger a vicious cycle of poverty, resource degradation, environmental deterioration, and social unrest. Due to pressure on available resources and ecosystem services, change in climate is currently experienced - which causes extreme weather events and increased the frequency of natural disasters. Global warming may cause increased weather variability, more frequent and intense extreme events

## **4** Chapter

such as droughts, floods, and forest fires, and greater exposure to coastal storm surges. Asia-Pacific countries are more exposed and less resilient to climate hazards.

Developing countries are particularly reliant on ecosystem services and natural capital for production in climate-sensitive sectors. Much of their population lives in physically exposed locations and economically precarious conditions. In addition, their financial and institutional capacity to adapt is limited.

Many of the Asia-Pacific countries are vulnerable to natural hazards including floods, droughts, glacial lake outburst floods, landslides, and tsunamis. Floods are a recurring phenomenon in Bangladesh, India, and Nepal and in some other Asia-Pacific countries. The frequency of high intensity floods and other natural disasters is increasing. Asia-Pacific countries have to incur huge economic and social costs as well as loss of human life due to natural disasters (Table 6). Frequent natural disasters have put enormous constraints on the development potential of these countries and have become a serious concern for rural development.



Economic and social costs of natural disasters in the Asia-Pacific region

	Mortality	People affected per annum on average			Economic loss			Population and area in coastal zones	
	1971-2008 No. of people dying annually	Drought (in thousands)	Floods storms (in thousands)	Share of population (%)	Droughts (million US\$)	Floods and storms (million US\$)	Largest per event loss (%GDP)	Population in low-elevated coastal zones (%)	Area in low-elevation coastal zones (%)
Bangladesh	5, 673	658	8, 751	9.1	0	445.6	9.8	45.6	40.0
India	2, 497	25, 294	22,314	7.2	61.6	1, 055.4	2.5	6.3	2.5
Indonesia	217	121	206	0.3	4. 2	62. 6	9.3	19.6	9.3
Lao PDR	5	112	123	6.3	.03	8. 7	22.8	0	0
Malaysia	12	0	15	0.1	0	28.0	0.9	23.5	6.2
Nepal	137	121	87	2.0	.3	25. 8	24.6	0	0
Pakistan	277	58	1,163	1.3	6.5	120. 9	10.5	2.9	2.8
Philippines	743	172	2,743	4.5	1.7	164.4	11.0	17.7	7.7
Sri Lanka	45	165	282	3.1	0	12. 0	3.7	11.8	8.3
Thailand	95	618	929	2.2	11. 1	132.7		26.3	6.9
Vietnam	393	161	1,749	3.0	17.0	157.6		55.1	20.0

Source: World Bank 2010

Asia Pacific countries continues to be the world's most disaster-prone region even in 2015. Approximately 160 disasters were reported in the region, accounting for 47 per cent of the World's 344 disasters. The region bore the brunt of large-scale catastrophic disasters with over 16,000 fatalities- more than a two-fold increase since 2014. South Asia accounted for a staggering 64 per cent of total global fatalities—the majority was attributed to the 7.6 magnitude earthquake that struck Nepal in April 2015, which caused 8790 deaths. Asia and the Pacific incurred more than US\$46.1 billion in economic damage in 2015 even higher indirect losses. These numbers, however, are gross underestimates as there are no systematic assessment procedures of the cost of all disasters that struck the region, especially slow-onset disasters such as droughts, heat waves, forest fires and haze.

Some common disasters of Asia Pacific region are highlighted here:

#### Flooding

**Afghanistan:** 21 out of 34 provinces in Afghanistan are vulnerable to floods The Western region and central belt are at risk of floods. However, the South West and few northern provinces of Afghanistan (Hirat, Ghor, Urozgan, Jozjan, Balkh and Faryab) can be severely affected by both, flood and drought.

**Bangladesh:** Bangladesh is prone to serious and chronic flooding. Even in an average year, 18% of the landmass is inundated and previous floods have affected 75% of the country (as in 1988). About 75% of the country is below 10m above sea level and 80% is classified as floodplain as Bangladesh is principally the delta region of South Asia's great rivers. Bangladesh floods on a regular basis, recent notable and catastrophic floods have occurred in 1988 (return period of one in every 50 to 100 years), 1998, 2004, 2007 and 2010.

In 2004, floods lasted from July to September and covered 50% of the country at their peak. At the time of the July 2004 floods 40% of the capital, Dhaka was under water. About 600 deaths were reported and 30million people were homeless. Approximately 100,000 people alone in Dhaka suffered from diarrhoea from the floodwaters. Bridges were destroyed, the death toll rose to 750 and the airport and major roads were flooded. This hampered relief efforts. The damage to schools and hospitals was estimated at \$7billion. Rural areas also suffered, the rice crop was devastated, as were important cash crops such as jute and sugar.

**Fiji:** In Fiji, flood is usually caused by torrential rains coupled with cyclones or storms. In 2016, days of torrential rain have caused severe flooding in parts of Fiji as towns lie underwater, and flood warnings remained in place across much of the country's main island of Viti Levu for several days. More than 3,000 families were evacuated in about 50 evacuation centres and some of them forced to live there for more than 10 months as they had lost their homes. This flood caused severe damage to roads blocking smooth movement of people and landslides as well. Further, this flood damaged a water treatment plant in Tamavua affecting treated water supply to people living in central Suva. Further, main trunk line carrying untreated waste from Greater Suva collapsed and sewage spilled in to a creek, which flows through several villages.

In July 2016, the whole village Tukuraki was relocated due to the threat from landslides trigged by heavy rains in 2012. This village hit by frequent natural disasters like Cyclone Evan in late 2012, Cyclone Zena in mid-2016, again in the same year torrential rain brought by Cyclone Winston and damaged the infrastructure and livelihood.

**India:** Floods occur in almost all rivers basins in India. The main causes of floods are heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/ rivers. Ice jams or landslides blocking streams; typhoons and cyclones also cause floods. Flash floods occur due to the high rate of water flow as also due to poor permeability of the soil. Areas with hardpan just below the surface of the soil are more prone to, floods as water fails to seep down to the deeper layers.

Vulnerability to floods and other natural disasters is caused by the high population density, widespread poverty, unemployment, illiteracy, enormous pressure on rural land, and an economy traditionally dominated by agriculture. Children and women are particularly vulnerable. Eighty five percent of the deaths during disasters are of women and children (Centre for Research on the Epidemiology of Disasters, CRED 2000). Presently there is an inadequate level of protection in the country against floods. Though non-structural measures improve the preparedness to floods and reduce losses, the necessity of structural measures would always remain to reduce the extent of physical damage caused by floods. In future, programme, flood control and management planning along with climate change need to be integrated into development planning for the country.

#### Droughts

Drought is another major natural hazard faced by communities directly dependent on rainfall for drinking water, crop production, and rearing of animals. Since ancient times, droughts have far-reaching effects on humankind. Large land areas often suffer damages from dust storms and fire. Drought could be the reason for migration of early human communities. It has long been considered to be a natural hazard responsible for ups and downs of many civilizations of the world.

While droughts can have different causes depending on the area of the world and other natural factors, the majority of scientists have started to link more intense droughts to climate change. That's because as more greenhouse gas emissions are released into the air, causing air temperatures to increase, more moisture evaporates from land and lakes, rivers, and other bodies of water. Warmer temperatures also increase evaporation in plants and soils, which affect plant life and can reduce rainfall even more.

Country wise account of recent drought situation is discussed in the section below:

**Afghanistan:** Afghanistan began experiencing unusual droughts beginning in 1995.Drought combined with conflict has created internally displaced populations that are living in extremely poor conditions. Many communities continue to depend on meagre incomes derived by migrating outside their farmlands. Inadequate rains and snowfall during 2008 to 2010 in parts of Afghanistan caused significant failure of the rain-fed crops in the provinces six provinces: Herat, Jawzjan, Balkh, Badghis, Faryab and Sar-e-Pul. The situation affected the most vulnerable populations and their access to food and water, negatively affecting communities' health and nutrition status.[2] However, in 2012 Afghanistan's long drought has ended due to heavy snow.

**Bangladesh:** Drought has become a recurrent natural phenomenon of north-western Bangladesh (i.e. barind tract) in recent decades. Barind Tract covers most parts of the greater Dinajpur, Rangpur, Pabna, Rajshahi, Bogra, Joypurhat and Naogaon districts of Rajshahi division. Rainfall is comparatively less in Barind Tract than the other parts of the country. The average rainfall is about 1,971 mm, which mainly occurs during the monsoon. Rainfall varies aerially as wells as yearly. For instance, rainfall recorded in 1981 was about 1,738 mm, but in 1992, it was 798 mm. The distribution of rainfall is rather variable from one place to another. Thus, this region has already been known as drought prone area of the country.

The average highest temperature of the Barind region ranges from 35'C to 25'C for the hottest season and 12'C to 15'C for the coolest season. Generally, this particular region of the country is rather hot and considered as a semi-arid region. In summer, some hottest days experience the temperature of about 45'C or even more in the Rajshahi area, particularly at Lalpur. Again, in the winter the temperature even falls at 5'C in some places of Dinajpur and Rangpur districts. Therefore, this older alluvium region experiences the two extremities that clearly contrast with the climatic condition of the rest of the country.

Drought mostly affects Bangladesh in pre-monsoon and post-monsoon periods. From 1949 to 1979, drought conditions had never affected the entire country. The percentage of drought affected areas were 31.63% in 1951, 46.54% in 1957, 37.47% in 1958, 22.39% in 1961, 18.42% in 1966, 42.48% in 1972 and 42.04% in 1979. During 1981 and 1982, droughts affected the production of the monsoon crops only. During the last 50 years, Bangladesh suffered about 20 drought conditions. The drought condition in north-western Bangladesh in recent decades had led to a shortfall of rice production of 3.5 million tons in the 1990s. If other losses, such as, to other crops (all rabi crops, sugarcane, tobacco, wheat etc.) as well as to perennial agricultural resources, such as, bamboo, betel nut, fruits like litchi, mango, jackfruit, banana etc. are considered, the loss will be substantially much higher.

**Fiji:** Fiji is suffering its worst drought in 56 years because of the El Niño weather phenomenon, the Daily Post reports. In Fiji, many communities are experiencing the effects of an El Niño-induced drought, with farmers losing crops and water supplies drying out and water trucking underway. A drought warning is in place and the Government reports at least 30,000 people are now affected. Other El Niño effects include a drought declaration in Tonga after extremely dry weather for nearly a year and further low rainfall expected for the rest of the year. Emergency water supplies were distributed to the outer islands and water desalination services are available if needed (OCHA, 2015).

Current estimates suggest that 4.3 million people in 12 Pacific countries could be at risk from changed rainfall patterns caused by El Niño (drought and increased rainfall). Fiji is reliant on water deliveries because of the country's El Niño-related drought in Western, Eastern and Northern divisions of Fiji.

People living in the west of the main island of Viti Levu have been hit by water shortages since last year and now consumers in Suva and Nausori are experiencing the same fate. In Suva, the Savura Reek Pumping Station will soon have to shut down, for varying lengths of time, due to dwindling water reserves.

**India:** In India, around 68 percent of the country is prone to drought in varying degrees. Of the entire area, 35 percent receives rainfalls between 750 mm and 1125 mm, which is, considers drought prone while 33 percent, which receives rainfalls between less than 750 mm, is considered to be chronically drought prone. Drought in India has resulted in tens of millions of deaths over the course of the 18th, 19th, and 20th centuries. Agriculture sector of India heavily dependents on climatic conditions. Such as a favourable southwest summer season is critical in securing water for irrigating Indian crops. In some parts of India, the failure of the monsoons results in water shortages, resulting in below-average crop yields. This is particularly true of major drought-prone regions such as southern and eastern part of Maharashtra northern part of Karnataka, Andra Pradesh, Odisha, Gujarat, Telangana and Rajasthan. All such episodes of severe drought correlate with El Nino-Southern Oscillation (ENSO) events.

**Indonesia:** In Indonesia, drought associated with El Niño is reported in 16 of 34 provinces, while 43 districts in eight provinces are facing an extreme drought. The Ministry of Health reported that ten people have died and more than 272,000 people have suffered from acute respiratory infection from August to September 2015. (OCHA, 2015). El Niño meant that the rainy season did not start in December as expected: after a short period of average rain in the first days of January, rainfall returned to well below average in February. Nusa Tenggara Timur (NTT), one of the poorest provinces, is one of the most affected, and makes up almost half of the people in need, as high poverty and malnutrition exacerbate the impact of the drought. In NTT, besides the 500,000 people in need of food assistance, an additional 700,000 are considered at risk of food insecurity (ACAPS, 2016).

An estimated three million Indonesians live below the poverty line in severe drought impacted districts with 1.2 million of these reliant on rainfall for their food production livelihood. The late onset of rains and subsequent delays in planting have two critical cascading effects: extension of the lean season and increased exposure of the second rice planting to peak dry season which increases the probability of crop damage or failure. (WFP/Govt. Indonesia)

**Iran:** Iran may have a huge challenge to deal with lack of water and a severe drought. Lakes and dams have dried up and many cities are on the brink of running out of water. In some remote regions, the catastrophe is also threatening the local economy. The drought has become a main concern for many Iranians. For those living and working in Iran, it is a topic impossible to escape. Environmental experts are sounding the alarm for what they say could become one of the worst natural disasters in the Middle East in recent history.

In Iran, as many as nine cities, including the capital Tehran, face water shortages as dams, and much of the lakes in both the east and south, have dried up. The drought is posing a serious threat to millions of people and many Iranians could even be forced to migrate.

**Lao PDR:** Temperatures have increased in Lao PDR due to influence of El Nino on average between 0.1 to 0.3°C per decade between 1951 and 2000. The year 1998 was the highest in temperature in the past two decades with average temperatures of 30°C. This was also the driest year on record with average rainfall of 800mm,

**Malaysia:** The drought affected Malaysia until June 2016. The heat wave was compared to the one in 1997-1998. Sabah and northern Sarawak districts ware affected badly. Fires in Sabah have destroyed several hundred hectares of crops. Ten villages were affected. The drought caused water pollution and water scarcity (ECHO, 2016).

**Myanmar:** In Myanmar, a total of 146 villages suffered from water shortages during 1915's summer season, while on 2016 those figures increased to roughly 300 villages, with the majority of those villages located in the townships of Ngapudaw, Thabaung, Kyaunggone and Yekyi, according to the records of the Directorate of Water Resources and Improvement of River Systems. (Gov't of Myanmar, 2016) According to the Myanmar Department of Meteorology and Hydrology, since mid-February 2016, Myanmar has been experiencing a severe impact of El Niño including extreme temperatures, unusual rainfall patterns, dry soil, high risk of fires and acute water shortages (OCHA, 2016).

**Nepal:** There were no significant distinct trends of precipitation for mean annual, monsoon and winter rainfall of the central Nepal, but there is large inter annual variation. The years 1991, 1992, 2005, 2006 and 2009 are found to be rainfall deficient years. Due to large topographical variation and the presence of the Himalaya, there is large spatial variation

within the region. Although there is no overall trend in average precipitation, the area receiving a large amount of precipitation showed an increasing trend of precipitation, while dry areas have decreasing trend of precipitation. In addition, the driest months for Nepal, November and December, have significant decreasing trend of precipitation. Trend analysis of SPI reveals a clear tendency toward more droughts over the past decades and is more evident at the longer time scale. Both drought frequency and intensity in recent years were found to have increased. Among the drought years, summer season of year 2004, 2005, 2006, 2009 and winter of year 2006, 2008 and 2009 are the worst since 1981 and have been experienced by almost all areas of central Nepal. Other sources confirm that this drought condition has been severely affecting agricultural production in central Nepal.

**Pakistan:** Drought in Pakistan has become a frequent phenomenon in the country. The drought of 1998–2002 is considered worst in 50 years. According to a report issued by the Economic Survey of Pakistan, the drought is one of the factors responsible for poor growth performance. Baluchistan especially the western and central parts of the province remain in the grip of drought almost all year round. Drought in the country is common; if the monsoon season fails to deliver rains then drought emerges.

**Philippines:** In the Philippines on 7 June 2016, the Province of Davao del Norte, in Mindanao, declared a state of calamity due to El Niño-induced drought. An estimated 57,240 families (229,000 people) were affected. Agricultural damage in the province is estimated at US\$19.2 million. A total of 17 provinces across the Philippines were under a state of calamity (OCHA, 2016).

For the first seven months of 2016, El Niño contributed to about US\$ 258M in crop losses across the country, affecting the production of rice, vegetables and high-value crops. There were some 285,000 affected farmers (OCHA, 2017).

**Sri Lanka:** Sri Lanka is suffering its worst drought in four decades, according to officials, with more than a million people experiencing acute water shortages. The lack of rain in 2016 has lowered water levels in rivers in parts of the country. With less water available to drain the sea salt, supplies have been contaminated, especially in the town of Kalutara, south of the capital, Colombo.

In the tail end of river Kaluganga, more than 200,000 people were affected, as they lacked access to clean drinking water. It is one of the worst droughts since the 1970s. Farmers have been badly hit by the dry spell in as they have managed to plant only a third of the usual 800,000 hectares of paddy fields - the lowest in 40 years. FAO and WFP jointly reported that the rice production would drop by 40% i.e. to 2.7million tones in 2017.In addition, Pulses, Onion and Chilies are expected to take a blow due to last four season's consecutive failure in sufficient rainfall.

**Thailand:** In February 2016, the Government of Thailand announced that 28 provinces throughout the country were at risk of water shortages. (Government of Thailand, 2016) In June, a government official said that continuous rainfall that came with the start of the monsoon season had alleviated the country's drought situation (Government of Thailand, 2016).

**Vietnam:** In Vietnam, the worst drought the country has seen in 2016 in 90 years has been attributed to the El Niño weather event, with 52 out of 63 provinces having been affected by drought. Coupled with the drought's impacts, saltwater intrusion has extended up to 90 km inland in some coastal areas, leaving river water too salty for human or animal consumption, or to irrigate crops and continue fish-farming production (FAO, 2016).

In the most affected 18 provinces, 2 million people including 520,000 children and 1 million women were in need of humanitarian assistance, as of August 2016. Of the total 2 million people affected, some 500,000 live in the drought-affected South Central and Central Highlands Regions, and 1.5 million live in the Mekong Delta (UNICEF, 2016).

In terms of forecast for the 2016/17 dry season (November to April), river water levels are expected to be: 15-35% lower than average in the Mekong Delta; 20-60% lower than average in the Central Highlands and 70% lower than average in the South-Central region. For all three regions, rainfall will be slightly higher than average in the coming months (Nov. 2016-Feb. 2017), but lower in the months after. Drought conditions are expected for the coming dry season in the Central Highlands, but not as severe as in 2015/16. The Mekong Delta will also be affected by higher than normal rates of salinity intrusion, but less severe than the previous dry season (UNCT, 2016).

During the peak of the drought (February-May 2016), an estimated 2 million people did not have access to water for consumption and domestic use, 1.1 million were food insecure and more than 2 million people lost incomes due to damaged or lost livelihoods. Risks of water-related diseases and severe acute malnutrition also significantly increased. The total costed recovery needs from October 2016 until 2020, as calculated by the 18 drought affected provinces, is estimated at VND 27,241.2 billion (equivalent to US\$1,221 million) (Govt. Viet Nam/UNCT/OCHA, 2016).

#### Sea Level Rise

Climate change has a direct impact on rising sea levels. Sea levels rise is happening due to thermal expansion, melting of glaciers from Greenland and West Antarctica ice sheets (Anemaller, 2008; VanKooten, 2013).

The sea level rise causes loss of fragile land and population displacement, salinization, erosion of sandy beaches, affects agriculture sector leading to yield loss and unemployment, reduce fresh water quality and hamper coastal tourist (Shukla et al, 2003; Leatherman et al, 1997).

IPCC, 2014 reports that the emission of greenhouse gasses from small island nations are negligible in relation to global emission threat to these small island nations like Sri Lanka, Indonesia, Fiji is very high. In addition, IPCC, 1998, reported that a 30cm sea level rise would increase flood intensity by 36-58% all along the coastal line.

Further, increasing global average temperature coupled with sea level rise and extremes in the hydrologic cycle can have negative impacts on human health and diseases like malaria, dengue, fever, diarrhoeal diseases, acute respiratory infections and asthma.

Coastal zones of any country witness some of the deleterious effects of climate change. Coastal flooding through sea level rise and storm surges has the potential to spread water borne diseases like cholera. Sea level rise will bring salt intrusion in to cultivated fertile farmland rendering them useless for the crops cultivated in the area. When agriculture is disrupted, people are forced to flee because their livelihoods are destroyed.

It can also affect the tourism industry upon which millions of people depend for their livelihood especially in India, Sri Lanka, and Indonesia etc. Dwindling fish yield in coastal area can be attributed to changing the temperature of water currents. This will have severe drawbacks on livelihoods of fishing folks living in coastal area.

Sea Level Rise (SLR) largely affects economic growth and welfare at least on the regional scale and channels through the following: (i) the loss of land, (ii) the loss of infrastructure and physical capital, (iii) the loss of social capital and the additional cost from extreme events and coastal floods, and (iv) an increase in expenditure for coastal protection. Further, Hallegate (2012), notes that SLR is a progressive and dynamic process and that it requires a continuous adaptation process in order to cope or readily react to it. Moreover, the complexity of SLR and how it can affect economic growth clearly pose a challenge for quantitative analysis in terms of measurement and actuality.

SLR has serious implications on the livelihood of people living along the coastal line especially in Island nations and countries with long coastal lines. World Bank (2009) reported that Vietnam is one of the five countries predicted to be among the most affected by climate change due to its long coastline, the high concentration of population and economic activity in coastal area and heavy reliance on agriculture, natural resources and forestry. In 2009, National Centre for Hydro-meteorological Forecasting reported that soil water intrusion has approached almost area of Mekong River and in some provinces, the salt water got in to about 70km with an intensity of 13-30%. In Vietnam, sea level rise will have serious implications with its extensive coastline, leading to salinity intrusion and loss of productive land (Asian Disaster Preparedness Centre, 2003). A net rice importer in the 1980s, Vietnam has now become the second-largest rice exporter in the world (FAO 2010).

The Red River Delta and the Mekong Delta are considered the country's two major granaries, accounting for 14 % and 53 % of rice cultivation area, respectively. With its high level of productivity, the Mekong Delta has in recent years contributed half of Vietnam's total rice production and about 90 % of its total rice exports. Damage to rice production due to loss of rice land, based on scenarios of climate change for Vietnam is very serious (MARD, 2009). According to Monre (2003), drought and salt water, intrusion has affected 200ha out of 700ha

of paddy land in Bac Lieu province. Further, he also reported that in Soc Tang province 40,000ha of paddy lands were affected due to the same reason. It is estimated that in Vietnam, sea level rise in each one meter will affect 10% of population and loss of 10% GDP (Tran Duc Viean, 2011).

Indonesia also faces a serious threat of sea level rise. It is estimated that Jakarta Bay will rise by 0.57cm every year causing receding of land surface up to 0.8cm. These two factors together will cause an increased risk of flooding. It is also estimated that more than 43,000farm labours and 81,000farmers will lose their means income in the Subang region of west Jawa alone (Augus et el,2007; Mariah Measey,2010).

Bangladesh is the other country that will be seriously affected by sea level rise and seawater intrusion. It has already been felt the repercussions of these two factors along its long coastal lines.

Fishing, agriculture, shrimp farming, salt farming and tourism are the main economic activities in the coastal area. The Sundarbans is a major source of subsistence for almost 10 million people (Islam & Haque, 2004). Main activities in the Sundarbans area are fisheries, wood collection and honey collection. Almost ten thousand households in the area have neither homestead land nor cultivable land. On the other hand, more than a million households in the area have only homestead but no cultivable land (Islam, 2004).

Sea level rise has various impacts on Bangladesh, a coastal country facing 710 km long coast to the Bay of Bengal. It already has affected Bangladesh by land erosion, salinity intrusion and loss in biodiversity. Its potential threats are coming even strongly in the future. Sea level rise will cause riverbank erosion, salinity intrusion, flood, damage to infrastructures, crop failure, fisheries destruction, loss of biodiversity, etc. along this coast. A one-meter sea level rise (SLR) will affect the country's vast coastal area and flood plain zone.

The main impacts of sea level rise on water resources are fresh water availability reduction by salinity intrusion. Both water and soil salinity along the coast will be increased with the rise in sea level, destroying normal characteristics of coastal soil and water.

According to IPCC 2007 report, it is expected that the sea level will rise by 0.18 to 0.59m by the end of this century. But reality is different as reported by Overpact et al (2006) and Rig Not et al (2006) the magnitude of sea level rise will be far more grater due to recent rapid ice loss from Greenland and Antarctica and it can be expected a sea level rise between 0.5m to 1.4m by 2100 (Rahmsford, 2007).

Shrimp farm areas in the year 2004 were 87-fold more than that of the year 1975. Number of shrimp farms were only 1330 in 1975 in three districts where as in 2004 the number increased to115,900. It is another indicator of salinity intrusion in the coastal zone. Shrimp farming is a recently emerged important industry in Bangladesh started from the input of saline water intrusion into agricultural land. It is a very good example of adaptation/mitigation to impacts of climate change although agricultural farmers lost their livelihood in those areas. Rahman et al (2013) reported that the soil quality of fresh land is degraded due to the seawater intrusion into fresh land, which was previously used for agricultural production. The soil quality of fresh land is degraded due to the addition of saline water, which affects vegetation, aquaculture, ecology as well as health of people of Bangladesh.

It is predicted that the largest mangrove forests of the world in Bangladesh, Sundarbans will be completely lost with 1m rise in sea level (World Bank, 2005) leading to a great loss of heritage, Biodiversity, Fishery resources life and livelihood. Net-like spread root system of mangrove acts as coastal stabilizer and binder (Hossain, 2001) that protects soil erosion in the coastal area. Salinity intrusion will harm the mangrove forest of the area. Decreased mangrove will result in breaking soil composition. Thus, sea level rise will accelerate soil erosion in the coastal area by reducing mangrove forest. Sea level rise also affects coastal fisheries of Bangladesh, which would lead to poor health affect food industry and the earning and livelihood of people (Sarwar, 2005).

The worst scenario that can be predicted is loss of land due to SLR. About 2,500, 8,000 and 14,000 km2 of land with a corresponding percentage of 2%, 5% and 10% with respect to the total land area of the country will be lost due to SLR of 0.1m, 0.3m and 1.0m respectively (Ali, 2000). The potential land loss estimated by IPCC (2001) is even worse. It reports 29,846 sq. km area of land will be lost and 14.8 million people will be landless by 1-m SLR. Land loss leads to loss of

agricultural land, loss of homestead, loss of road and other communication infrastructure and above of loss of wide range of biodiversity. One of the major causes of land loss is erosion. This will leave millions of people homeless. A study by Hutton and Haque (2003) observed that people even displaced ten times during the period of 1981-1993, because of riverbank erosion of the Jamuna River. Thus, erosion will cause financial loss for the displaced people to build their new houses.

Another livelihood that can be affected by erosion is salt industry of Bangladesh. There are 216 saltpans, having an area of 8,153 ha only in Chakaria and Cox's Bazar Sadar Thana of the district, producing 175,030 metric tons of salt annually (Hossain and Lin, 2001). This coastal industry is fully influenced by seawater and its level. A one-metre sea level rise will inundate all the salt fields and will ruin the sectors. Salt farmers cannot move upwards land for the purpose because, physical properties of the soil of the present salt field will not move backward with sea level rise. About 20 million people are directly or indirectly related to salt production (Hossain and Lin, 2001) and/ or trading in Bangladesh. Sea level rise, by inundating salt fields will force this huge number of people to be unemployed.

Fiji: As ocean water warms, it expands causing the sea level to rise. The melting of glaciers and ice sheets also contributes to sea-level rise. Instruments mounted on satellites and tide gauges are used to measure sea level in Fiji. Satellite data indicate sea level has risen in Fiji by about 6 mm per year since 1993. This is larger than the global average of 2.8–3.6 mm per year. This higher rate of rise may be partly related to natural fluctuations that take place year to year or decade to decade caused by phenomena such as the El Niño-Southern Oscillation.

Sea level is expected to continue to rise in Fiji. By 2030, under a very high emissions scenario, this rise in sea level is projected to be in the range of 8–17 cm. The sea-level rise combined with natural year-to-year changes will accentuate the impact of storm surges and coastal flooding. As there is still much to learn, particularly how large ice sheets such as Antarctica and Greenland contribute to sea-level rise, scientists warn larger rises than currently predicted could be possible.

Nurse et al. (2014) reported that small islands are especially vulnerable to sea level rise, cyclones, increasing air and sea surface temperatures, and changing rainfall patterns. More specifically, increased sea level in conjunction with extreme sea level events, such as waves and storm surges, will reduce arable land, affect groundwater reserves, and increase the risk of flooding and erosion in coastal areas as well as infrastructure damage.

The impact of sea level rise is felt differently in low land and in highland. The coastal areas of high islands are vulnerable to sea level rise but it does not threaten the very existence of the nation. On the other hand, low islands are most vulnerable as only a modest sea level rise could cover most of their territorial space. Fiji, comprise of both low and high islands, with the majority of its population concentrated on the two largest islands. Hence, Fiji will be significantly affected by changes in the climate system, with severe consequences projected for local economies and people's livelihoods.

Growing and sustaining local community gardens also became increasingly difficult to maintain due to the saltwater intrusions. In an initial attempt to mitigate the saltwater intrusions and protect the community, a seawall was constructed, however, over time this barrier became ineffective. Hence, in Fiji, relocation of people is being practiced as a last resort of adaptation measure to prevent damage from flooding and salt-water intrusion. However, relocation of communities is financially, psychologically, and socially costly (McNamara and Gibson, 2009).

Fiji plans to move more than 40 villages to higher ground to escape coastal floods and is working on ways to help future migrants from other Pacific island nations as sea levels rise.

#### 4.2 Impact on key areas

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Table
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#### Poverty, per capita growth and sanitary facilities in rural areas

SI	Country Proportion of population living Per capita growth Prevalence of undernourish below poverty line (\$ US 1.9 national income (% of population) purchasing power parity a day) (\$ US)		dernourishment pulation)	Proportion of p improved sani in rural a	oopulation using itation facilities reas-2015			
		Year 2000-7	Year 2010-16	Year 2016	Year 2000	Year 2015	Rural (%)	Urban (%)
1	Afghanistan	36	39.1	610	46	23	27	45
2	Bangladesh	49	31	1330	21	15	62.1	58
3	Fiji	35	27	4830	5	5	88	93
4	India	37	21	1590	17	15	29	63
5	Indonesia	19	11	3440	18	8	48	72
6	Iran	18.7	1	5470	5	6	82	93
7	Lao PDR	33	22	1740	38	17	56	95
8	Malaysia	5	1	10570	3	3	96	96
9	Myanmar	31	26	1160	48	17	77	84
10	Nepal	30	25	730	22	8	44	56
11	Pakistan	64	29	1440	23	20	51	83
12	Philippines	34	21.6	3550	20	14	71	78
13	Sri Lanka	22	6	3800	30	22	97	88
14	Thailand	12	10.5	5720	19	10	96	90
15	Vietnam	20.7	7	1990	24	11	70	94

Source: World Bank report 2016

#### 4.2.1 Poverty

Poverty and risk to disasters are inextricably linked and mutually reinforcing. The poor section of the society is worst affected in case of disaster. The situation further aggravates due to the compulsion of the poor to exploit environmental resources for their survival, increasing the risk and exposure of the society to disasters, in particular those triggered by flood, drought and landslides. Poverty also compels the poor to migrate and live at physically more vulnerable locations, often on unsafe land and in unsafe shelters. Either these inhabitations of the poor at such locations are because there is no other land available at reasonable cost or it is close to the employment opportunities. The inhabitations of the poor people on marginal land are prone to all types of disasters. The type of construction of these houses further deteriorates the condition. These dwellings made up of low cost material without considering technical aspect are easy targets of various hazards.

Data on persons below poverty line in the country is an important input for policy formulation as it shows the enormity of problem of poverty that needs to be tackled. The poverty scenario is more reflected in rural area and issues are very crucial. Table 7 provides data relating to poverty ratio in Asia-Pacific countries based on income per day \$1.90. Although countries claim that poverty is decreasing, issues remain critical and challenging, as they have to deal with huge number of persons in this category. It is seen that relatively high rates of poverty in terms of share of population living below \$1.90 a day are observed in several countries, such as Bangladesh (43.7 percent) and Lao PDR (30.0 percent). In South Asia, the share of population living below \$1.90 a day declined from 50.6 percent in 1990 to 18.8 percent in 2012. Such decline, however, has been much faster in East Asia and Pacific region where the decline was from 60.6 percent in 1990 to 7.2 percent in 2012. These declining rates compare well with decline in the poverty rate across the world, which was from 37.1 percent in 1990 to 12.7 percent in 2012. However, data suggest that combating poverty in some countries of this region is a challenging task for policy makers.

The data in Table 7 suggest that percentage of population living below poverty line is reduced in all member countries except in Afghanistan where it is increased from 36% in 200-7 to 39.1% during 2010-16. However, countries like Iran, Sri Lanka, Philippines, and India have achieved a tremendous progress in this regard. It is reported that climate change can affect the rate of people becoming poverty. The reasons why people falling into poverty or they cannot come out of poverty is directly or indirectly related to environment and climate change. Krishna (2006) reported that in Andra Pradesh, India, a household affected by droughts in the past was 15 times more likely to fall into poverty.

Climate change also affects the flow of people escaping poverty and poverty alleviation is largely driven by assets accumulation (Moser, 2008; Bulch 2011). Low or reduced income due to lower agricultural productivity and assets losses due to natural disasters are some of the causes for slowing down of assets accumulation, which in turn reduce the poverty reduction.

On the other hand, climate change, which leads to natural disasters drastically affects human capital, especially children, by pulling them out from schools, or suffer from permanent health consequences (Hallegate et al 2017). An increase in drought or flood frequency, brought about by climate change could also hamper poverty reduction. Elberts et al (2007) reported that more frequent extreme weather conditions make investments riskier, especially poor people, invest less and less and not be able to come out of poverty. They are caught in the vicious cycle of poverty. In most of the CMCs assets of poverty-stricken people are more vulnerable to climate change and hence steps should be taken to mitigate /and resilience the effect of climate change.

This requires, while poverty reduction and development are continuing targeted actions to help poverty-stricken people to cope with shocks due to climate change like developing early warning system, flood protection, introducing heat resistance crop varieties etc. Ivanic and Martin (2014) reported how poor, poverty-stricken people are affected by flood occurred in different years in Bangladesh. They also pointed out that poor people are much more vulnerable to these weather related extreme events caused by climate change.

Eriksen et al (2007), Schipper (2007) and Bohle (1994) also reported that climatic variability and climate change are widely recognized as factors that may exacerbate poverty particularly in less economically developed countries. In these countries poorer individuals are expected to have a greater propensity to be harmed by climate change for a variety of reasons: they have fewer assets to help them recover from climate shocks and stresses such as droughts, hurricanes, and floods; their livelihoods are more likely to depend on climate sensitive sectors like agriculture, forestry, fishing, and pastoralism (Ribot, 2010; Barua, 2013).

However, as stated by John Roome, Senior Director for Climate Change at the World Bank Group "We have the ability to end extreme poverty even in the face of climate change, but to succeed, climate considerations will need to be integrated into development work. And we will need to act fast, because as climate impacts increase, so will the difficulty and cost of eradicating poverty."

#### 4.2.2 Health

Climate change is the biggest global health threat of the 21st century declared by the world's leading general medical journal, The Lancet. The Asia Pacific region stands particularly vulnerable to its adverse consequences where more than half of the world population lives. Women are the most vulnerable to climate change and its negative health consequences (Costello et al 2009). Climate change affects human health both directly and indirectly. Deaths, injuries, and disabilities can occur as direct consequences of extreme climate events such as heat waves, floods, and storms.

WHO reported that floods triggered by a continuous sea level increase are projected to affect 94 million people in South Asia by 2100. In addition to deaths, physical injuries and diseases, people who experience flooding, may also be at risk of psychological disorders (Arhen et al, 2005).

Climate change also affects mortality and morbidity by creating favourable environments for, and altering the distribution of, climate-sensitive infectious diseases, particularly water-food-and vector-borne diseases. For example, warmer climate often increases the risk of mosquito - transmitted diseases such as dengue fever and malaria. Reduced availability of safe drinking water caused by droughts, floods, or intrusion of warmed salt water into fresh water due to sea level rise increases the risk of diarrhoea diseases. According to Benitez and Mary Ann (2009), Malaysia experienced a dramatic rise in dengue fever cases over the past three decades, from less than 1,000 in 1973 to 46,000 in 2007. In Bangladesh, no serious dengue epidemics were registered before the year 2000. However, the number of dengue cases between 1999 and 2005 reached nearly 20,000, with an annual average of 3,305 cases. Bhutan and Nepal reported dengue epidemics for the first time in 2004 and 2006, respectively (WHO, 2006).

Due to climate warming, mosquitoes that carry malaria parasites are today detected in high-elevation areas of Papua New Guinea, India and Bhutan where they were non-existent in the past. (Dhimal and Bhusal 2009). There is evidence of a positive correlation between El Niño that brings warm temperatures and malaria epidemics in various parts of South Asia. Cruz et al (2007) reported in the 4th Intergovernmental Panel on Climate Change that there will be an increase in morbidity and mortality from diarrhoeal diseases associated with floods and droughts that are affected by climate change in East, South, and South East Asia.

Rising coastal water temperature due to global warming is expected to worsen the prevalence and toxicity of cholera in South Asia. In Bangladesh, cholera epidemics in its coastal areas are associated with the arrival of El Niño as reported by Haines et al (2006).

#### 4.2.3 Education

Children are forced to miss or drop out of school because of destruction of schools or related infrastructure or to help their families recover from extreme climate events. A study conducted by UNICEF in 2011 found that children were often kept out of school after extreme events to help their family and community to clean up debris. Negative impacts of climate change on livelihoods make parents to remove their children from school. A study conducted by the World Bank on the impact of disasters on human capital shows that household income typically falls after a disaster, especially for already poor households; the effects of reduced household expenditure included a decline in investments in children's education (Baez et al, 2010).

A study on school enrolment in rural areas of India found that a 10 per cent decline in agricultural income due to heavy rainfall led to an average decline in school attendance of five days.

A research carried out by UNICEF in Indonesia, Mongolia and the Pacific in 2011provide anecdotal evidence of this. When asked about experiences in the previous year due to bad weather events, children interviewed in Indonesia reported that they had to quit school due to a lack of money, which they associated with crop failure. This was the case far more often in rural than in urban communities (Urbano et al 2011).

#### 4.2.4 Agriculture, Food and livelihoods

Climate change is likely to have a negative impact on rural livelihoods and agriculture in different ways. Rural people are highly dependent on natural resources and ecosystem services and highly vulnerable to climate change including its effects on water availability, rainfall, the hydrological regime, natural disasters, and extreme weather events.

The impact of observed changes in climate trends, variability and extreme events show that the crop yield in many countries of Asia has declined, partly due to rising temperatures and extreme weather events. Several studies have shown that production of rice, maize and wheat in the past few decades have declined in many parts of Asia due to increasing water stress arising partly from increasing temperature, increasing frequency of El Nino and reduction in the number of rainy days (Wijeratne, 1996: Aggarwal et al, 2000; Fischer et al, 2002; Tao et al, 2004). Peng et al (2004) study at the International Rice Research Institute indicates that the yield of rice decreased by 10% for every 1°C in growing season minimum temperature. The frequency of occurrence of climate induced disease and heat stress in Central, East, South and South -East Asia has increased with rising temperatures and rainfall variability.

In a study Parry et al, (1999) and, Rosenzweig et al, (2001) suggested that substantial decline in cereal production potential in Asia could be foreseen by the end of this century due to climate change. However, sub-regional differences in the response of wheat, maize and rice yields to projected climate change could likely to be significant. Results of crop yield projection using HadCM2 shows that crop yields could increase up to 20% in East and South-East Asia while they could decrease up to 30% in South Asia by the mid-21st century. Studies indicate that the combined influence of fertilization effect and the accompanying thermal stress and water scarcity in some regions under the projected climate change scenarios, rice production in Asia could decline by 3.8% by the end of the 21st Century. In Bangladesh, production of rice and wheat might drop by 8% and 32% respectively, by the year 2050 (Faisal and Parveen, 2004). Based on a simulation study on the impacts of climate change on global cereal production (von Braun, 2007), the International Food Policy Research Institute concluded that the negative impact of climate change on world cereal production may vary from 0.6 per cent to 0.9 per cent, but that in South Asia the impact could be as high as 18.2 per cent to 22.1 per cent (Table 8). Similarly, UNDP (2006) warns that increased temperatures and water stress may lead to a 30 per cent decrease in crop yields in South Asia by the mid-21st Century. Although increased temperatures may offer the opportunity to grow cereal crops at certain altitudes in the Himalayas, the environmental costs of this could be very high due to accelerated soil erosion.

#### Expected impacts of climate change on global cereal production

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	1990-2080 (% change)
World	0.6 to -0.9
Developed countries	2.7 to 9.0
Developing countries	-3.3 to -7.2
Southeast Asia	-2.5 to -7.8
South Asia	-18.2 to -22.1
Sub-Saharan Africa	-3.9 to -7.5
Latin America	5.2 to 12.5

Source: von Braun (2007, p. 4)

Damage to agriculture and livestock service centres that provide direct services to farmers have seriously disrupts extension and livestock support services. In addition, damage to a large number of physical facilities, such as training halls, laboratories, garages, boundary walls, toilets, livestock farms, seed stores, water tanks, pump houses, quarantine offices, cooperatives, milk collection centres and chilling centres, both public and private, seriously jeopardises crop and livestock production. Damage to access roads in upland areas by landslides affects the sale of farm produce, particularly perishable vegetables and milk. These losses discourage farmers, decreasing their efforts in production, which leads to decreased production. Besides the agriculture, the livelihood of people dependent on other sectors, such as tourism is directly impacted.

#### 4.2.5 Local Governance

The active commitment and leadership of a local government are important for the implementation of any local disaster risk reduction measures to deal with different stakeholders and multiple layers of government. In many cases, a comprehensive disaster risk reduction measure takes long time to fully implement, and the leadership of the local government is particularly crucial to ensure the political momentum and support among external stakeholders throughout the process.

As the most immediate public service provider and interface with citizens, local governments are naturally situated in the best position to raise citizens' awareness of disaster risks and to listen to their concerns. Even the most sophisticated national disaster risk reduction measures (such as early warning systems) may fail, if communities are not properly informed and engaged. Likewise, community preparedness measures are sometimes as effective as costly public investments in reducing casualties from disasters, and local governments should play a central role in community and training.

In Bangladesh, a national government Ministry has been conducting community risk assessment and disaster risk reduction action planning with municipal governments across the country, as a part of the country's Comprehensive Disaster Management Programme. Local governments were encouraged to participate and assume the responsibility through a 'learn through doing' approach. However, the contribution from local governments varied from one to the other, with the partner NGOs filling gaps in capacity. Moreover, the availability of a
funding mechanism (the Local DRR Fund) to implement identified priority projects ensured local governments and communities could see a clear path from risk assessment to funded action. In Bangladesh, as the result of the community risk assessment, local authorities got practical experience in assessing their risk environment, determining the vulnerabilities of their local communities, and taking the appropriate actions to mitigate them.

In Fiji, with the support from UNDP, the provincial administration of Serua and Namosi mainstreamed disaster risk reduction in local development planning in a flood-prone area. The provincial government incorporated disaster risk reduction and development priorities identified by communities into the provincial development plan.

The provincial government in Jakarta in Indonesia, in partnership with the national, local and technical partners, implemented a process to improve the flood early warning system. As the main owner of the early warning system, the province provided significant political and technical support and publicity. It was highlighted that, in the context of megacities, the collaboration between provincial and city governments is very important in order to coordinate overlapping resources and responsibilities.



An NGO in Nepal helped the Chitwan district and village authorities to promote agricultural livelihood protection and disaster risk reduction, through animal protection, drought mitigation and flood preparedness measures. Both district and village authorities played key coordination roles in implementing these projects at the community level.

Being a long-term process, a disaster risk reduction initiative often suffers from staff changes and uneven interest among. Long-term political commitment is crucial for successfully implementing disaster risk reduction programmes over time. The provincial government of Albay in the Philippines established and managed an independent and institutionalized disaster risk reduction office with permanent staff. Through the office, the government decentralized and mainstreamed disaster risk reduction into local governments' plans and programmes. The fact that the project gained consistent support for its policies and funding from the provincial governors since its inception contributed to the success of the office.

In Vietnam, an international NGO worked with local governments to promote cyclone-resistant buildings and related awareness raising for local communities. Initially supported by the NGO, as the project progressed the local governments took over many roles that the NGO originally fulfilled. They also formed a network of local governments to share the experience with other governments facing similar conditions and risks.



# TRANSITION IN RURAL LIVELIHOODS

# **Transition in Rural Livelihoods**

With the advent of the concept of Sustainable Development, thirteen of the seventeen Goals in SDGs are directly concerned with the natural environment, climate or sustainability and climate change is playing a pivotal role here. It is important to emphasis that climate change inevitably poses a vast risk on community as well as a whole region. It is a potent threat-multiplier for other urgent concerns, such as habitat loss, disease and global food security (IPCC ,2014) and challenges or thwarts the development achievements of the past decades (World Bank (2016). If unchecked, climate change could fundamentally redraw the livelihoods pattern of a community, can cause a radical shift in the development paradigm, and erase the gradually fading line between rural and urban.

Against this backdrop, this chapter will essentially chalk out the implications of climate change on the structural shift in the economy resulting into changing priorities in rural livelihoods options. It will explain how climate change can fade the distinction between rural and urban and how it can cause migration and change in livelihoods as a coping mechanism of climate change.

# 5.1 Structural Shift in the Economy

The recent growth performance of the CMCs is shown in Table 9. It shows significant divergence in growth performance among the countries with growth remaining persistently low in some CMCs and large fluctuation in growth rates over time in almost all countries. During 2010-2014, the average GDP growth rate in only three countries (Afghanistan, Lao PDR and Sri Lanka) exceeded the yearly threshold of 7 percent. But all of them failed to sustain the growth rate in later years.

Shift in the political economy has changed the growth process over the years in the region. In the 1950s, agriculture was a major contributor to GDP in most of the countries in the region; by 2014 its contribution had declined significantly whereas the contribution of the service and industry sectors had increased significantly.

There has been a significant structural shift in the economy towards the urban sector, and within the urban sector, towards the manufacturing and service sectors, especially the informal sector from the rural agriculture sector. This statement is reflected in the Figure 5 showing the pattern of contribution of agriculture sector in GDP in CIRDAP member countries from 1960 to 2016.

In the rural sector, the shift from agriculture sector has been basically towards the non-farm activities. The rural non-farm sector, especially rural industry, is not only associated with agriculture, but also has strong tie with urban sector. Some non-farm industries in rural area provides supply of raw materials for urban industries. At the same time, urban areas also provide markets for the products of rural industries.

# 5 Chapter

Table 9

# Real GDP Growth in CIRDAP Member Countries (Percent per year)

Country	2010-2014	2015	<b>2016</b> ª	2017ª
Afghanistan	7.1	2	3	4
Bangladesh	6.2	6.5	6.8	7
Fiji	3	4	2.2	3.1
India	6	7.6	7.6	7.8
Indonesia	6	4.8	5.3	5.5
Iran Islamic Rep.	0.6	0.8	4.4	5.1
Lao PDR	8	6.4	7	7
Malaysia	5.6	5	4.4	4.8
Myanmar	6.8	8.5	8.5	8
Nepal	4.1	3.4	2.2	4.5
Pakistan	3.6	4.2	4.5	4.8
Philippines	6.4	5.8	6	6.2
Sri Lanka	7.5	4.9	5.4	5.9
Thailand	3.9	2.8	3.2	3.5
Vietnam	5.8	6.7	6.8	6.9

Source: UNESCAP, 2016

\* a - Estimated data



# Contribution of the Agricultural Sector in GDP in the CMCs from 1960 to 2016



Source: World Bank Database

Increased employment towards non-farm sectors, migration to urban region, structural shift towards manufacturing sector are primarily deeply embedded in the stagnant agricultural sector which is a resultant vector of lack of arable, fertile lands and many determining factors like soil condition, weather, temperature, natural disasters etc. Sometimes these features also result into migration to urban area and employment on non-farm sector. For example, many farmers in semi-arid zones of western India, where farming and off-farm opportunities are limited, are migrated to urban areas for livelihoods. In this case. The workers are pulled into non-farm sectors in urban region.

According to an analysis by National Resources Institute, following are the push factors and pull factors of Rural Non-Farm Sectors:



Source: World Bank

Also, in traditional Rural agriculture sector, there has been a significant change; outmoded subsistence farming is gradually being replaced by commercial agriculture. Many farms are now connected with national, regional, and global markets. Agricultural methods are also being modernised in terms of input use, methods of cultivation, harvesting, threshing, and processing. Agribusiness and contract farming have been emerging rapidly. A significant part of the rural economy is, in fact, being redeveloped in the form of non-farm activities in the service sector or small industries, or through non-crop agriculture. The traditional view of agriculture as a 'way of life' and a preferred occupation is no longer tenable.

A wide range of such activities is appearing in rural areas, which is redefining the structure of the rural economy and its links with the urban sector. This structural shift in the rural economy has big implications for rural development.

### **Contribution of different sectors to GDP of CMCs**

Country	Agriculture contribution to GDP			Industry contribution to GDP (%)			Service contribution to GDP (%)					
country	1965*	1988*	2008**	2014***	1965*	1988*	2008**	2014***	1965*	1988*	2008**	2014***
Afghanistan				25.2				21.7				53.1
Bangladesh	53	46	19	16.1	11	14	29	27.6	36	40	52	56.3
Fiji				11				20.9				68.1
India	44	32	18	17	22	46	29	30	34	38	53	53
Iran												
Nepal	65	56	34	32.5	11	16	17	15.1	23	27	50	52.4
Pakistan	40	26	20	25	20	24	27	20.9	40	49	53	54.1
Sri Lanka	28	26	13	9.9	21	27	29	33.8	51	47	57	56.3
Indonesia	56	24	14	13.7			48	42.9	31	40	37	43.2
Lao PDR		59	40	24.8			31	34.7		21	29	40.5
Malaysia	28		10	9	25		48	40.4	47		42	50.6
Philippines	26	23	15	11.3	28	34	32	31.4	46	44	53	57.3
Thailand	32	17	12	10.5	23	35	46	36.8	45	48	43	52.7
Vietnam			20	18.1			42	38.5			38	43.4

Source: \* World Development Report (1990); \*\* World Development Report (2010), \*\*\* ADB (2015)

# 5.2 Changing Priorities in Rural Livelihoods

The last three decades have been seen as a testimonial to unprecedented achievement in world living standards and a decrease in poverty across many fundamental dimensions. This remarkable development occurred as the result of decisions and actions by many government and non-government actors. Embracing of the Millennium Development Goals (MDGs) at the turn of the century provided a strong foundation for international cooperation and development. However, environment, climate and sustainability issues were not prominent in the MDGs. As the impact of climate change has been getting more evident, the world development thinkers are slowly recognising the crucial importance and relevance of this issue in shaping future living standards and indeed for survival and whether the achievement of the last few decades will be continued or advanced, or whether they will be diluted or reversed as an impact of the climate change. In the Sustainable Development Goals (SDGs), agreed in September 2015, make it clear that a new phase is emerging where the issue of in economic development of rural and urban region, poverty reduction, social development and the environment are at the forefront and ever more intertwined. Climate change can redraw the livelihoods pattern of a community, can cause a radical shift in the development paradigm, and erase the gradually fading line between rural and urban.

Against this backdrop there has been a significant change in the priorities of international development agencies and national governments in the allocation of resources. While there is an increasing trend of allocation of resources towards fighting climate change impacts on the poorest of the poor and rural marginalised community as well as the social sector, including social safety nets. It is clear that the share of total development assistance for agriculture has been declining over the years. Likewise, from the viewpoint of rural community, similar trends can be observed in agricultural land usage and employment in agriculture sector in the member countries. Rural people are inclining more towards non-farm activities; thus, the agricultural land is decreasing. The diminishing trend can be identified from the graph based on the data from 1961 to 2015 show that the percentage of land used for agriculture has been declining in almost all CMCs.

Figure

7





Source: World Bank

A parallel, although not uniform, trend can be observed in national resource allocation. Investment in agriculture and rural development decreased up to the end of the century and changed only slightly in the second half of the first decade under the pressure of soaring food prices and high energy costs.

Demographic changes, rapid urban population growth, a structural shift in the rural economy, and rural-urban migration have all changed the overall framework conditions of rural development. This means that rural development strategies can no longer be perceived in the same economic context as visualised in the 1960s and 1970s. Therefore, the nature, scope, and focus of rural development has to move away from traditional agrarian development to broad-based development of the rural economy, environment and ecosystem protection, human resource development, infrastructure development, market development, technology transfer and knowledge sharing.

For development of the rural sector in connection with climate change; every CIRDAP member countries should share the climate smart technologies and its application in rural areas.

# 5.3 Shifting Paradigms in Rural Development

The concept of rural development has evolved over the years along with changes in perspectives on economic development and tied-up with the evolution of economic growth theories. Over the year's climate change has played an indirect yet easily perceptible role in shifting rural development paradigm. In the 1950s, the focus of economic development was to increase gross national product (GNP). The first paradigm shift in rural development occurred in the early to mid-1960s when agriculture was seen as an engine of growth for developing countries that could increase food production and provide employment for the growing rural labour force. Although increasing GNP and the modernisation of agriculture contributed to economic growth and increased agricultural production, the benefits did not trickle down to the poor as expected. Poverty, malnourishment, economic and social deprivation have become widespread resulting in increased inequality. The lesson learned was that the top-down sectoral approach to development cannot address inequality.

The second paradigm shift in rural development took place in the 1970s with emphasis on the redistribution of income to ensure fulfilment of basic needs (food, health, shelter, clothing, education, safe drinking water, sanitation) of all, particularly the poor. Employment generation was considered a vehicle for the distribution of income in achieving the social goal of providing basic services to the poor. The delivery of basic services to the poor was considered a national responsibility making governments critical in ensuring these services and integrated rural development became the main thrust of rural development in the Asia-Pacific region. Besides the farming activity in the rural region, off farm and non-farm activity and employment gradually began to take place with fast industrialisation and drastic increase in manufacturing sector.

The development paradigm of the 1990s focused on private sector-led growth with a reduced role of government in business and development. In turn, government was seen as having an increased role in creating an enabling environment for the smooth functioning of the market and private sector through appropriate fiscal regulations and good governance. Likewise, the role of non-government organisations (NGOs) and civil society was emphasised in poverty alleviation and rural development.

Another paradigm shift in rural development took place recently with a focus on ecologically sound development and mainstreaming rural development in poverty reduction strategy papers (PRSPs). The concept of ecologically sound development emphasises the protection of ecosystems, conservation of resources, minimisation of waste, and maximisation of the use of renewable resources, as well as respect for local social and cultural values, aspirations, and needs.

# 5.4 Fading Boundaries between Rural and Urban Region

The relationship and the distinction between urban and rural region are increasingly changing all over the world. While some of the issues, like changing agricultural systems, are universal, other aspects of the process such as geographic details are specific to certain countries or regions.

Urban and rural land uses in these countries are no longer mutually exclusive, but rather exist on a continuum of community types that are increasingly interconnected. Migration and settlement patterns are also changing the pattern of community development.

Rural areas and urban areas have always been interconnected and maintained a co-dependent relationship, but recent decades have seen new forms of these interconnections: a tendency for rural–urban boundaries to become less well defined, new types of land use and non-farm economic activity on those boundaries. These conditions have important implications for understanding climate change impacts, vulnerabilities, and opportunities for adaptation. Following three critical implications:

#### (a) Climate extremes in rural areas resulting in urban impacts

Tele connections of resources and migration streams mean that climate extremes in non-urban locations with associated shifts in water supply, rural agricultural potential, and the habitability of rural areas will have downstream impacts in cities.

#### (b) Events specific to the rural-urban interface

Given the highly integrated nature of rural– urban interface areas and overarching demand to accommodate both rural and urban demands in these settings, there is a set of impacts, vulnerabilities, and opportunities for adaptation specific to these locations. These impacts include loss of local agricultural production, economic marginalisation resulting from being neither rural or urban, and stress on human health.

#### (c) Integrated infrastructure and service disruption

As urban demands often take preference, interdependent rural and urban resource systems place nearby rural areas at risk, because during conditions of climate stress, rural areas more often suffer resource shortages or other disruptions to sustain resources to cities. For example, under conditions of resource stress associated with climate risk (e.g., droughts) urban areas are at an advantage because of political, social, and economic requirements to maintain service supply to cities to the detriment of relatively marginal rural sites and settlements.

Table

1



Source: ICIMOD

# 5.5 Migration as a Livelihoods Strategy

Migration – seasonal, temporal, or permanent – has become a strong pattern and strategy for livelihoods development and coping climate change impact in the Asia-Pacific region. The term "environmental refugees", first coined in 1985, became a growing concern of the international community about the consequences of migration resulting from environmental deterioration.

As Lonergan notes (1998), five groups of factors can be singled out as environmental push elements that might lead to migration:

- a) Natural disasters;
- b) Development projects that involve changes in the environment;
- c) Progressive evolution of the environment;
- d) Industrial accidents; and
- e) Environmental consequences due to conflicts.

While it is extremely difficult to elaborate scientific predictions by combining climate and migration models (Perch-Nielsen 2004), the expected consequences of climate change can be enumerated and compared to past experiences so as to establish a list of the populations most at risk and the possible resulting emigration flows. Three consequences of climate warming, as forecast in the latest report of the IPCC for the end of the 21st century, appear to be the most threatening potential causes of migrations (Intergovernmental Panel on Climate Change 2007):

- The increase in the strength of tropical hurricanes and the frequency of heavy rains and flooding, due to the rise in evaporation with increased temperatures.
- The growth in the number of droughts, with evaporation contributing to a decrease in soil humidity, often associated with food shortages.
- The increase in sea levels resulting from both water expansion and melting ice.

Climatic conditions and anthropogenic factors mutually reinforce the chronic vulnerability of livelihoods in drought-prone areas. Droughts strike regularly, but it is the limited local capacities and capabilities and the lack of access to various forms of assets that make peoples' livelihoods increasingly vulnerable.

According to a Case Study report by FAO in 2006, Successful local adaptation to climate variability and change requires multiple pathways with well planned, interrelated short- and long-term measures, which are shown in the box:



- Adjusting existing agricultural practices such as adjustment of cropping patterns, selection of drought-tolerant crop varieties; better storage of seeds and fodder; dry seedbeds; or adopting alternative, cash crops;
- Adjusting socio-economic activities such as livelihoods diversification, market facilitation, small-scale cottage industries, integration of traditional knowledge;
- Strengthening local institutions such as self-help programmes, capacity building and awareness raising for local institutions;
- Strengthening formal institutional structures such as local disaster management committees and financial institutions;
- Formulating policy to catalyse enhancement of adaptive livelihoods opportunities;
- Creating awareness and advocacy on climate change and adaptation issues;
- Supporting better research such as on-farm links to new or improved crops including drought-tolerant varieties, and other conducive and adaptive technologies.



# AN OVERVIEW OF RELEVANT KEY POLICIES

# **An Overview of Relevant Key Policies**

CIRDAP focuses on rural development including the eradication of poverty and improving the quality of life of the rural masses. Many interventions, experiments, models, designs, and plans have been made for the improvement of rural development in the past years.

The Sustainable Development is to promote sustained economic growth and development. The relative significance of these goals no doubt varies across countries and in individual countries over time; but the priority for the CMCs is to close the development gaps specially in rural areas in all aspects of development within the shortest possible time. Food, clothing, housing, healthcare and education are the basic needs of human beings in most of the CMCs. Moreover livelihood facilities are comparatively less in rural areas. People are being more interested to live in urban areas due to better income generating scope, education, health and other livelihood facilities. Gradually the urban population is increasing due to urbanisations in CMCs. Therefore, population density has decreased in rural areas. A comparative scenario has been showed in the table 12.



 Table
 Rural population in the year 1960 & 2016 (% of total population)

 12
 12

SI.	Countries	Year 1960	Year 2016
1	Afghanistan	92	73
2	Bangladesh	95	65
3	Fiji	70	46
4	India	82	67
5	Indonesia	85	46
6	Iran	66	26
7	Lao PDR	92	60
8	Malaysia	73	25
9	Myanmar	81	65
10	Nepal	97	81
11	Pakistan	78	61
12	Philippines	70	56
13	Sri Lanka	84	82
14	Thailand	80	48
15	Vietnam	85	66

Source: World Bank report 2016

It is understood from the above mentioned table that the poverty rate has decreased drastically in the CIRDAP member countries both in urban and rural areas. Moreover, per capita growth has also increased. The education, healthcare, food & nutrition and sanitation system has been developed.

Generally rural people depend on agriculture. Rural livelihoods in the CMCs are being more exposed to natural calamities because of climate changes. Disaster also affects the rural livelihood. Different types of disasters are seen in the CMCs. Meanwhile, flood, earthquakes, droughts, snow avalanches, landslides are major disasters. The global temperature has increased due to excess carbon emission. For which sea level has increased in many countries and saline water has entered into the crop lands resulting decrease in crop production. It affects the rural livelihoods. Climate change and disasters are major threats in CIRDAP member countries. The member countries of CIRDAP have individual policies to overcome the threats in view of their country context.

The rural livelihood policies of CMCs in connection with disaster management and climate change issues are highlighted here:

# 6.1 Afghanistan

Agriculture is the backbone of Afghanistan's economy, hence so the Government of Afghanistan pays more attention on agricultural development taking place especially in rural areas. In spite of numerous natural resources (Chromite, coal, gold, iron, natural gas, petroleum, stones, salt etc.). The development progress is hampered due to natural disasters, climate change and political instability. Country's high poverty level, lack of livelihood and income generating opportunities, as well as chronic health problems adds to the country's vulnerability towards managing disaster related risks. Chronically impoverished and conflict ridden communities are so vulnerable that even small scale natural hazards can have devastating effects on peoples' lives. With extremes in climate and tough Geo-physical conditions, the inherent vulnerabilities of the communities are high. Earthquakes, floods, droughts, landslides and avalanches are some of the major disasters in Afghanistan. Over three decades of conflict, coupled with environmental degradation, and insufficient investment in disaster risk reduction strategies, have contributed to increasing vulnerability of the Afghan people to cope with the sudden shock of natural disasters. This ultimately adds to their socio-economic vulnerabilities.

#### Key Policies for Rural Development in Afghanistan

The key policy sectors for rural development in Afghanistan are agriculture, good governance (rule of law, political participation and public administration), health & nutrition, supply of potable water, sanitation, education and social protection. Now a days, natural disasters and climate change are also considered as key policy issues in Afghanistan. The government has warned that climate change is putting "the foundation of the country's economy, stability, and food security under threat and its impacts are seen on rural livelihoods in the country. The rural people particularly the subsistence farmers are suffering for climate change and disasters. This leads to a lot of damage to the crop production, roads, infrastructures etc. Therefore, rural communities of Afghanistan face serious challenges for the development of rural livelihood.

#### **Challenges for Rural Livelihood Development**

Due to its donor dependent economy, implementing the Sustainable Development Goals (SDGs) for Afghanistan will require strong commitment from the development partners to fund the SDGs. Disaster and climate change will have negative effects on Afghanistan's efforts for achieving Sustainable Development Goals. The question is whether Afghanistan has the human and financial capacity to avert the negative impacts of natural disaster and climate change impacts in rural livelihood. The consensus on prediction for the economic growth rate of Afghanistan in the near future is two to three percent. This low rate which will negatively affect Afghanistan's overall economy. The high rate of illiteracy in Afghanistan contributes to malnutrition, poor food utilisation, and poor agricultural practices, which will have negative impacts on the implementation of SDGs.

#### **Disaster Risk Reduction Policy in Afghanistan**

Although the disaster preparedness law was developed three decades ago, it remains relevant and require only minor fine-tuning. The United Nations Assistance Mission in Afghanistan (UNAMA) and the Asian Development Bank has collaborated with the Government of Afghanistan and other partners to develop a national plan for disaster management as well as the strategy for Institutional Strengthening in Risk management. The central Government is reorganising several departments and allocating responsibilities. The Department for Disaster Preparedness (DDP) and the ministry of Rural Rehabilitation and Development (MRRD) are responsible for disaster risk management. DDP receives information from the provincial offices of MRRD (located in each district) on floods, earthquakes, landslides, avalanches, sand movements, storms, locust, epidemics, extreme temperatures (+/-) etc. MRRD and DDP record the information received from the field in their databases. The Red Cross also collects information from their offices and shares them with the responsible government bodies. There was a hazard mapping done in 2003 at the national scale, which ranked all provinces qualitatively in terms of hazards. The information that has been collected from local authorities based on historic events and not through any quantitative, empirical methods.

Organisations working at the community level such as the Afghan Red Crescent Society have provided training in hazard assessment and mapping to community volunteers in order to assist in the preparation of plans, updating of various databases on water, using the monitoring of water levels in wells in certain parts of the country. In the year 2003, the United Nation Center for Regional Development (UNCRD) had joint project with Ministry of Urban Development and Housing (MUDH). They prepared together the guideline for earthquake resistant design, construction, and retrofitting of building in Afghanistan. This guidelines is printed in English and local Persian 8 languages, which is very useful for earthquake design principle for training of engineers, to select the proper material and building construction technology for earthquake safe building in the regions and good for repair and seismic retrofitting of existing buildings. Because of almost three decades of war no proper building codes are established, however, there are building statements in Kabul municipally but hardly implemented.

Ministry of Urban Development is considering the establishment of building codes as the priority and has started working and researching for proper practical building codes specified for different areas in Afghanistan. An emergency fund of 25,000,000 Afs. = \$500,000) created by the central Government and managed by MRRD and DDP. Different ministries have also allocated some part of their annual budget for emergency preparedness and response. Since the government resources are limited they are relying on the direct support of international organisations and foreign support. Limited resources like tents, ambulances, medicines are available in some of the ministries like MRRD,MOH, MOI,MOD etc. Further WHO positioned some (WHO pre-positioned some New Health Emergency Kits (NHEK) and other emergency supplies in regional sub offices. One NHEK is sufficient to cover the health needs of 10,000 patients for 3 months.

In Afghanistan, the education system has undergone several problems during the years of war such as lack of good infrastructures, teachers and updated teaching programs. Therefore, a consistent disaster-preparedness teaching programmes has not been yet introduced to the primary and secondary education system. But Government try to mitigate this problem.

In 2012, the Parliament passed the Disaster Management Law (DML), Strategic National Action Plan (SNAP), National Mitigation Policy (NMP), National level five years Disaster Management Plan, Sectoral Disaster Management plans and some SOPs were also prepared under the institutional leadership of Afghanistan National Disaster Management Authority (ANDMA) to guide the Disaster Management processes in more robust and systematic way. These are main gaps to exist in the present form of disaster management:

- Awareness and Preparedness was very low.
- No strong institutional set for Early Warning System in the country.
- Lack of donor attention to Disaster Risk Reduction (DRR) and resilience as other major humanitarian issues were front-runner for donor attention.
- Disaster management could not capture the inclusiveness to address the vulnerable community very appropriately.
- There is no instrumentation and mechanism for disaster risk communication and data gathering for informed decision-making.
- Low institutional capacity and coordination among different government line ministries.

It has paved the way to reorient complete process and strategy of Disaster Management in Afghanistan to respond appropriate need of preparedness, mitigation, response and recovery. It also highlighted the needs to define the strategic position of ANDMA for five years (2015-2019) in area of disaster management. The main components for strategic positioning of ANDMA\*:

**Component 1:** Establishment of National Disaster Management Information System (NDMIS) and establishment of Comprehensive Early Warning System for at risk communities to cope and understanding the disaster risk of Nation and Communities.

**Component 2:** Strengthening the legislation and institutional mechanism at all level of Governance for effective Disaster Management System.

**Component 3:** Integration of DRM, CCA concepts and Community Resilience in Development agenda of the country. Comprehensive Risk Reduction measures including community based framework for risk reduction.

**Component 4:** Strengthening Disaster Preparedness Response and Recovery in Afghanistan in line with the principle of building back better.

**Component 5:** Knowledge, innovation and education to build "Culture of Safety" and resilience at all level through appropriate capacity development measures.

# **Climate Change Policies in Afghanistan**

Afghanistan is highly vulnerable to the impacts of climate change. A high proportion of Afghans rely on climate-sensitive sectors, particularly agriculture and animal husbandry. Uncertain and extreme climatic conditions such as droughts, floods and erratic rainfall patterns impact on the productivity of these sectors. Climate change therefore poses a direct threat to marginalised, vulnerable communities and sustainable economic development in the country. The country's most severe drought ever, which lasted from 1998 to 2006. Over the next 45 years, scientists predict a decrease in rainfall and a rise in average temperatures of up to 4°C compared to 1999. Droughts are likely to be the norm by 2030, leading to land degradation and desertification. About 80 percent of Afghans depend on rain-fed agriculture and cattle-grazing for their incomes, both of which are threatened by temperature increases and erratic rainfall. Risk and vulnerability assessment in Afghanistan estimates that 36 percent of people have been affected by natural disaster and climate change issues.

Action on Climate Today (ACT) is a five-year programme that works closely with governments of Afghanistan to develop strategies to combat the impact of climate change. This is funded by the UK Department for International Development (DFID), ACT began in 2014 with the aim to help Afghanistan and other partner countries in South Asia for climate change policies, plan and budgets (ACT and UNDP report 2015).

The lack of robust environmental and climate data presents numerous challenges for the development of comprehensive climate projections. Nevertheless, based on currently available climate data analysed in conjunction with global estimation does not match with local situations. Thus, it is imperative that climate change adaptation, based on sound scientific analysis of the changes in local condition and uncertainties, be integrated into sectoral planning to reduce the negative impacts of climate change in Afghanistan and increase resilience. This is particularly important in rural areas where communities rely on agricultural production as a primary means of subsistence and changes in the seasonality of precipitation may present further challenges for agricultural productivity and rural livelihoods. However the Afghanistan National Development Strategy (ANDS) functions as the country's overall road map for national development and was approved by the Cabinet of the Islamic Republic of Afghanistan in April 2008. The ANDS is based on Afghanistan's Sustainable Development Goals (SDGs) and is structured along the three pillars of i) security, ii) rule of law and governance, and iii) economic and social development. The ANDS makes no mention of climate change; however, the economic and social development pillar does target the areas of water and natural resource management, agriculture, energy, and rural development.

<sup>\*</sup> See more at www.andma.gov.af/en/content/view/policy-strategy

Moreover, the ANDS identifies the environment as "a cross-cutting issue that underpins the entire social and economic development framework for the country" and developed the National Environment Strategy (NES) that places particular emphasis on strengthening the capacity of NEPA to perform its regulatory, coordination, and oversight functions, as well as other ministries to actively address environmental considerations including climate change in their programme design.

# 6.2 Bangladesh

#### Key Rural Development Policies in Bangladesh

The main trends and issues of rural livelihood in Bangladesh are natural, human, social, physical and financial assets, vulnerability to income shocks, food & nutrition security and natural resource management. The policy priority of the Government of Bangladesh has been modified from time to time based on needs. It included achieving growth with equitable distribution, employment generation, capacity building for reaping the benefit of market economy, promoting local governance etc. In Bangladesh, a comprehensive rural development effort was started in 1953 through the Village Agricultural and Industrial Development (V-AID) programme. In the post independence period, the IRDP (present name BRDB) gave importance on micro credit program in rural areas to enhance the economic capacity of the poor. Since 1970s the Government of Bangladesh has implemented Five Year Plans (Five Plans) for rural development and poverty alleviation. Currently, number of government and non-governmental programmes such as social safety net programmes, micro credit programme and agricultural programme like "one house one farm" are implementing successfully as poverty alleviation, rural livelihoods development and income generating programmes.

Bangladesh has emerged as Micro-credit hub in this region and one third of the households in rural areas are the beneficiaries of micro credit. According to available data till 2005, about 690 NGOs are operating in the field of micro credit. There are some specialised and big micro finance organisations like Grameen Bank, BRAC, PROSHIKA, Bangladesh Rural Development Board (BRDB) and Palli Karma Sahayak Foundation (PKSF) and various agencies are contributing in poverty reduction, diversifying and improvement of rural livelihoods.

Despite of visible improvement (concrete road, sanitation, healthcare, education, agricultural technology etc.) in rural areas; natural disaster and climate change issues created barriers for the development of rural livelihood. The most vulnerable areas of Bangladesh are Coastal regions, Barind tract and river side areas. Livelihood has been threatened due to constantly flood, drought, cyclone and climate change issues. Crops and vegetables production have been decreased about 30% -35% due to increase of salinity level in the coastal belt of Bangladesh. The salinity level in the coastal areas of Bangladesh was 4-8 decisiemens per metre (dS/m) in the year 2000. Now it is 14 dS/m. On the other hand, the farmers of drought prone areas are also suffering to get better production. They need stress tolerant varieties, climate smart technologies and better management practices. Government of Bangladesh and some donor funded projects has been taken initiative to adapt climate smart agricultural technologies and disaster risk reduction management practices in the vulnerable areas.

Moreover, the Government of Bangladesh (GOB) has initiated the process of formulating Seventh Five Year Disaster Management Plan for the period 2016-2020. In the recent years, the GOB has produced a National Plan on Disaster Management, formulated a Policy on Disaster Management, revised its Standing Orders on Disaster, and enacted its legal framework for disaster risk reduction. Efforts are being made to fulfil GOB's promises through the Hyogo Framework of Action towards providing DRR services to its citizens. On climate change, Bangladesh Climate Change Strategy and Action Plan has been formulated, which has been complemented by the establishment of a number of institutions and funds so that both adaptation and low carbon development may be addressed adequately through the engagement of various stakeholders including the government agencies. Various initiatives of the GOB has received global accolade and generally accepted as amongst best practices across the globe. Despite such ground breaking initiatives and policy frameworks, the GOB recognises a few challenges which needs to be overcome in order to provide adequate services to the citizens towards reducing risks of hazards and disasters with or without climate change and to steer the country's economy in a low carbon and energy efficient pathway.

#### Key Policies on Natural Disaster Management and Climate Change in Bangladesh

Natural disaster and climate change have a profound effect on rural livelihood in Bangladesh. The National Disaster Management Policy defines the national policy on disaster risk reduction and emergency response management, and describes the strategic policy framework and national principles of disaster management in Bangladesh. The Government of Bangladesh through the Standing Orders on Disaster issued in January 1997 created a well-defined disaster management institutional mechanism. The Ministry of Disaster Management and Relief (MoDM&R) of the Government of Bangladesh is overall responsible for coordinating national disaster management efforts across all agencies. Under this ministry a series of inter-related committees, at both national and sub-national levels have been created to ensure effective planning and coordination of disaster risk reduction and emergency response management at all levels.

The overall national policy in this regard is to reduce the underlying risks by:

- Integrating disaster risk reduction approaches and climate change adaptation in all ongoing and future development plans, programmes and policies.
- Enhancing professional skills and knowledge of key personnel on risk reduction, preparedness, warning and forecasting system, climate change risk reduction and post-disaster activities
- Strengthening mechanisms to build capacities for the Community and Institutions at all levels of Community based Programming for risk reduction
- Promote and facilitate the incorporation of longer term disaster risk reduction due to climate change into disaster management
- Promote livelihood strategies and options for poor that incorporates disaster management and risk reduction practices
- Strengthen capacities for risk assessment for flood, cyclone, drought, river bank erosion, pest attacks, earthquake, epidemics, including assessment of climate change risk.

The following issues are considered to establish the policy:

- Creating a legal and institutional framework for effective response management
- Strengthening national capacity for response management with emphasis on preparedness and support to disaster management committees at district, upazila and union levels
- Improving the early warning and community alerting system
- Strengthening search and rescue capabilities of relevant agencies
- Introducing an effective response management coordination mechanism including a relief management logistic system to handle different levels of emergency response
- Establishing an electronic based information management system (Source: National Disaster Management Policy report 2008 and Disaster Management Reference Hand Book 2017).

# Challenged and Gaps

Despite such ground breaking initiatives and policy frameworks, the GOB recognises a few challenges which needs to be overcome in order to provide adequate services to the citizens towards reducing risks of hazards and disasters with or without climate change and to steer the country's economy in a low carbon and energy efficient pathway. The following are identified as current limitations which require immediate attention.

- Limited understanding, knowledge and capacity.
- Inadequate management skills at all tiers.
- Adaptation priorities are yet to be set out.
- Inadequate integration of climate risk with development planning and budgeting.
- Weakness in implementation, monitoring and shared learning.
- Limited financing.
- Weaknesses in institutional coordination

# 6.3 The Republic of Fiji

The policy direction for rural development by the current administration centres specifically on three pillars as espoused in the People's Charter for Change and Progress. The pillars ensure the provision of minimum and affordable basic need to ensure good and income security and to strengthen the effectiveness of service delivery to rural dwellers.

As a small island nation with a land area of close to 18,272 square kilometers, comprising 333 islands and a population of 837,271 (2007 Census) Fiji has had its share of post colonial problems. To date, it is still grappling with the challenges of a developing island nation. The country is severely scarred and is still reeling from problems of governance, race relations, poverty, high unemployment and land tenure. Many rural communities have yet to share in the fruits of development so far. To the present day most are still denied access to basic services and utilities and the problem is more pronounced amongst rural communities. The rural development policies could not be successful due to bureaucratic system imposes top-down control throughout the process. Disaster management and climate change issues has come forward for rural development.

#### **Relevant Key Policies in Fiji**

Some legislations, national plans and strategies which are vital for the effective implementation of disaster risk reduction strategies are still in their draft stages or yet to be endorsed, namely the Joint National Action Plan (JNAP, now referred to as Joint Platform for Climate Change and Disaster Risk Management), the National Climate Change Adaptation Strategy (NCCAS), and the outdated Natural Disaster Management Act reviewed in 2005.

The NCCP (National Climate Change Policy) provides for the policy implementation framework. It describes the policy strategies and identifies the responsible agencies for their implementation. Most of the strategies outlined in the policy cut across sectors and require the contribution of a number of agencies and organisations for effective implementation. The Ministry of Environment currently coordinates all environmental and climate change programmes, projects and activities in the country. The added value is that Ministry of Environment already has vast experience in project implementation of this kind at the national level and it is prudent that such experience and expertise is used to maximum benefit. The National Focal Point for PACC-Fiji is the Chief Executive Officer, Ministry of Environment and the implementing agency for the PACC-Fiji project will be the Ministry of Agriculture, Sugar and Land Resettlement. The office within the MASLR responsible for implementing adaptation activities will be the Drainage and Irrigation Section of the Land and Water Resources Management Division. The national focal point and the implementing agency will be responsible to their respective Chief Executive Officers and serve as secretariat to the National Climate Change Country Team (NCCCT). The NCCCT will provide overall guidance (technical, scientific and policy) to the implementing agency as it relates to the PACC-Fiji project.

However it was reported that Fiji's institutional arrangements and coordination mechanisms are at the heart of the country's response to climate change and disaster risk management. A system of committees, units, offices and other entities has been established but weak connections between the entities results in a fragmented approach marked by a lack of communication and coordination.

The National Climate Change Policy endorsed by Cabinet in 2012 serves as an implementing tool for many of the strategies outlined in the charter linking to climate change activities such as: environmental protection, sustainable management and utilisation of natural resources; strengthening institutional capacities for environmental management and strengthening food security. The National Climate Change Policy was developed by the Department of Environment under its Climate Change Program and later by the CCU upon its transfer to the Ministry of Foreign Affairs. The policy was developed after widespread consultation with all stakeholders from all relevant government sectors, non-government organisations, development partners, and community based organisations.

The National Climate Change Policy provides guidelines for sectors to ensure the current and expected impacts of climate change are considered in their planning and implementation programmes. Disaster risk reduction strategies are provided under Objective 5 of the NCCP. The implementation of the NCCP is supported by the Draft National Climate Change Adaptation Strategy (NCCAS).

The National Climate Change Adaptation Strategy (NCCAS) lays out an approach to identify and implement efficient and effective activities to manage the existing and anticipated consequences of climate change for the land-based resources sectors in Fiji, namely, agriculture, biodiversity, forestry, land and water. These sectors play dominant and essential roles in the economy of Fiji and contribute to livelihoods and the general well-being of the people and the country as a whole.

The NCCAS is aligned with and builds on existing strategies, policies and action plans. The adaptation actions identified in the draft NCCAS are directly linked to the policy objectives and strategies as defined in the National Climate Change Policy. This inter-linkage between the two documents allows the draft NCCAS to directly support the implementation of the NCCP. The draft NCCAS is thus the guiding document and foundation for all upcoming initiatives, programs and projects implemented in Fiji in order to adapt its land based resource sectors to the current and future consequences of climate change and natural disasters.

Key Constraints and Challenges in rural development in Fiji includes the following:

Constraints	Challenges
Many rural areas have poor road, utilities, transport (to market) and social services- All disincentives to follow anything other than a subsistence lifestyle.	Fiji's rural areas have great potential to contribute to economic growth in the areas of tourism, agriculture, forestry and fisheries. The challenge is for government to provide basic infrastructure and market to harness this opportunities.
Several communities have produced sustainable plans or identified sustainable management options but have been handicapped by the lack of financial resources.	The challenge is to explore long term innovative financial mechanisms for supporting the development and implemen- tation of community sustainable develop- ment plants.

# 6.4 India

In 1980s, the Government of India put greater attention on poverty reduction, removal of unemployment and under employment, improving the efficiency of infrastructure and the economic sector. In this period expansion of irrigation, multiple cropping, application of improved technologies, conservation and better use of land and water resources were the key activities adopted for higher agricultural growth and labour absorption. Promotion of export of agricultural products has taken greater attention since 1991 and its effects on incomes of the farmers and employment of poor were considered as favorable. The XI plan also concerned and views agriculture as a growth engine and envisages a strategy of inclusive growth including creation of large scale non-farm employment, decentralisation of development planning process, democratic and people centric governance and public private partnerships in infrastructure development.

The Government of India implemented number of programmes related to rural development, poverty alleviation and rural livelihoods such as Integrated Rural Development Programmes (IRDP), Swarnajayanti Gram Swarozgar Yojana (SGSY), Sampoorna Gramin Rozgar Yojana (SGRY), National Rural Employment Rural Guarantee Programme (NREGP), Integrated Wastelands Development Programme (IWDP), Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP). Many of the programmes comprising self-employment programmes (IRDP, DWCRA, TRYSEM) and wage employment programmes (NREP,FFW, RLEGP) for the small and marginal farmers and landless labour etc. The IRDP covered about 35 million poor families during the eighties and provided 134.5 billion rupees of financial assistance. The NREP (1983) and Rural Landless Employment for the poor at an expenditure of Rs. 75,775 million during the decade of the Eighties. SGSY is the largest self-employment programme for the rural poor, which was evolved by merging the

earlier self employment programmes such as IRDP and Development of Women and Children in Rural Areas (DWCRA) in 1999. Under this programme the government has disbursed credit amount Rs. 107051.6 million as at March 2008. This programme is likely to be enlarged and named as National Rural Livelihood Mission. Another flagship wage employment programme is NREGP, it is the rights based intervention in rural labour markets with focus on transparency, quality implementation and accountability of delivery system to the community. It aims at provision of 100 days of (unskilled) employment for adult members of the rural households who are willing to take up manual work at minimum wage. Under this programme 390.8 million person days of employment have been provided to poor people from 2006/07 to 2008/09.

#### The Key Policy for Rural Livelihood Development

The policies for rural development are in the nature of interventions in rural communities- to provide resources, infrastructures and development services to achieve development goals. It is useful to divide the full range from policy making till achieving goals. A strategy consists of various orderly policy parameters to attain the desired goals. The key rural development policies of India are as follows:

**Land Policy:** Land policy is a crucial element in a rural development strategy in India. It is well-known that distribution of land and other assets is much skewed in India, as the large majorities have small land holdings. This has a direct impact on the ability to earn incomes in rural areas. Land reforms including the protection of the rights of tenants are one of the primary means of transforming rural societies.

It has also been contended that productivity levels of small farms are often greater than those of large farms. This is attributed to the fact that the small peasant puts in more intensive labour on the small plot that belongs to him. Thus land reforms and a land policy that seeks to provide distributive justice may also result in greater agricultural productivity.

**Technology Policy:** Improvements in technologies available to rural societies can have a big impact on them. On one hand, it is essential that newer technologies are adapted to rural societies and on the other, it is necessary that existing technologies are extended to rural areas. Technological planning, research and development are very vital ingredients of rural development.

In India, the agricultural sector is particularly vulnerable to the ravage of the weather. Technological improvements can play a vital role in insulating agriculture from the effects of weather. Rural societies are also characterised by large scale unemployment on the one hand and low productivity on the other. Therefore care has to be taken when new technologies are introduced in rural areas.

Technologies appropriate to rural societies have to be chosen so that there is no large-scale displacement of labour. A judicious balance between achieving higher productivity and increasing employment opportunities to rural communities has to be struck. Rural development strategies have to take this into account in formulating heir programmes.

**Agricultural Policy:** Agriculture remains the main avenue for providing incomes and employment in rural areas. Needless to say, agricultural planning is vital for rural development strategies. The balanced growth of the agricultural sector can play an important role in creating better conditions for those depending on this sector.

**Employment Policy:** Given the extent of unemployment problem in rural India, the need for well-formulated employment programmes can hardly be over stated. Such programmes can insulate fluctuations in rural incomes on account of poor weather conditions IKS is the case when the monsoon fails. Agricultural employment is often seasonal. Under these conditions, rural employment programmes can ensure better spread of employment through the year. The growth of non-agricultural activity within the village economy can also relieve the pressure of population on the land.

**Education, Research and Extension Policy:** In India the problem of illiteracy is particularly acute in rural areas. The lack of education can act as a constraint in furthering rural development. Rural societies, are also characterised by wide spread inequalities in the distribution of incomes and assets. The lack of education creates a situation in which this problem is perpetuated. The spread of education on the one hand, can enable the rural poor to

ensure distributive justice and, on the other, help them inactively participating in rural development programmes.

Research and extension is a very important ingredient of rural development strategies. Research enables furthering knowledge which is appropriate to rural cultures and extension ensures that the gains are actually delivered to the target groups. Trained staff are very important for any rural development programme since they actually interact with the community for whom the programmes are meant.

**Rural Institutions Policy:** Rural institutions need to be reformed and utilised for successfully carrying out rural development. The institutional aspects of rural societies are often ignored when strategies are formulated. The institutional structures such as panchayats need to be nurtured so that there is popular participation in rural development. These structures can act as powerful agents in actually implementing the development strategies.

Since rural settlements are spread out and are often isolated, they cannot be monitored successfully from outside. Contrarily, local monitoring by institutions such as panchayats can actually ensure that programmes are successfully implemented and that the target group actually benefits from such programmes. Rural institutions such as banks and co-operatives can also play a vital role in rural development.

**Price Policy:** The use of a price is also a crucial element in a rural development policy. Agricultural produce has to be priced in such a manner that the farmers enjoy adequate returns. The price policy through the use of subsidies can act as a means of providing essential items of mass consumption to people residing in rural areas. This is particularly essential for those below the poverty line. The spread of the public distribution system through its network of ration shops in rural areas can be used to solve this problem. This is particularly important during periods of poor rainfall when rural Incomes are adversely affected, which in turn has a negative effect on consumption

Subsidies may have other forms—the form of input subsidies to the agricultural sector for example. This is particularly important in the case of fertilisers, pesticides and seeds. Thus, the price policy can act as a useful means of achieving rural development objectives.

The recent thinking along the neo-liberal lines has led to significant changes in the various aspects of the price policy, and it is quite clear that rural India has been subjected to tremendous stress during the liberalisation era: some of it is on account of changes in some aspects of the price policy.

#### National Policy on Disaster Management (NPDM)

The natural disasters cause massive losses of life and property. Droughts, flash floods, cyclones, avalanches, landslides brought on by torrential rains, and snowstorms pose the greatest threats. A natural disaster might be caused by earthquakes, flooding, volcanic eruption, landslides, hurricanes etc. In order to be classified as a disaster it will have profound environmental effect and/or human loss and frequently incurs financial loss. Moreover, frequent summer dust storms cause extensive property damage in North India and deposit large amounts of dust from arid regions.

The National Policy on Disaster Management (NPDM) has been approved by the central government on October 22, 2009 and circulated to all concerned. The policy envisages a safe and disaster resilient India by developing a holistic, proactive, multi-disaster oriented and technology driven strategy through a culture of prevention, mitigation, preparedness and response. The policy covers all aspects of disaster management including institutional and legal arrangements, financial arrangements, disaster prevention, mitigation and preparedness, techno-legal regime, response, relief and rehabilitation, reconstruction and recovery, capacity development, knowledge management, research and development. It focuses on the areas where action is needed and the institutional mechanism through which such action can be channelised.

The NPDM addresses the concerns of all the sections of the society including differently abled persons, women, children and other disadvantaged groups in terms of granting relief and formulating measures for rehabilitation of the persons affected by disasters. The issue of equity and inclusiveness has been accorded due consideration. It aims to bring in transparency and accountability in all aspects of disaster management through involvement of community,

community based organisations, Panchayati Raj Institutions (PRIs), local bodies and civil society.

**National Plan on Disaster Management:** An institutional mechanism for preparation of the National Plan has been put in place, which is under preparation in three parts namely:-

- (i) National Response Plan,
- (ii) National Mitigation Plan and
- (iii) National Capacity Building Plan.

A Facilitation Committee under the Chairmanship of Secretary (Border Management) in the Ministry of Home Affairs and three sub-committees namely: (i) National Response Plan Committee (ii) National Mitigation Plan Committee and (iii) National Capacity Building Plan Committee have been constituted for preparation of the National Plan on Disaster Management.

On June 30, 2008, India's first National Action Plan on Climate Change (NAPCC) was released outlining existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" running through 2017 and directs ministries to submit detailed implementation plans to the Prime Minister's Council on Climate Change. The National action plan identifies the following eight missions:

- National Solar Mission
- National Mission on Sustainable Habitat
- National Mission for Enhanced Energy Efficiency
- National Mission for Sustaining The Himalayan Ecosystem
- National Water Mission
- National Mission for Green India
- National Mission for Sustainable Agriculture
- National Mission for Strategic Knowledge on Climate Change

India is at the top of the list of nations expected to be worst hit by the adverse effects of climate change. India's climate is warming up at a very fast rate. It is warming at a much faster rate than thought previously.

India is one of the world's foremost emitters of CO2. A recent study conducted by Yale and Columbia universities, ranks India 126 out of 132 countries on environmental performances.

India is the world's fourth largest economy and fifth largest greenhouse gas emitter. India accounts for about 5% of global emissions. India's emissions surged 65% between 1990 and 2005 and are projected to increase another 70% by 2020. When compared to other major economies, India's emissions are low. India accounts for only 2% of cumulative energy-related emissions since 1850. On a per capita basis, India's emissions are 70% below the world average and 93% below those of the United States. India has introduced a number of policies that work towards climate change control by reducing or avoiding greenhouse gas emissions. In June 2008, Indian government released India's first National Action Plan on Climate Change, which identified eight core "national missions" continued through 2017.

The goals pertaining to climate change are included in this plan which are-

- Reduce emissions intensity in line with India's Copenhagen pledge; and
- Add 300,000 MW of renewable energy capacity.

One of the government's first acts was to rename the environment ministry the Ministry of Environment, Forests and Climate Change. The newly reconstituted Prime Minister's Council on Climate Change launched new initiatives on coastal zone management, wind energy, health and waste-to-energy.

India has a strong, modernised and growing mainstream economy. It has also adequate scientific and technical talent to deal with the vulnerability to global forces and trends.

However, it would remain seriously exposed and vulnerable to these groups when a large part of its population and resources remain outside the development process. Improving policymaking for rural development is important not only because of the poor conditions of rural areas and communities, but even more because the totality of Indian polity, economy and society will remain seriously vulnerable so long as the policymaking for rural development remains as short-sighted and ineffective as now and the policymaker remains as unconcerned as he has been over the post-Independence period.

Overall, Budget 2018 has delivered a massive 14.34 lakh crore push on rural development to reduce the gap between rural India and urban India. This will propel India towards realising its 8%-plus GDP growth rate dream

# 6.5 Indonesia

#### The Key Policy for Rural Livelihood

Policies of rural development in Indonesia have evolved over time. It began with the land reform policy implemented in the 1960s, then the Green Revolution was implemented in the 1970s and 1980s, the Backward Village Program was implemented in 1990s, the Kecamatan Development Program (KDP) was implemented in 2000s, and Social Protection Programs were implemented thereafter. KDP was carried out for over eight years and was one of the largest empowerment programmes in Indonesia. KDP is now part of the PNPM (National Program for Community Empowerment or Program Nasional Pemberdayaan Mandiri). PNPM was launched in July 2007 aiming to accelerate achievement of three purpose of MDGs viz., improvement of basic education, reduction of under-five mortality rate and the improvement of married women health.

The programs have had positive impacts on rural livelihood, but most of them have not been completely successful. Various implementation gaps can be identified from the programs, which mostly lie in the weak capacity of the bureaucracy to implement the programs, insufficient funding, and the weak management of the poverty database. Therefore, the future of rural development in Indonesia will depend on the government's capacity to manage the programs, the political commitment of national and local leaders to create pro-rural development budgeting, and support from local institutions through decentralisation to improve the targeting of poverty alleviation programs.

In 2000, 58% of the population of 206 million lived in the rural areas. In 2015, it was 45%. So, urbanisation is increasing day by day as other countries. Still there are various livelihood development barriers in rural areas such as lack of access to basic education & medical services, poor infrastructure (safe water, adequate sanitation, transport and roads, electricity) and lack of proper planning and implementation.

#### **Challenges for Agriculture and Rural Development**

This publication proposes a new ARD (Agriculture and Rural Development) strategy to ensure that the agriculture sector remains a vibrant source of growth and poverty reduction. The strategy addresses the changing structure of the rural economy and the many challenges it faces in the domestic and international markets.

The key strategic challenges are:

- Low productivity and quality of agricultural products,
- Low access of farmers to productive resources and to the results of scientific and technological progress, and low capacity to absorb the implications of such results;
- Diversification, to keep up with rapidly changing food consumption patterns and urbanisation; ", land conversion to non-rice farming and non-agricultural usages;
- Universal access to productive assets and employment, to accelerate growth with poverty reduction;
- Destructive utilisation of natural resources and decline in availability of water, especially in Java;
- Political change, including the democratisation and decentralisation of development policy; and
- Globalisation and economic liberalisation.

#### Gaps between Policy and Practice

Indonesia's administrative and regulatory framework cannot yet meet the demands of sustainable development in spite of a long history of support for policy and capacity development both from within the government and with international donor support. The rapid decentralisation process has created additional challenges for environment and natural resource managers are considered to have generated a negative impact on the environment. There are gaps between policies and practices, unclear national priorities, and weak vertical and horizontal integration. National strategies are lacking, e.g. related to increased access to sanitation, or rural electrification (generally correlated to poverty alleviation and easing of gender imbalances). Regulatory bodies in many provinces and districts fall directly under the governor or district heads, which sometimes are the proponents of the projects that shall be regulated, and many provinces and districts are making new interpretation of existing rules. While some of these innovations strengthen environmental controls, many relax them or bypass national standards entirely. Furthermore, environmental data and information on municipal budget allocation and private expenditures are scarce and difficult to gather.

#### **Disaster Risk Reduction Management Policies in Indonesia**

The National Board for Disaster Counter measure was established in 2008 to replace the National Disaster Management Coordinating Board. The chairman of this board is appointed directly by the President of Indonesia ant it reports to the president directly.

The key responsibilities of National Disaster Management Coordinating Board are as follows;

- Provide guidance and direction on disaster management effort that includes disaster prevention, emergency response, rehabilitation, and reconstruction in a fair and equitable
- Assigning the standardisation and implementation of disaster management needs based on laws and regulations
- Delivering information to community disaster management humans
- Disaster management reporting to the President once a month in normal conditions and at all times in a state of emergency
- Use and account for donations / support national and international
- Account for the use of funds received from the State humans
- Carry out other obligations in accordance with laws and human rights
- Develop guidelines for the establishment of the Regional Disaster Management Agency

Indonesia's mid-term national development plan or RPJMN for both 2009-2014 and 2015-2019 have included CCA and DRR as part of development policy priorities. The last development plan also prescribed improved spatial planning, enhanced organisational or institutional mechanisms and better human resources as the foundation for cities' resilience against climate change and disaster risk.

Indonesia has been making great strides in ensuring the establishment of local disaster management agencies in most districts and cities. Statistics suggests that more than 90 percent of the districts and cities (circa >450) in the country have established Local Disaster Management (DM) Agencies (BPBDs). In the last five years, the central government via the National Agency for Disaster Management (BNPB) has facilitated the development of DM Plans in more than 60 districts and cities (about 15% from the total number) as of 2013. At present 122 districts and cities in Indonesia have developed their contingency plans for multiple hazards. Efforts to engage communities and DRR stakeholders in contingency planning and disaster emergency response exercises are also increasing. There is a growing number of disaster simulations and exercises conducted in many parts of the country, with the biggest one - the Mentawai Mega thrust Tsunami Disaster Exercise - being organised in 2013. It was attended by international partners and 18 neighbouring countries.

# 6.6 Islamic Republic of Iran

#### Rural Livelihood Policies in Iran

Since the Islamic revolution, rural development in Iran has had two phases: firstly, 'infrastructure development' and secondly, 'social development'. The second phase emphasised on entrepreneurship, diversification of rural income generation, production credit development, self-employment development, development of rural and small industries, commissioning of rural ICT centers, social capital development, enhancing women's participation and decentralised planning development. The government has increased loan amounts for natural resources and agricultural sector form RIs 1646 billion in 1995 to RIs provides 2951 billion in 2000 and for industrial sector RIs 217 billion in 1995 to RIs 425 billion in 2000. Furthermore, government established Rural Employment Development Soft Loan Fund (REDSLF) in 2002 with the goal of meeting the credit requirements of the rural people. The new process of the Iranian rural development will be more or less based on a series of upstream documents such as the national vision 2025 and the 4th and 5th state economic development plan documents.

The main development challenges faced by the country in the agricultural and rural sector are:

- (a) Harsh conditions of the physical environment, which affect the sustainability of natural resource development and the physical productivity of arable land;
- (b) Constraints to food security and self-sufficiency in major staple crops;
- (c) Inadequate access to food (also in terms of quality of the daily energy intake);
- (d) Low productivity of small-holder farmers, their limited access to land, combined with water shortage, excessive ground water withdrawal, inadequacy of irrigation systems and excessive post-harvest losses;
- (e) Low productivity of livestock and poultry, and threats from trans-boundary diseases;
- (f) Prevailing poverty in rural areas, unequal income distribution, inadequate farm income, and insufficient non-farm revenues in rural areas, especially among specific social groups such as women, younger generations, elderly, nomads, their limited access to productive resources, unemployment/underemployment, and limited opportunities to increase their income;
- (g) Impact of over use of natural resource environment (especially over-grasing in rangelands);
- (h) Inadequate availability of feed material, which cause dependence on imports;
- (i) Inefficiencies in fisheries and problems such as illegal fishing, detrimental fishing practices and increasing pressure on fishing stock, which undermine the sustainability of fishery production;
- (j) Impact of low productivity levels on quality, profitability, competitiveness and comparative advantages of agricultural products; and
- (k) Constraints in the commercialisation of agricultural products also linked to limitations in the trading environment.

National policies respond to these challenges. They are essentially aiming at the following objectives\*:

- (i) Enhance agriculture, its role for the economy and its contribution to combat poverty;
- (ii) Achieve national food security, food self-sufficiency and food safety;
- (iii) Improve agricultural productivity (especially in small-holder farming, livestock and poultry, and fisheries), including water productivity;
- (iv) Enhance commercialisation (increasing profitability, competitiveness and comparative advantages) and reduce dependence on imports;

<sup>\*</sup> See Country Programming Framework (CPF)-2016; Ministry of Jihad-e-Agriculture

- (v) Promote sustainable development of natural resources through desertification control, reduction of over-grasing, limiting irresponsible fishing practices, mitigating effects of climate change;
- (vi) Improve disaster risk management linked to natural calamities (including trans-boundary animal diseases); and
- (vii) Increase the role of non-governmental and private sectors

#### **Key National Disaster Risk Management Policies**

Iran has a high level exposure to multiple disaster risks. Situated in one of the most arid regions of the world, it suffers from frequent, droughts. Moreover, floods, forest fires and sand and dust storms increasingly affect different parts of the country. Iran's main concern however continues to be seismic risk. Due to its particular location in the Alpine-Himalayan mountain range, Iran is also highly vulnerable to numerous and often severe earthquakes. Earthquakes in Iran occur often and are destructive. In 2017, the earthquakes occurred five times in Iran. Among that, the biggest earthquake was occurred in Kermansha province on 12 Nov, 2017. The level of the richter scale was 7.3 Mw. A total of 630 persons were deaths and 8435 persons were injured.

In the last two decades, the Government of the Islamic Republic of Iran took a number of steps to enhance its national disaster management capacity. This has resulted in strong disaster preparedness and emergency response capabilities at national and local levels.

The 5th National Development Plan of the Islamic Republic of Iran (2011-2015) addresses the issue of disaster risk reduction and management in several areas, including enhancement of disaster preparedness and response, upgrading building and construction codes and standards and earthquake prevention measures, improving safety in rural settlements, and importantly, allocation of 2% of annual national budget to disaster risk reduction and management.

**The Emergency Response System in Iran:** Disasters are categorised as being of National, Regional or local significance. Depending on the classification of disasters, the respective authorities take control to direct relief efforts. During the disaster, the relevant organisations are obliged to participate in the response operations upon the call of the Head of the High Council in accordance with pre-planned programs. The cessation and termination of the response operations will be announced by the Head of the High Council.

**Specialised Working groups:** Specialised Working groups under the overall supervision of the Ministry of Interior and headed by their ministries are responsible for managing, coordinating, administrating all activities related to Natural Hazards in their Organisations. The Specialised Working groups includes the followings: Communications; Health and medical care; Droughts, Vegetation diseases and cold; Transportation, lifelines and weather disasters; NGO's; Recovery, Hazardous material, Insurance, Firefighting; Security; Flood, power, sanitations and sea level rise; Fuel and oil supply; Earthquake and landslide; Reconstruction; Environment hazards; Media and public Awareness; and Rescue and relief & public Training. These working groups work at three levels: Local, national and provincial.

**Climate Change Strategy:** Iran launched a national strategic plan for helping the country to adapt and mitigate to risks from climate change. The plan, developed in line with the "Kyoto Protocol" on reducing greenhouse gas emissions and the Paris Agreement to combat climate change, will guide how Iran moves forward on sustainable socio-economic development.

**Strategies and Action Plan:** At the outset the guiding principles governing the strategies and actions are introduced. By guiding principles, we mean the principles whose effects should be internalised throughout the process of decision-making on goal, strategies and action plan definition. This maintains integration and consistency across the planning process. Guiding principles also pinpoint the paradigm opted for. Three guiding principles were identified:

- 1. Sustainable Development is the paradigm for the climate change planning process,
- 2. Global and regional cooperation is a necessary part of the management,
- 3. Reinforcement of integrity in development plans and programs.

1. Sustainable Development (SD) Paradigm: Many of the policies and actions that can protect Iran from the harmful impacts of climate change meet SD compatibility. Comprehensive management of water, sustainable agriculture, optimal fossil fuel consumption and pollution prevention are but a few of them. Fortunately, many of the climate change and SD policies and actions have been considered in the national and provincial development plans. Therefore, pursuing mitigation and adaptation strategies, indeed, proceed on the track of sustainable development.

2. Global and Regional Cooperation: The Middle East region will more likely experience a high degree of vulnerability. Hence both regional and international cooperation are of great importance. In addition to utilisation of scientific and technological findings, exchange of traditional knowledge is also an effective means of cooperation in arid and semi arid regions. However, technology transfer for mitigation is of utmost importance.

3. Reinforcement of Integrity in Development Plans and Programs: While provision of a well-defined plan is very important, existence of consistency and homogeneity (integration) among those who implement is more essential. From a participatory viewpoint, since those who implement a plan, should engage in its preparation, more integration is called for. For an effective CCNSAP, a variety of integration techniques should be employed. Substantive, methodological, procedural, institutional and policy integration are, in a sense, pivotal challenges. Therefore, realisation of the action plan is bound entirely to development and strengthening of institutional arrangement both at the national and provincial levels.

The vision of interrelationship of climate change and sustainable development can be stated as:

- a. 2025 Development Vision of I. R. Iran,
- b. Macro Policies of the Country,
- c. 5th National Development Plan,
- d. All sector-strategic plans and policies.

To realise the vision, the following strategies have been considered:

a. Mitigation of GHGs: Reduction of GHGs has twofold benefits for the country. It meets optimisation of the fuel consumption on the one hand, and improves the international environmental status of the country on the other hand. This is the area that needs broad cooperation of the developed countries, principally in transfer of technology. Regarding our potentials for green energy, solar, wind and nuclear, Iran is also strongly obliged to reduce GHG emissions. In conjunction with technological improvements, utilisation of solar, wind and nuclear energies can reduce the share of fossil fuels.

b. Adaptation to New Climatic Condition: This strategy embraces all policies and plans which deal with development of the resource-based sectors. The broad outlines of this strategy can be observed in most of the national and provincial and sectoral development plans.

c. Promotion of Climate Compatible Management: Due to the weaknesses of institutional arrangements both in the short and long terms, collaborative management is of great importance to implement the climate change action plan.

# 6.7 Lao PDR

#### **Rural Development Policies in Lao PDR**

Rural development is the key component in planning for poverty reduction for Lao PDR. This country has made several changes in its overall economic development from graduating from least developing country status to that of a developing country. This is evident from the continuing growth rate of the nation's GDP. However, as the country enjoys its growth and development, there are still large numbers of people living in poverty, particularly in many rural areas. People in the rural areas who are dependent on agricultural continue to live in poverty as the growth rate of the agricultural sector continues to decline.

Although the government has several policy measures to develop and promote rural development, these policies are not concrete, broad based, enduring or strategic. Agricultural production which is the principal industry of many people in rural areas is still not properly developed. In fact, its contribution to the country's GDP continues to decline. Thus, to promote inclusiveness, the agricultural industry must be modernised, be a priority concern of the policymakers and be developed into a productive industry that can raise the quality of life of many people in the rural areas.

These policies can only be drawn by the country's policymakers, the National Assembly. They are to develop a full rural development and agricultural modernisation law. The law must also encapsulate all the policy options from capacity building, research and development to a more conducive, sound and enduring agricultural development program.

Given its demographic makeup, Lao PDR has an opportunity to capitalise on its future labour force but must do so by investing heavily in rural education. Decentralisation and de-concentration therefore play a key role in ensuring that a successful social delivery system flourishes and that capacity is built in more remote areas of the country.

Challenges of Rural Development: Despite development efforts, Lao PDR remains one of the poorest countries in the world with more than a quarter of its people still living in poverty-mostly in rural areas and mostly tied to subsistence agriculture. Notwithstanding the fact that the government has already instituted reforms to improve and develop the agricultural industry in Lao PDR, the results are not impressive and the agricultural industry's contribution to the country's GDP continues to decline. This stems in part from the fact that the country faces a number of pressing challenges to rural development in general and to agricultural development in particular.

The government lacks an overall concrete and enduring policies that can address rural development in general and agricultural reforms in particular. Although there are measures embodied in many policies of the government, such as the 7 and 8 NSEDPs, Vision 2020, etc. They are scattered and on a piecemeal basis. Effective coordinating mechanisms that create links with other agencies of the government are yet to be institutionalised. There is also a lack of coordinating bodies for harmonising planning, research and development, and extension work to promote rural development. In fact, the government has tended to go backwards in that agricultural land concessions were given away for foreign direct investments. This could possibly result in the decline of the agricultural industry and, with it, a loss of income for people in rural areas. Many of these land concessions were devoted to the construction of buildings and mining facilities, rather than being focused on agricultural production and support for rural development. Several government projects appear to have manifested a "top down" approach at the expense of the requisite "bottom-up" process that could pave the way for rural development.

According to the Ministry of Agriculture and Forestry, other challenges that can be a stumbling block for rural development efforts seem to be the lack of effective and strategic prioritisation of resources and insufficient technical capacity to promote rural development. Many government agencies have concentrated their effort on a certain number of villages in a limited geographic area.

#### **Disaster Risk Reduction Management Policy**

Lao PDR's disaster management reform continues to evolve. The newly created National Disaster Management Committee (NDMC), was endorsed by a Decree by the Prime Minister Decree in 2013. Its institutional model is similar to Indonesia's disaster management structure in the 1990s and early 2000s where the Committee coordinates with DM focal points in Line Ministries and the NDMO at sub-national levels. The government claims that the shift from a reactive response to more proactive or preventive approach, including the increasing use of early warning systems, is a significant product of such reforms.

In general, most disaster financing in Lao PDR is still heavily dependent on international funds. However, the 2013 PM Decree on NDMC has allowed the country to create the Disaster Prevention Fund. This means clearer budget allocation for disaster management. In addition, the government has also created a formal mechanism for social and international donations. For climate change adaptation, at the moment, the Government has access to the United Nations Framework Convention on Climate Change (UNFCCC's) Global Environment Facility (GEF). The GEF granted multi-million dollars for climate financing in 2013 and 2014. However most of the climate financing was skewed towards mitigation rather than adaptation.

Lao PDR has recently created a Plan of Action for Disaster Risk Reduction and Management in Agriculture (2014 -2016). The implementation of the plan is elusive as it appears to be a long list of actions. However, the fact that Lao PDR has recently endorsed the National Socio-Economic Development Plan III (2016-2020) which targets include "Prepare to cope with

the disaster risks and climate change" and "Reducing the instability of agricultural production caused by the impact of disasters (ensure about markets and prices for the agricultural products)" is in itself a progress in the right direction. Interestingly, the 2016-2020 Plan also highlights some of the disaster losses that led to poverty during between 2010 and 2015.

Disaster Management Key Strategic Plan to 2020\*:

- Making Lao society safer and minimising the impact of disaster to people life, country economy, government's and population property.
- To timely assist to the victims of disaster helping they mitigate disaster impact and quick return to normalcy.
- Building completed legal system on disaster management and prevention of disaster impact to individual, community, society and country economy
- Making disaster management concept and environmental protection as unique to development and becoming cultural perception of society.

# 6.8 Malaysia

#### **Rural Development Policy**

Rural development has been the core focus of the Malaysian economic policies since her independence in 1957 through the 1990s. The rural sector is pivotal to the country's economic growth, social and political development. Rural development deliberately induced change in Malaysia. In 1970 the rural population accounts for about 73 % of total population and steadily declined to 38% in 2000, 25.7 % in 2015 and is anticipated to decline further to 22.8 % in 2020 and 20.4 % in 2025. Average gross monthly household income of the rural population is less than half of the urban population. The continued decline of the rural population has given rise to issues of out-migration, aging, shortage of labour, social problems especially drug abuse, land fragmentation, lack of employment amongst youth, dependency on government etc. For example, out-migration among the youth especially between the ages of 20-29, in the rural areas is high, about 36.6%. Although poverty has declined significantly since 1970, however, the incidence of poverty is still common in the rural areas.

#### **Climate Change & Disaster Management Policy**

Malaysia's climate change adaptation framework is reflected in its 2010 National Policy in Climate Change. The National Steering Committee on Climate Change (NSCCC) in the Ministry of Natural Resources and Environment is the focal point for the UNFCCC. Malaysia also has the Cabinet Committee on Climate Change. The National Policy calls for climate-proof and climate-resilient development, and envisions the integration of climate change adaptation measures in disaster risk reduction policies, plans, programmes and projects as reflected in its key actions. Although Malaysia is relatively less vulnerable to natural hazards, it has been facing flood events from time to time. In late 2014, Malaysia experienced her worst ever floods, with an estimated half a million people being affected and damage costs amounting to RM2.851 billion.

To deal with disaster events, Malaysia refers to the National Security Council Directive No.20 on The Policy and Mechanism on National Disaster and Relief Management as the guiding document. Malaysia's National Security Council is the highest authority in disaster management and disaster risk reduction. It serves as the focal point for the National Platform and Action Plan on Disaster Risk Reduction (myDRR), a forum comprising of government agencies at federal and state levels, non-governmental organisations, international organisations, academic institutions, media and private sector. Among its objectives, MyDRR aims to mainstream DRR in Malaysia's national development agenda. In 2011, the Melaka Declaration on Disaster Risk Reduction, which recognises the increased disaster risk associated with climate change, was adopted.

<sup>\*</sup> Source: Minister of Labor and Social Welfare Report; ww.preventionweb.net

Similarly, awareness of the need to address climate change and natural disasters simultaneously is reflected in the 11th Malaysia Plan (2016-2020). Under the 'Pursuing Green Growth for Sustainability and Resilience' agenda, strengthening resilience against climate change and natural disasters through the strengthening of disaster risk management, improving flood mitigation and enhancing climate change adaptation are mentioned. While the integration of disaster risk reduction and climate change adaptation is already called for in relevant policies, the institutions remain largely separated from each other.

# 6.9 Myanmar

In Myanmar about 65 percent of the total population is living in rural areas and depending upon agriculture for their livelihoods. The prime economic objective is the development of agriculture as a base and all-round development of other sectors of the economy as well. Therefore, the Government of Myanmar implements several programmes to achieve objectives of promotion of productivity in agriculture, increase farm income and improve the livelihood of farmers in rural areas. In addition to that, Myanmar government adopted wide-ranging programmes to reduce poverty and develop the agricultural sector such as Agricultural Land Development Programme and Modern Upland Reclamation Project, construction of dams, reservoirs and pump irrigation facilities for the expansion of irrigation networking. Furthermore, government of Myanmar has put special emphasis on micro credit as an important instrument for poverty alleviation and rural livelihood. Three government banks, namely Myanmar Agricultural Development Bank (MADB), Myanmar Economic Bank (MEB) and Livestock and Fisheries Development Bank (LFDB) have been providing micro finance to rural farmers to improve their livelihood activities and income generation.

Rural livelihood policies of Myanmar that enable rural communities to participate in expanding economic opportunities can be central to inclusive growth in Myanmar. Rural communities are home to the majority of Myanmar's population, the majority of its many ethnic groups, and 70 percent of its poor. Development in rural areas is constrained by low returns to agriculture, and significantly lower levels of public service delivery and human development outcomes relative to urban areas. Reforms to enhance agriculture productivity are necessary though not sufficient for improving the welfare and livelihoods of rural communities. These have to be complemented with increased access to social and economic services that can raise human and physical capacity to create the conditions necessary for the growth of a dynamic rural non-farm sector. These reforms could help to not only reduce the drag on rural growth and poverty reduction, but also contribute to structural economic transformation so that the welfare of all people in Myanmar can grow together.

The key rural development policies are emphasised on five components. These are i). good governance process, ii) Targeting strategy iii) Synergy of development intervention strategy iv) sustainable financing and v) effective collaboration strategy. (Source: Department of Rural development, Myanmar 2016).

#### **Climate change and disaster Risk Reduction Management Policy**

Myanmar is vulnerable to natural disasters such as flooding, drought, earthquakes, cyclones, and communicable and infectious disease outbreaks. Myanmar ranks as one of the most vulnerable countries to the effects of climate change and the impacts of natural disasters are expected to increase in the immediate future. Floods and landslides in 2016 demonstrated the vulnerability of the country to natural disasters. In addition to natural disasters, Myanmar has been affected by ongoing national conflicts for the past 40 years, which have yielded population displacements and humanitarian crisis including the Rohingya population. It has affected the national economy and also rural livelihood development.

The Myanmar Climate Change Strategy and Action Plan (MCCSAP) 2016-2030, however, is still in the early stages of development. The drafting of the document is supported by the Myanmar Climate Change Alliance, an initiative by the Global Climate Change Alliance being implemented by the United Nations Human Settlements Programme (UN-Habitat) and the United Nations Environment Programme (UNEP). In the draft, the integration of climate change in disaster management to strengthen disaster preparedness, risk reduction and recovery initiatives is mentioned. Myanmar endorsed its National Development Plan 2011-2031 in 2013. The extent of the incorporation of disasters and climate change in the Plan however remains largely unknown. However, it is interesting to note that Myanmar has planned to deal with climate change in several development sectors.

Myanmar has made significant progress in its disaster management policies, plans, and procedures since 2008, when Cyclone Nargis impacted the country leaving devastation in its aftermath. The Government of Myanmar (GoM) has modified the government structure and created new authorities and plans to improve the effectiveness of disaster management at all levels. While this progress is encouraging and shows the determination of the government to make necessary adjustments, the resources to implement the policy changes have been slower to develop\*.

# 6.10 Nepal

Nepal economy is predominantly based on agriculture, which remains as a main source of livelihood for the majority of the people. Therefore, Nepal government had formulated Land Act (1964) to deal with land reforms. Besides, there are special efforts to improve the conditions of land and agriculture productivity. To improve rural livelihood government has introduced credit facilities for both farm and non-farm activities. Agricultural credit is disbursed by the Agricultural Development Bank and credit for business, commerce and industries is disbursed by the Nepal Industrial Co-operation (NIDC) and the Rastriya Bajijya Bank. In spite of access to finance opportunities are existing in rural areas; still Rural development in Nepal is a complex phenomenon involving an interaction of economic, social, political and cultural factors. The concept of rural development is linked to infrastructural development, commercialisation of agriculture, proper utilisation and mobilisation of resources, food security, creating employment opportunities, inclusive social development in the rural community and modernisation of overall society. However, there are a lot of opportunities to improve rural development in spite of unstable political situation, absence of people's participation, lack of research and political commitment. (Source: A report of Dhaulagiri journal of social and Anthropology).

# **Disaster Risk Reduction Management Policy in Nepal:**

The natural disasters of Nepal are earthquakes, landslides, snowstorms, avalanches and deadly flood. Their policies are well developed for emergency risk reduction and disaster management that they implemented these effectively. In 2015 Nepal suffered from a great deal of disasters when two big earthquakes occurred in a single year. In April 2015, Nepal earthquake killed nearly 9,000 people and injured nearly 22,000.

DRM in Nepal is governed by the Natural Calamity (Relief ) Act, 1982 which established institutional mechanism at various levels (Central, Regional, District and Local) for effective disaster management focusing primarily on preparedness and response. Now, considering the importance of disaster risk reduction, the Constitution of Nepal has clearly spelled out disaster management functions in all the three-tiers of government.

Moreover, disaster risk reduction began to receive more attention from Government side since the 10th Five Year Development Plan (2002-2007) and the subsequent periodic plans. Furthermore, in alignment with Nepal's commitment to the HFA, the Government of Nepal approved the National Strategy for Disaster Risk Management in 2009. This Strategy outlined 29 priority activities for risk reduction and mitigation.

Major policy frameworks on DRM in Nepal

- Constitution of Nepal Natural Calamity (Relief ) Act, 1982
- Local-self Governance Act, 1999
- National Strategy on Disaster Risk Management, 2009
- National Disaster Response Framework, 2013
- Guidance Note on Disaster Preparedness and Response Planning, 2011
- National Guidelines for Search and Rescue, 2014
- District Disaster Preparedness and Response Plans
- Standard Operating Procedures of NEOC (and DEOCs)

The legal framework for disaster management has a long history in Nepal with the Natural Calamity (Relief) Act 2039 promulgated in 1982. This Act allocated the responsibility for preparing and responding to disasters in Nepal to the Government. The Act, for the first time in history of Nepal, provided a disaster management administrative structure in the country.

At the central level, it constituted the Central Disaster Relief Committee (CDRC) with the Minister of Home Affairs as the Chair. The 36-member apex body for disaster management comprises the Secretaries of the Ministries of Finance; Defense; Federal Affairs and Local Development; Urban Development; Health and Population; Agriculture Development; Education and Sports; Environment, Science and Technology; Land Reform and Management, Industry Commerce and Supplies; Foreign Affairs; Water Resources; Information and Communication; Forest and Soil Conservation; Women, Children and Social Welfare, and representatives from the Nepal Army, Nepal Police and Nepal armed Police, and also from the Nepal Red Cross Society, Nepal Scout, Social Welfare Council and the Department of Mines and Geology, the Department of Water Induced Disasters, and the Department of Hydrology and Meteorology.

The Natural Calamity (Relief) Act, 1982 provides for the establishment of regional committees when required. During the 1988 earthquake affecting eastern Nepal and the 1993 floods in south-central Nepal, Regional Service Centre established respectively at Biratnagar and Simara provided relief coordination demonstrating the usefulness of setting up regional committees to coordinate relief activities related to more than one district. However, these centers were closed after the emergency operations were over.

District Disaster Relief Committees (DDRC) is a permanent outfit at the district level to coordinate relief and preparedness. DDRC is chaired by the Chief District Officer (CDO) who is the main administrative functionary to maintain law and order at the district level. Other members to DDRC are the representatives of the district level offices of the various public sector agencies such as district water supply office, district education office and district health office. The Local development Officer (LDO) – the district level officer of the Ministry of Federal Affairs and Local Development, who coordinates development works with the elected bodies at the district level, is the member-secretary of DDRC. At the village level, there is Village Disaster Response Committee led by VDC Secretary\*.

# National Strategy for Disaster Risk Management (NSDRM) 2009

The NSDRM was promulgated in 2009. This strategy has been developed on the base of Hyogo Framework for Action (HFA) 2005. A detailed process was adopted during the preparation of the NSDRM, 2009. Multiple occasions were organised to solicit the view of governmental, non-governmental agencies, local bodies, academic institutions, private sector, UN agencies, INGOs, and civil society organisations. The long term vision of the strategy is to develop Nepal as a disaster-resilient community. It has also a mission to provide guidance and ensure effective disaster management through development and implementation of the concept of effective preparedness for mitigation, disaster risk reduction and incidence of calamities. Besides this, the strategy has been adopted the following directive principles for disaster risk management.

- Mainstream DRR concept into the development plan
- Ensure life safety and social security
- Give emphasis to gender and social inclusion
- Adopt decentralise process of implementation
- Follow the holistic approach
- Give priority to staff safety and security
- Follow one-window policy and cluster approach in implementation of DRM
- Work in the spirit of participation, interaction, and coordination

The strategy has been framed on the foundation of five priority actions of HFA 2005. In addition, 29 activities have been identified within the priority areas. Realising that disaster management is a multidimensional and multi-sectoral responsibility, sectoral strategies have also been adopted. Those sectors are broadly divided into nine areas, which are Agriculture

<sup>\*</sup> see more at Nepal efforts of Nepal towards building a disaster resilient country, Oxfam Nepal.

and Food Security, Health, Education, Shelter, Infrastructure and Physical Planning, Livelihood Protection, Water and Sanitation, Information, Communication, Coordination and Logistics, Search and Rescue and Damage and Need Assessment. The strategy has also proposed new institutional arrangement for disaster management which entails the formation of a National Disaster Management Council (NDMC) being chaired by Prime Minister. Besides, it also envisions National Disaster Management Authority (NDMA) as a secretariat of the council where other three committees under the council for preparedness, rescue and relief and reconstruction and rehabilitation activities. The strategy realises that disaster management is possible only through integrated, participatory, and collaborative involvement of all partners. As such due importance is given to UN agencies, donor communities, inter-governmental agencies, I/NGOs, and people from different segments of civil societies.

**Climate Change Policy of Nepal:** Nepal is one the most vulnerable countries to the impacts of climate change. The country is experiencing a constant increase in temperature, erratic and unpredictable precipitation and storms, irregular frost and fog, and several other types of climate variability. As a result, the threats of ice melting and glacial retreat cause Glacial Lake Outburst Flooding (GLOF); flash floods lead to landslides and inundation in plain areas, as well as casualties and destruction of houses and cultivated lands; new diseases are emerging, damaging livestock and crops; and optimal crop growing locations and timing is shifting, resulting in poor yields. These results are already apparent. In order to improve adaptation to climate change, the government of Nepal (GoN) has been participating in different national and international negotiations as part of their responsibilities in being party to the United Nations Framework Convention on Climate Change (UNFCCC), one among three conventions which emerged during the UN Conference on Environment and Development (Earth Summit) at Rio de Janeiro, Brazil (Upreti, 2009). As there is an obligation of each signatory country to develop a climate change policy, the GoN prepared and promulgated a Climate Change Policy for Nepal, in 2011.

The main goal of Climate Change Policy is to improve livelihoods by mitigating and adapting to the adverse impacts of climate change, adopting a low-carbon emissions socio-economic development path and supporting and collaborating in the spirits of country's commitments to national and international agreements related to climate change.

Key climate change policies\* are as follows:

- a) Climate adaptation and disaster risk reduction
- b) Low carbon development and climate resilience
- c) Access to financial resources and utilisation
- d) Capacity building, peoples' participation and empowerment
- e) Study and research
- f) Technology development, transfer and utilization
- g) Climate-friendly natural resources management.

# 6.11 Pakistan

#### **Rural Livelihood Policy in Pakistan**

The Government of Pakistan since 1953 implemented a number of programmes and project to improve rural livelihood and rural development. The Village Agricultural and Industrial Development Programme (V-AID) was the first comprehensive multi sectoral and multipurpose programme aimed at rural development. The programme focused at increasing income of the rural people, raising the agricultural production and establishment of rural small scale industries. Under this programme the Agricultural Development Finance Corporation (1952) and the Agricultural Bank (1957), the Small Industries Corporation (1956) were established by the government to achieve its target. The Rural Workers Programme (1963-71) was launched with twin objectives of providing gainful employment to rural people and to provide rural infrastructure needs. The focus of the programme was to take up works of labour intensive and create productive assets that include utilisation of available local resources with involvement of local leaders.

<sup>\*</sup> see more at www.climatenepal.org.np

This programme was subsequently merged in People's work programme in 1972. These two programmes provided some temporary employment to the landless laborers. Furthermore, the Government launched another programme namely "Khushhal Pakistan programme-2000" focusing to generate employment through the construction of essential local infrastructure in rural areas and low income urban areas. The programme provided job opportunities to around 2 million people and an amount of Rs. 36 billion was spent in two years time.

During the 1972-80 the Government of Pakistan implemented Integrated Rural Development Programme (IRDP) which aimed at providing services, facilities and opportunities for both farm and non farm activities in the Markaz (centre). This programme was partial success but could not make much headway in bringing socio-economic changes in the rural areas.

The Government of Pakistan implemented Special Development Programmes for improvement of comparatively less developed regions and groups including women, youth and children. Under this programme government has established Bait-UI-MalL (Bank for the poor) which aimed to rehabilitate the children involved in labour due to poverty, vocational training centres for children labour, handicraft schools to enable widows and orphan girls' to earn livelihoods.

To provide the financial services to poor on sustainable basis government has launched micro finance sector development programme since 2000 and established Khushali Bank (KB) for micro finance. It is estimate that 40 micro finance institutions are operating in the country and these institutions have provided credit to the tune of around Rs. 6.6 billion in 2005-06. Furthermore, the government established Pakistan Poverty Alleviation Fund (PAF) in 1997, with endowment of US\$ 9 million, an apex institution to help the poor. Outreach of the programme as of June 2002 was around US\$ 15 million and the number of borrowers were over 65,000. For development of non farm sector employment, government established 'Employer-led-Skill Development Councils' in all provinces. These councils are entrusted to identify needs of geographical area, prioritise them on market demand and to facilitate the training of workers through training providers in public and private sectors. These councils have trained 46,674 persons so far.

#### **Disaster Risk Reduction and Management Policy**

Following the 2005 earthquake, and in light of consecutive floods, droughts and other crises, the government established several disaster management bodies and institutions, of which ERRA and NDMA (at national, provincial and district levels) are the most central. It also reorganised and renamed existing government ministries (i.e. changed the Ministry of Environment to the Ministry of Climate Change) to show that DRR and CCA are high on their agenda. The main policies and strategies developed by federal institutions are the:

- (i) Environment Protection Act 1997 (MoCC (previously Ministry of Environment))
- (ii) National Environment Policy 2003 (MoCC/Minister's Office)
- (iii) National Disaster Risk Management Framework 2007 (NDMA)
- (iv) National Disaster Management Plan 2010 (NDMA)
- (v) National Rangeland Policy 2010a (MoCC)
- (vi) National Climate Change Policy 2012 (MoCC/Minister's Office)
- (vii) National Climate Change Strategy and Action Plan 2013 (MoCC/ Minister's Office)
- (viii) National Disaster Risk Reduction Policy 2013a (NDMA)
- (ix) National Agriculture and Food Security Policy 2013b (Ministry of Agriculture and Food Security)
- (x) National Forest Policy 2014 (MoCC)
- (xi) Pakistan Climate Change Authority Mandate 2016 (inter-ministry).

However, despite some progress, these institutions are still not able to implement any concrete mitigation and adaptation measures. There are several reasons for this. Firstly, with hazards occurring more frequently and intensely, these institutions are too young to develop the skilled human capital, knowledge and experience necessary to address such complex issues. Secondly, politics and power relations among and between government bodies and humanitarian and development organisations hamper their effectiveness. Who is responsible for what, and who is accountable to whom is often unclear, and becomes even more complicated in areas where security issues persist (as in FATA and Swat).
Funding has also influenced the ways in which institutions function, collaborate or compete. For example, the MoCC and NDMA which initiated climate and disaster policies, are dependent on line departments which under the recent eighteenth constitutional amendment were decentralised to the provinces, and are thus no longer reporting and accountable to the federal ministries. Thirdly, there exists a diversity of understandings of vulnerability, which in turn leads to very different types of interventions, many of which are neither sustainable nor transformational. For example, if one views vulnerability as being at risk of exposure to a hazard, avoidance or structural protection might be the chosen measure. On the other hand, an understanding of vulnerability as being at risk in terms of one's weak position in society and inability to adapt, would instead address the root causes of vulnerability such as poverty, lack of political voice, or gender inequality. An important aspect of this is whether the government and humanitarian organisations have the knowledge to understand the complexities of how and why different people experience hazards differently, and adapt or fail to adapt to the challenges of climate change.

The broader institutional landscape in Pakistan in the field of CCA and DRM and reduction is complex, with government, humanitarian and development organisations often competing for space and power. Policies are as well spread across several government bodies and represent different perspectives on how to address climate change challenges. This makes it difficult for implementers to make concerted efforts, and rather leads to disconnected and competing initiatives. What is clear, however, is that these institutions do not operate in a vacuum, and are subject to the broader political, economic, social and international context in which they work. While the international community has been involved in development work in Pakistan for decades, there has been a marked increase in the involvement of humanitarian organisations as disasters have become more frequent. Both the 2005 earthquake and the 2010 flood saw a huge influx of international humanitarian organisations intent on providing relief. Particularly since the 2010 flood, humanitarian organisations have become more interested in how they, too, might play a role not only in preparedness, but in DRR and prevention.

#### **Climate Change Policy**

Climate change policy provides a comprehensive framework for the development of Action Plans for national efforts on adaptation and mitigation. This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.

The main objectives of Pakistan's Climate Change Policy include:

- To pursue sustained economic growth by appropriately addressing the challenges of climate change;
- (ii) To integrate climate change policy with other inter-related national policies;
- (iii) To focus on pro-poor gender sensitive adaptation while also promoting mitigation to the extent possible in a cost-effective manner;
- (iv) To ensure water security, food security and energy security of the country in the face of the challenges posed by climate change;
- (v) To minimise the risks arising from the expected increase in frequency and intensity of extreme weather events such as floods, droughts and tropical storms;
- (vi) To strengthen inter-ministerial decision making and coordination mechanisms on climate change;
- (vii) To facilitate effective use of the opportunities, particularly financial, available both nationally and internationally;
- (viii) To foster the development of appropriate economic incentives to encourage public and private sector investment in adaptation measures;
- (ix) To enhance the awareness, skill and institutional capacity of relevant stakeholders;
- (x) To promote conservation of natural resources and long term sustainability.

#### Gap and Future Strategies in Rural Development Policies

The rural poor (small landholders and landless class) need to participate in the development and implementation of the relevant policies and programs. It requires institutional and technological reforms. For sustainable rural development, conservation and development of natural resources, focusing on protection of environment and biodiversity must be undertaken. Strengthening rural institutions in the country can satisfy the thrust for rural development. There is a need to address the issues of inequality in terms of resources along with the innovation and adoption of cost saving technologies.

There is a strong need to develop and promote agro-based industry in rural areas to create employment opportunities through private-public interventions. This will definitely help in reducing the rural urban migration on one hand and rural poverty on the other. It could be achieved by promoting savings in rural areas, thereby increasing investment opportunities for overall improvement in the income of the rural communities. Proper monitoring and evaluation of rural development programmes must be carried out to ensure successful implementation of programme activities and those who are responsible for not achieving the results must be accounted for.

Initiatives must be taken to address the problems of public health and education for fast growing population. This demand for establishment of schools and health facilities on modern lines. Such facilities would provide productive, healthy and educated labour force to agriculture in particular and to the economy in general.

#### 6.12 Philippines

#### **Rural Livelihood Policies in Philippines**

Although during the 1970s, government heavily intervened in agricultural production, marketing and trade, late 1980s government made to reverse the interventionist policies by deregulating the agricultural sector. Monopolies on sugar, rice and coconut were abolished. A land mark rural development policy is the institution of the comprehensive Agrarian Reform Programme (CARP). It covers both land distribution and other tenure improvement arrangements. The law provided a specific mechanism for the delivery of support services to programme beneficiaries. As at end of December 2006, the government of the Philippines distributed agricultural land 8.556 million hectares for farmers.

In 1997, government was legislated an Agricultural and Fisheries Modernisation Act (AFMA) for the sector's modernisation and rural development. AFMA's major provisions include reforms and reorientation in the provisions of public production and marketing services, human resource development, rationalised and strengthened national agriculture and fisheries education system, rural non farm employment, trade and fiscal incentives. The government provides P 17 billion as annual supplementary budget to fulfil AFMA's targets.

The Kapit Bisig Laban SaKahirapan (KALAHI) or Arm-in-Arm against poverty is the current programme on rural development implemented by the government. The aims of programme are reducing poverty, improving governance and empowering communities. They are following strategies like accelerated assets reform, provision of employment and livelihood opportunities, pro-poor infrastructure development and security from violence and social protection.

The Super Regions Strategy intends to harness the natural advantage of major areas of the country and take advantage of the information technology. Five super regions have been identified each with central theme such as agribusiness, industry and service, tourism, information technology.

#### **Disaster Management Policy in Philippines**

The National Disaster Coordinating Council (NDCC) under the Office of the Civil Defense is the main body in charge of disaster management in the Philippines. The council comprises of representatives from multiple government agencies, and the structure is repeated at regional, provincial, city, municipal and barangay (district) levels. Disaster risk management was supported by Republic Act No. 10121 titled "An Act Strengthening The Philippine Disaster Risk Reduction And Management System, Providing For The National Disaster Risk Reduction and Management Framework And Institutionalising The National Disaster Risk Reduction and Management Plan, Appropriating Funds There for And For Other Purposes" or the Philippine Disaster Risk Reduction and Management Act of 2010.

The framework of integrating disaster risk reduction and climate change reduction is explicitly reflected in the Act. Prior to the passing of this Act, the Philippines has already worked on disaster risk reduction through its Strategic National Action Plan on Disaster Risk Reduction that contains 10-year action plans and 18 priority DRR programs and projects. To operationalise the Act, the National Disaster Risk Reduction and Management Plan (NDRRMP) 2011-2028 was formulated. The Plan acknowledges the need to align its activities with the Philippine Development Plan, National Climate Change Action Plan, and National Security Policy, and takes into account the targets of national development and climate change action plans in the formulation of the Plan's activities and timelines.

As for climate change, Republic Act No. 9729 titled "An Act Mainstreaming Climate Change into Government Policy Formulations, Establishing the Framework Strategy and Program on Climate Change, Creating for this Purpose the Climate Change Commission, and For Other Purposes", or the Climate Change Act of 2009 was passed to provide the legal basis for climate change measures. Similar to the Disaster Risk Reduction and Management Act, the Climate Change Act also acknowledges the strong linkage between disaster risk reduction and climate change adaptation and the need to integrate the former to the latter. The Climate Change Commission under the Office of the President was then established and given the task to formulate relevant policies, supervise the implementation of climate change programs, and mainstream the climate change agenda in development plans at national, local, and sectoral levels. The Commission developed the National Framework Strategy on Climate Change 2010-2022, and further detailed the vision in the National Climate Change Action Plan 2011-2028. The Framework 2011-2018 guides various levels of development planning processes including the formulation of the Medium- term Philippine Development Plans, public investment plans, from the central to village government levels.

The Philippine Development Plan 2011-2016 has indeed addressed climate change and disaster risk issues explicitly. Among its goals, the Plan's Environment and Natural Resource Sector aims to "Enhance Resilience of Natural Systems and Improve Adaptive Capacities of Human Communities to Cope with Environmental Hazards Including Climate-related Risks"

The articulation of climate change adaptation and disaster risk reduction in relevant documents shows that the Philippines is on track to implement them in its national development plan. A dedicated institution tasked to integrate DRR and CCA and to supervise implementation however does not exist.

#### 6.13 Sri Lanka

#### **Rural Development Policies in Sri Lanka**

The government implemented relatively large scale rural development programmes in the past. The major one is the Integrated Rural Development Programmes (IRDP) which is covering three fifth of 25 districts. Starting from concentration on provision of infrastructure facilities to create an enabling environment for rural communities, the emphasis on IRDPs has shifted to helping the poor to undertake non farm activities, primarily through self-employment.

In 1980 onwards, smallholders farming sector was taken up to provide technological advancement, crop diversification, market orientation, productivity improvement and income generation. To meet the emerging situation various alternative strategies were tried out such as Agricultural Productive Villages, Export Production Villages, Farmer Bank, Promotion of Agro-wells, Micro Irrigation Support Schemes and Dedicated Economic Centres. It has benefited smallholders farmers.

There are number of programmes implemented by the government for rural development, poverty alleviation, rural livelihoods and income generation. For example, Janasaviya, Samurdhi, Gama Neguma and Gamidiriya. These are most ambitious programme currently undertaken by the government for rural development to increase the size and diversity of livelihood options. About 500,000 people in the target districts are being benefited from community infrastructure and productive investment such as drinking water, ICT centres, and access to credit, markets and income generation. Samurdhi is a main safety net programme being conducted by the government since 1994. Its main objective is poverty Alleviation through enhancing income generation activities and rural livelihoods.

In recent years, the government has placed emphasis on SMEs development with a view to creating new employment opportunities. For the purpose, government has established SME Bank (Lanka Puthra Sangvardana Bank) to provide credit facilities for small and medium scale entrepreneurs. The SMEs provide about 50 percent of employment.

In addition, government has been implementing several programmes for youth vocational training through government institutions such as Vocational Training Institutions and Council for National Youth Service in order to create a pool of skill labour to get absorbed in industries and self-employment.

#### Disaster Management Policies in Sri Lanka

The National Policy on Disaster Management is a core component of Sri Lanka's national regime for disaster management. It articulates agreed overarching principles and preferred outcomes for disaster management in Sri Lanka. It also provides policy directives to address the issues such as inadequate coordination among stakeholders agencies, duplication of efforts and insufficient policy directives to reduce the human and economic impacts of disaster situations. The 2005 Parliament Select Committee on Natural Disasters recommended formulation of a national policy to manage disasters after the 2004 Indian Ocean tsunami. The Disaster Management Act, No. 13 of 2005 provides that the National Council for Disaster Management shall formulate such a policy. Its preparation was the first listed of 60 outcomes for the period 2006-2016 under the document Towards a Safer Sri Lanka: A Road Map for Disaster Management, as Secretariat of the Council, led a consultative process to formulate the Policy with input and guidance from relevant agencies and stakeholders. The Council approved this Policy on 28.12.2010.

Since the tsunami, there has been a renewed attempt to institutionalise a DRM framework in Sri Lanka. The consensus is that ongoing policy and legislative efforts have to be complemented by adequately identifying risks, evaluating their differential impacts, developing strategies for their management and adequately communicating the risk to all stakeholders at the community, provincial and national levels, and this has contributed towards the conceptualisation of this framework. There has also been an affirmed need to address the underlying vulnerabilities with regard to strengthening local and national governance structures, emphasising national and community-based environmental resource management, and considering the differential nature of hazards and associated vulnerabilities while formulating national action plans for poverty alleviation and infrastructure for Sri Lanka. In acknowledging these needs, the Ministry for Disaster Management has proposed a comprehensive framework which will seek to identify and coordinate multi-stakeholder efforts in the next ten years through a holistic strategy or "Road Map" towards building a "Safer Sri Lanka". The road map is broadly focused on seven thematic components which are consistent with ongoing and past efforts in the field of DRM and development planning in Sri Lanka.

The strategy proposed by the DRM framework for Sri Lanka seeks to cover the following areas:

- Policy, Institutional Mandates & Institutional Development including components such as the preparation of a national policy for DM, reviewing and formalising mandates, identifying the capacity development needs of agencies to perform their DM functions; and including the steps to implement policies that are already in place.
- Hazard, Vulnerability and Risk Assessment, comprising activities ranging from flood simulation modelling in key river basins to the development of a vulnerability atlas for Sri Lanka. This will enable development planning which is sensitive to multiple hazards and different kind of vulnerabilities.
- Multi-hazard Early Warning Systems, incorporating elements to generate advancements in warning for floods, cyclones, abnormal rainfall, drought and landslides, thus enabling decision-makers to take much needed action even prior to the occurrence of a disaster.
- Disaster Preparedness Planning and Response, minimising the adverse impacts of a disaster through effective precautionary actions and timely adequate responses. Prioritised activities include the development of a national emergency preparedness and response plan and the establishment of emergency operation centres at the national, provincial and district levels.

- Disaster Mitigation and Integration into Development Planning, encompassing activities related to reducing the impact of droughts, preventing floods and landslides, and protecting against storm surges, sea and coastal flooding by incorporating disaster risk considerations into development plans.
- CBDM, involving activities that recognise the fact that communities though affected by disasters – are also the first line of defence against them if they are well prepared. Interventions proposed include mobilising community teams, creating a local network of trained volunteers, establishing resource centres, and providing small grants to fund priority projects by community teams.
- Training, Education and Public Awareness, focusing on empowering the public with ways and means to reduce disaster losses, and including a national awareness campaign designating a "National Disaster Safety Day", promoting disaster awareness among professionals through training and among children via the school curriculum. These components have been developed through a consultative process which has helped identify gaps, needs, priorities and strategies for further action in Sri Lanka. The strategies and priorities for particular projects have been developed by working groups comprised of multiple stakeholders, representing varied interests and capacities. The resulting conclusions and priorities for action are consistent with the requirements and responsibilities of the Sri Lanka.

**Post-tsunami institutional bodies:** In the aftermath of the tsunami, a number of initiatives have been undertaken to address DRM issues over the short and medium term within the context of the post-tsunami recovery, as well as over the long term with a view to integrating DRM into the development processes\*. The main interim committees set up in the aftermath of the tsunami are as follows:

A Parliamentary Select Committee was constituted to review the current status of DRM in the country and to make recommendations for improvement. This multi party committee has adopted a highly consultative process across the institutions and made extensive use of national and international expertise to come with a comprehensive report.

A Buffer Zone Committee was set up to examine issues of definition and to implement a "buffer zone" for reconstruction in the coastal areas.

An Interim Committee on Early Warning Systems was set up to review the existing (multi-hazard) early warning systems in the country and to chart directions for the future. It is still operational and is the official link to the Indian Ocean Tsunami Early Warning System. The reports of these committees as well as the broad-based dialogue that they started are extremely relevant to the improvement of the country's DRM system. Over the past year, the Government of Sri Lanka (GoSL) has taken significant steps towards strengthening legislative and institutional arrangements for DRM.

#### Rural Development Policy Gap

For rural development issues government has taken many initiative for rural development such as infrastructure development, roads construction, water storage facilities, protect land degradation and poverty reduction. In spite of these efforts still some gaps are remaining for rural development.

The reason of this gap is political uncertainty, lack of appropriate technology and policy implementation. Sri Lanka also faces several challenges that increasingly put its future economic growth and stability at risk, which as a world bank report suggests, must be addressed through macro and structural reforms:

- stay on the fiscal consolidation path by broadening and simplifying the tax base and aligning spending with priorities: this is important given high public debt, State Owned Enterprises (SOE) debt and guarantees; and large gross financing requirements;
- (ii) shift towards a private investment-tradable sector-led growth model by improving trade, investment, innovation and the business environment in rural areas;
- (iii) improve governance and accountability by implementing the Right to Information Act and improve SOE performance and service delivery; and

(iv) reduce vulnerability and risks in the rural economy by enhancing disaster preparedness and mitigating the impact of reforms on the poor and vulnerable with well-targeted spending.

#### 6.14 Thailand

#### **Rural Development Policies in Thailand**

The Government policies and programmes have always emphasised the importance of agriculture and the rural economy. Hence, government has undertaken number of measures such as restructuring of the agricultural sector, public campaign on food safety and strengthening of the food safety mechanism. Under the restructuring of agricultural sector government encourage garlic farmers to switch to other crops where contract farming between private sector and farmers can be made. To facilitate this, government has set up an Agricultural Restructuring Fund. The programme on food safety and strengthening consisted of many components such as one million cattle farmers' project, multi year watershed development plan and land reform programme. To assist small and medium scale entrepreneurs, government has established SMEs Bank to meet the needs of small investors.

#### Disaster Management Policy

The body reviewing and approving climate change policy decisions in Thailand is the National Committee on Climate Change (NCCC), of which the Climate Change Management and Coordination Division (CCMC) of ONEP, MONRE, is the Secretariat. Other stakeholders are: Ministry of Foreign Affairs (MOFA), other line ministries and agencies, local governments and universities (i.e. Kasetsart, Rajamangala, Naresuan etc.) Supporting organisations are: GIZ (RISK-NAP), BMUB (IKI: International Climate Initiatives), UNDP (Climate Finance), FAO (NAP-Ag), JST and JICA (IMPAC-T, ADAP-T) etc.

Thailand is yet to approach disaster risk management and climate change adaptation from an integrated perspective. Climate change adaptation-related policy and projects are under the purview of the Ministry of Natural Resources and Environment. Within the Ministry, the Office of Natural Resources and Environmental Policy and Planning through the Office of Climate Change Coordination serves as the national focal point for the UNFCC and the Kyoto Protocol. In 2009, the Climate Change Knowledge Management Centre was set up. The Centre is part of the National Science and Technology Development Agency in the Ministry of Science and Technology and is responsible for the collection, analysis and dissemination of climate-related data to the government, private sector and communities.

Thailand's progress in crafting its policy responses began with National Strategy on Climate Change (2008-2012) and followed by the Climate Change Master Plan (2012-2050) and National Strategy on Climate Change (2013-2017). The Climate Change Master Plan lays down the framework for cross-sectoral and multi-stakeholder approaches in preparing for and mitigating climate impacts. It recognises the need to mainstream climate change adaptation across various development sectors. Public, private and civil society partnerships, community participation, and Polluter-Pay-Principle form the basis for climate policy implementations within short, medium and long-term planning. Climate change management strategy focuses on three key areas including climate adaptation, reduction of greenhouse gas emission and increase of greenhouse gas sinks, and human resource and institutional capacity building to deal with climate risks.

Disaster management is handled separately from climate change adaptation. The Department of Disaster Prevention and Mitigation (DDPM) established under the Ministry of Interior in 2002 is the primary agency in charge of the execution of disaster management action plans and activities in Thailand. The National Disaster Prevention and Mitigation Committee (NDPMC) chaired by the Prime Minister or designated Deputy Prime Minister is a national level policy-making agency, and it has local equivalent in the Provincial Disaster Prevention and Mitigation Committees and the Bangkok Metropolitan Committee. To assist smooth coordination in multi-sectoral and multi-agency disaster response operations, the NDPMC's

<sup>\*</sup> see more at National Policy on Disaster Management; http://www.disastermin.gov.lk

Standing Orders on Disaster clearly define the areas of responsibilities and duties of agencies and sectors involved. The Disaster Prevention and Mitigation Act enacted in 2007 is the main legal umbrella for disaster management. It replaces the Civil Defence Act 1979 and the Fire Prevention and Suppression Act 1999, and it strengthens DDPM's legal status. The National Disaster Prevention and Mitigation Plan (NDMP) 2015 and the Strategic National Action Plan (SNAP) on Disaster Risk Reduction 2010-2019 outline Thailand's disaster risk reduction strategies and plans. Operationally, command centers are established at both national and local levels, the National Command Headquarters and the Local Command Center respectively. When disaster responses are called for, the command centers will function as the Emergency Operation Centers (EOCs).

Despite the presence of DDPM, the responsibilities of disaster prevention, preparedness, mitigation and response responsibilities remain with the specific agencies and local governments. The Royal Irrigation Department and the Ministry of Agriculture and Cooperatives, for example, play a major role in mitigating climate-induced flood and drought risks through their dam, dyke, and pumping system construction works. Other agencies involved in disaster management include the National Disaster Warning Centre under the Meteorological Department. Although institutions and the legal umbrella are already in place, coordination among concerned agencies remained a challenge as bureaucratic rivalries hindered a holistic approach to disaster management. As a result, the work on disaster prevention and preparedness were still largely separated from disaster response and relief efforts.

The 11th National Economic and Social Development Plan (2012-2016)45 recognises the impacts of climate change on natural resources and environmental issues, and calls to increase national, regional and community capacity to adapt to climate change and natural disasters. The Plan explicitly draws a link between preparedness for climate change and related natural disasters with economic development and living standards. Agricultural, energy, environmental, information and technological sectors are some of the sectors identified to have immediate relevance to climate change. The Plan attributes past development practices deemed unsustainable and unbalanced to Thailand's current vulnerability towards climate change. Climate change adaptation and natural disaster preparedness therefore are made an integral of part of national development strategies.

**The National Climate Change Master Plan (2015 -2050):** It is designed to help Thailand achieve sustainable low carbon growth and climate change resilience by 2050, by following the below missions:

- "Building climate resilience into national development policy by integrating directions and measures in all sectors at both national and sub-national levels to ensure country's adaptability to climate change;
- Creating mechanisms to reduce GHG emissions, and leading to sustainable low carbon growth;
- Building readiness of master plan implementation by enhancing potential and awareness of all development partners; and
- Developing database, knowledge, and technology to support climate change adaptation and sustainable low carbon growth" (Missions).

To achieve the objectives, the National Climate Change Master Plan (2015 -2050) specifies a set of mitigation, adaptation and capacity building targets.

Short-Term (2016) targets include:

- Develop medium- and long-term GHG emission reduction targets and prepare road maps for implementation by sector (including vulnerability maps, Nationally Appropriate Mitigation Actions road-map, and Measurement, Reporting, and Verification mechanism);
- (ii) Establish domestic incentive mechanism, using both legal and economic measures to encourage low carbon development.

Medium-Term (2020) targets include:

- Reduce GHG emissions from energy and transport sectors by 7-20 per cent by 2021 compared to 2005 (subject to level of international support);
- (ii) By 2021, supply at least 25 per cent of energy consumed from renewable energy sources;
- (iii) Increase ratio of municipalities with more than 10 m2 of green space per capita.

Long-Term (2020-2050) targets include:

- (i) By 2030 reduce energy intensity by at least 25 per cent compared to a business as usual scenario;
- (ii) Increase proportion of trips made by public transportation;
- (iii) Reduce proportion of GHG emissions from land transport;
- (iv) Increase proportion of investment in low carbon and environmental friendly industries;
- (v) Reduce open waste dumping area;
- (vi) Reduce proportion of open burning in agriculture areas;
- (vii) Reduce carbon intensity of the economy.

#### 6.15 Vietnam

#### **Rural Development Policies in Vietnam**

Vietnam government is implementing several programmes and polices especially targeting to provide rural livelihood through development of agricultural sector. Law of Investment (2005) exhibits the preference that Vietnam attaches more importance to invest in agriculture and rural sector. For example, government implemented incentives for enterprises income tax, enterprise import tax, materials, land tax remission, training support and access to capital market. More so, government implemented many policies on rural livelihood such as credit, technological development and poverty alleviation.

Under these policies government launched National Target Programme for Poverty Alleviation (NTPPA) and Programme 135. The focus of the Programme 135 is to establish new economic zone, loans grant for small projects for generating employments, improvement of employment market information system and conducting training on employment management.

#### **Climate Change and Disaster Policies of Vietnam**

Vietnam ratified the United Nations Framework Convention on Climate Change (UNFCCC) in November 1994, and it entered into force by February 1995. It signed the Kyoto Protocol in December 1998, and representatives at the National Environment Agency are optimistic that it will be ratified in early 2003. The country established the National Action Plan of Vietnam for climate change issues, which is carried out by the Hydro-meteorological Service (HMS). The National Action Plan has two main roles: 1) to assist in the formation of socio-economic development strategies which take into account climate change; and 2) to control the diffusion of greenhouse gases which cause global warming.

HMS also established the National Office for Climate Change and Ozone Protection (NOCCOP), which is responsible for the national co-ordination of work on climate change, the construction of national policies to deal with impacts of climate change, and the encouragement of international co-operation in climate and climate change issues. NOCCOP has access to HMS's extensive network of hydro-meteorological stations, including 83 synoptic, 86 climatological, 90 hydrological, 163 stage measuring, 21 marine, 50 aquatic environmental and 20 atmospheric environmental stations. These stations are distributed over the entire area of Vietnam. This network provides climate information for planning activities in agriculture, forestry, fisheries, construction, transportation, industry and health.

Until recently, Vietnam (as were most of the Parties to the UNFCCC) was focused on developing greenhouse gas inventories and devising strategies to reduce these emissions. Scientists now largely agree that climate change will indeed occur, regardless of achieving emission reductions or even stabilisation. Therefore, it will be necessary to incorporate climate change adaptation into national planning and development.

Adaptation is a necessary strategy at all scales to complement climate change mitigation efforts. Experience with adaptation to climate variability and extremes can be drawn upon to develop appropriate strategies for adapting to anticipated climate change. Adaptation to current climate variability and extremes often produces benefits as well as forming a basis for coping with future climate change (IPCC, 2001).

In the last several years, Vietnam has made great strides to set up agencies and mechanisms for tackling its environmental problems, including climate change. It has recently upgraded the central institutional management of environmental issues, in the form of a new Ministry of Resources and Environment, which was established in August 2002. Its final structure has not yet been confirmed.

#### National Strategy on Climate Change

2011	2012	2025-2050
-Emphasis on capacity building and science and technology, - Adjustment and development of green growth mechanisms, - CC adaptation and GHG mitigation policies in line with the international situation, which will be clearer after 2012	-Aiming to be a modern industrialised country; - CCA and GHG mitigation must be carried out in parallel, in association with socio-economic development activities	-GHG mitigation willbecome criteria of the socio-economic development processes

The first National Strategy for Environmental Protection (NSEP) was drafted in the mid-1980s, under the National Environment Agency (NEA), formerly and part of the Ministry of Science, Technology, and Environment. NSEP provided an action plan for 1991-2000, including the creation of a system of state management agencies at the national, provincial, and sectoral levels. It also raised awareness among government officials, business owners and the communities. Although some progress was achieved during the 1990s, a review of the first NSEP found that environmental planning must be integrated into economic development. Also, investments in the environment are limited and spread too thinly across a variety of sectors (NEA, 2000).

The importance of accounting for climate change and adaptation has been recognised in a number of policies. Preparing for climate change impacts is noted as a key factor for Vietnam's development and poverty reduction, particularly as the vast majority of disasters are hydro-meteorological in origin (CCFSC, 2001). For example, an inter-agency committee for disaster management, the Central Committee for Flood and Storm Control, and the Disaster Management Unit have jointly drafted Vietnam's Second National Strategy and Action Plan for Disaster Mitigation and Management in Vietnam – 2001-2020. This strategy plan states the following:

Major consideration will be given to potential changes in weather patterns both globally and regionally. Any global climate change will have adverse and severe effects on Vietnam. The global temperature continues to increase, and all efforts for seeking measures to reduce carbon dioxide levels in the atmosphere are still unsuccessful. The result may be that disasters such as storms, floods, inundation, flash-floods, drought and all such disasters will occur more frequently and will be more severe for Vietnam in the future. (CCFSC, 2001)

The national focal point for the Global Environment Facility (GEF) is located within the National Environment Agency. The second NSEP stresses the importance of increasing the effectiveness of international funds and the need to increase capacity of focal points for international agreements and environmental managers at the national to local levels. It also states "priority should be given to use [Official Development Assistance] according to mechanisms of the Kyoto Protocol on Climate Change." (NEA, 2000) Other priorities are to facilitate international partnerships to implement environmental policies and programs, to ensure that obligations under international agreements are effectively implemented, and to clarify institutional responsibilities. Within the Ministry of Resources and Environment, a Bureau for Multilateral Environmental Agreements may

be created, which would help to coordinate GEF projects to address climate change, biodiversity, and desertification. The majority of the activities currently funded by GEF are to improve energy efficiency, promote renewable, and reduce GHG emissions.

Vietnam is frequently battered by typhoons and floods, and they incur very high losses. Between 2004 and 2015, close to 18 million people were affected and more than US\$ 7 billion was lost due to typhoons and floods. Due to its susceptibility to natural hazards, Vietnam has long developed a framework and practice for climate change adaptation and disaster management in its national development plans. In 2013, Vietnam passed the Law on Natural Disaster Prevention and Control.

The Vietnam Sustainable Development Strategy for 2011-2020 indicates the reduction of impacts, climate change adaptation, and prevention of natural disasters. The National Strategy for Natural Disaster Prevention, Response and Mitigation to 2020 and the 2011 National Strategy on Climate Change are the main documents for disaster management and climate change adaptation respectively. The Ministry of Agriculture and Rural Development (MARD) holds the main coordinating responsibility for disaster management while other ministries such as the Ministry of Construction, the Ministry of Planning and Investment and the Ministry of Science and Technology continue to work within their means to contribute to disaster risk reduction. The MARD is also responsible for the execution of the National Strategy for Disaster Prevention, Response and Mitigation to 2020, and all ministries, provinces and cities draft their own action plans to implement the Strategy. As typhoons and floods pose the most serious natural hazards in Vietnam, the Central Committee for Flood and Storm Control (CCFS) was formed, and the structure of the committee is replicated in each sectoral ministry.

Vietnam set up a multi-ministerial National Climate Change Committee under the Prime Minister's Office with the Ministry of Natural Resource and the Environment (MONRE) bearing the main responsibility for climate change actions in Vietnam.

The National Target Program (NTP) to Respond to Climate Change lays down climate-related main activities and targets including the vision to integrate such measures within sectoral and local development strategies and plans. Indeed, adapting to climate change and reducing the likelihood of natural disasters occurring is explicitly called for in the national development plan 2016-2020.

While efforts towards mainstreaming policies have been taking place, institutional integration does not seem to follow suit as each sector continues to carry out their respective climate-related initiatives.

In Vietnam, in order to adapt to climate change, local people have been changing their agricultural activities, the number of livestock reared, cultivation techniques, crop composition, vaccinations, pest- and disease-prevention measures and applying new techniques. Most of the climate change adaptation activities of local people are developed from their own experiences or by learning from their individual practices. There were no programmes from the government/local authorities to help local people adapt to climate change. The focus of the Government is in the coastal areas, where the impacts of climate change are much more serious.

It is evident that the policy interventions in relation with climate change and rural livelihoods varies. Climate change, however, is a common threat for the entire Asia-Pacific region as the region is one of the most disaster and climate hazard prone areas in the world, with frequently occurring natural disasters including earthquakes, tsunamis, tropical storms, flooding, landslides and volcanic eruptions affecting millions of people every year.

Although climate change has seriously affected rural livelihood to great extent, most of the countries in this region is yet to develop their capacities to reduce risk and respond to disasters and to mitigate impact of the climate change.

Existing national plans for adaptation seem to have attended only in a limited fashion to the role of local institutions in designing, supporting, and implementing adaptation. However, if adaptation is inevitably local, there is a great need to involve local institutions more centrally in planning for and implementing adaptation policies and projects. At the very least, there must be far greater coordination between adaptation policies and measures adopted by institutions and decision makers at the national level, and their counterparts at the local level.

Interventions for improving adaptive capacity in the context of development projects need to attend better to adaptation practices facilitated by different forms of external support. The multiple linkages among external interventions and local adaptations can only be understood through a focus on the mediating role and linkages among different institutions in a given territory, and their influence on production and adaptation possibilities.

Rural development, being a complex process, requires simultaneous action in various sectors: agriculture, non-agriculture, infrastructure, and technology, as well as human resource development. For sustainable rural development, it is required that important challenges like climate change and disaster management are taken into account integrating with the rural development dynamics. Therefore, strengthening the policies and developing capacities of the stakeholders is matter of paramount importance as it is the one of the key way to address the emerging challenges surrounding the negative impact of climate change on the lives of rural people.



# CONCLUSION AND RECOMMENDATIONS

### **Conclusion and Recommendations**

Asia-Pacific countries continued to be the worlds' most disaster-prone region. In 2015, 160 disasters were reported in the region, accounting for 47 per cent of the world's 344 disasters. The region bore the brunt of large-scale catastrophic disasters with over 16,000 fatalities, more than two-fold increase since 2014.

With frequently occurring natural disasters including tropical storms, flood, landslides affecting millions of people every year, it is evident that climate change has serious implications in rural livelihood. It has been a major driver of change in rural areas resulting in urbanisation, migration, technological change and globalisation, which is making rural development more complicated for policy makers.

Many countries in the region still lack capacity to reduce risk and respond to negative effects of climate change. As a result, it hampers agricultural production as well as other rural livelihood alternatives.

The rural development, disaster management and climate change policies are varying in CMCs. Presently there is an inadequate level of policy intervention in most of the CMCs against the negative impact of climate change. Though, rural development continues to be a very important priority for the entire Asia-Pacific region; urbanisation is increasing rapidly and the contribution of agriculture GDP has been declining over the years, at the same time rural areas still remain as the main livelihood option supporting the majority of people in the region.

Climate change mitigation and adaptation should be supported by initiatives that are built on the multi-tiered evidences based on transboundary socioeconomic and environmental 'hotspots', hence, the case for collective action on adaptation requires long-term planning and decision making considering a broad range of climate and socioeconomic scenarios. As climate change and its impacts become more evident, it is important to integrate concerns for managing risks faced by households and communities with earlier concerns for growth, poverty alleviation, equity, and sustainability.

Similarly, there is an emergent need for adaptation to the climate change through the sustainable development practices which can include adapting agricultural practices to changes in temperature and precipitation; safeguarding forest areas, adapting coastal zone management etc. Moreover, development policies and practices are also need to reflect gender, disability, and other social issues of marginalization and as they have a strong influence on natural resources management in terms of difference in use, right and benefits.

Based on the findings of the study, the following ten key policy recommendations are suggested for the policy makers and other stakeholders:

Climate change is likely to have a negative impact on rural livelihoods and agriculture in different ways. Rural people are highly dependent on natural resources and ecosystem services and highly vulnerable to climate change including its effects on water availability, rainfall, the hydrological regime, natural disasters, and extreme weather events.

Rural development strategies can no longer be perceived in the same economic context as in the 1960s and 1970s. The rural development and livelihood strategies of the future have to be understood as a continuum of urbanised and globalised systems. Traditional behaviour and values will be mixed with completely new interpretations of the past.

## 7 Chapter

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2	Integration of rural economies in the national economy and globalisation are increasing the inter-penetration between rural and urban. This means that rural policies have to be justified not only by their impact in rural areas, but by their contribution to national wellbeing. Material aspects (food production in its widest sense), ecosystem services (water, biodiversity, clean air, recreational capacities), and the contribution of rural areas to the mitigation of climate change have to be validated in the national context.
3	The active commitment and leadership of local government is important for the implementation of any local disaster risk reduction measures to deal with different stakeholders and multiple layers of government. In many cases, a comprehensive disaster risk reduction measures takes long time to fully implement, and the leadership of the local government is particularly crucial to ensure the political momentum and support among external stakeholders throughout the process. As the most immediate public service provider and interface with citizens, local governments are naturally situated in the best position to raise citizens' awareness of disaster risk reduction measures (such as early warning systems) may fail, if communities are not properly informed and engaged. Likewise community preparedness measures are sometimes as effective as costly public investments in reducing casualties from disasters, and local government should play a central role in community and training.
4	The government should identify beforehand vulnerable areas and nature of disasters through research and studies. Relief and rehabilitation commodities should be stored according to the need or individual disaster prone areas. In this regard tentative need assessment for individual areas should be made. Essential supply viz., food. shelter. water. Medicine etc. need to be timely ensured by government agencies.
5	Since the immediate help comes from the community, the community organisations should be equipped with knowledge and skill regarding disaster preparedness and management. In particular people should be made familiar with the warning system of disaster.
6	Regular documentation on national hazards is to be done by each country. Documentation and research outputs need to be circulated among the CMCs through CIRDAP. Knowledge and information sharing, including early warning of natural disasters and climatic events are essential to build the resilience of local livelihoods and communities to climate change.
7	Meteorological department in each country should be suitably equipped with modern technology to provide adequate forecast and warning about disasters. Exchange of technical information on weather and disasters among the CIRDAP member countries needs to be strengthened.
8	Each CIRDAP member country should develop capability of concerned government officials at various levels for disaster preparedness and management by organising periodical training courses and workshops. The existing institutional facilities and resource persons in some of the CMCs can be utilised by all member countries for human resource development in the field of disaster management.
9	Monitoring and evaluation of relief and rehabilitation activities are very much essential for each country for which proper planning should be made beforehand.
10	The issue of climate change cannot be addressed in solace, but, has to be integrated with the overall development plan. The challenges of climate change can be managed only if the identified limitations such as lack of awareness and capacity on climate change, absence of proper institutional coordination and management, erroneous priority setting and absence of appropriate implementation, monitoring and evaluation mechanism. These issues are need to be addressed to ensure sustainable and inclusive

rural development in CIRDAP member countries.

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The Centre on Integrated Rural Development for Asia and the Pacific (CIRDAP) is an intergovernmental organization working for the promotion of Integrated Rural Development (IRD) in the Asia-Pacific region through collective actions and cooperation. It has 15 member countries namely Afghanistan, Bangladesh (Host State), Fiji, India, Indonesia, Iran, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam.

CIRDAP was established on 6th July, 1979 at the initiative of the countries of the Asia-Pacific region and the Food and Agriculture Organization (FAO) of the United Nations with support from other UN organizations and donor countries/agencies with the mandate to promote collaboration and strengthen Integrated Rural Development (IRD) activities amongst member countries.

The main objectives of the Centre are to (i) assist national action; (ii) promote regional cooperation; and (iii) act as a servicing institution for its member countries for promotion of integrated rural development through research, action research, training and information dissemination.

Five thematic areas have been identified to constitute the programme strategies at present. These are: (a) Sustainable Development and Efficient use of Natural Resources (e.g. Land Administration and Management; Waste management; and natural resource management); (b) Livelihoods (e.g. Poverty reduction; Economic Productivity through Technological Innovation, Upgrading and Diversification and Related Policies; Skill development; Entrepreneurship; Access to Financial Services; and Sustainable Tourism); (c) Access to Basic Services (e.g. Food and nutrition security; Safe and affordable drinking water and sanitation; Health and education; Affordable reliable and modern renewable energy; Access to Information; Decent Housing; and Rural transportation access); (d) Climate Change (e.g. Strengthen Resilience and Adaptive Capacity to Climate Change; and Mitigation of adverse impact); and (e) Governance (e.g. Strengthening local governance & CBO/CSOs; and Management of rural areas in transition).

Operating through designated Contact Ministries and Link Institutions in member countries, CIRDAP emphasises on enabling the rural communities by engaging international, regional and national level development partners to ensure that the most marginalised communities in member countries are captured under rural development programmes and no one is left behind.



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