

About the author

Naseer Memon is a development professional and a writer on environmental and development issues. He has been associated with development sector for around two decades. He has worked with UNICEF, UNDP, WWF Pakistan and LEAD Pakistan. He is a regular contributor to Daily Dawn, The News and Daily Kawish on development issues and has authored six books in Sindhi, one in Urdu and two in English. Memon is a Civil Engineer by qualification and has also lectured extensively on water resource management. He is also member of the Executive Committee of Pakistan National Council of the IUCN-Pakistan. Currently, Memon is working at the Strengthening Participatory Organization (SPO), Islamabad, as Chief Executive.

Pakistan Institute of Labour Education & Research (PILER)

PILER established in 1982, is a not-for-profit, citizen sector organization engaged in research, education, policy advocacy and networking in the areas of labour rights, social justice, human development, regional solidarity and peace.

Terre des Hommes Germany (Tdh)

Tdh is a children's aid agency concerned with development policy. Founded in 1967, It works for the creation of a just and peaceful world for all children. Its endeavours are based on the fundamental principles of human rights, tolerance and equal rights for all people regardless of their origin, gender or religion.

Medico International (MI)

Established in 1968, MI has been campaigning for health to be recognised as a human right. It supports its partners in their endeavours to create the economic, social and cultural conditions which allow each person to attain the highest health standard possible particularly in situations of emergency.



Published by
Pakistan Institute of Labour Education & Research
PILER Centre
ST-001, Sector X, Sub Sector V,
Gulshan-e-Maymar, Karachi - 75340, Pakistan.
Tel: (92-21) 36351145-7
Fax: (92-21) 36350354
Email: piler@cyber.net.pk
Web: www.piler.org.pk



terre des
hommes



Disasters in South Asia

A Regional Perspective

Naseer Memon

Disasters in South Asia

A Regional Perspective

Naseer Memon



Disasters in South Asia – A Regional Perspective

Naseer Memon

© Pakistan Institute of Labour Education and Research

First published May 2012

ISBN 978-969-9153-12-9

Published by
Pakistan Institute of Labour Education and Research
PILER Centre,
ST-001, Sector X, Sub-Sector V
Gulshan-e-Maymar, Karachi
Tel: (92-21) 36351145-7
Fax: (92-21) 36350354
piler@cyber.net.pk
www.piler.org.pk

PILER acknowledges financial support of its partner organizations Terre des hommes (Tdh) and Medico International for this publication.

Printed at Print Vision
Karachi, Pakistan.

Contents

Foreword	01
Introduction	03
SECTION I: Background	
South Asia: Human Development Perspective	05
South Asia: Vulnerability to Climate Change and Disasters	07
SECTION II: Natural Disasters in South Asia	
Mapping the Course of Disasters.....	12
SECTION III: Disaster Response Mechanisms	
Regional Cooperation for Disaster Risk Mitigation.....	28
Institutional and Policy Framework in SAARC Countries	38
Conclusion	50
Acronyms	51
End Notes	53

Foreword

In the year 2010, Pakistan was hit by worst floods in its history rendering 20 million people homeless and bringing one-fifth of the country under water. The floods, that left a trail of miseries that the affected population continues to battle even two years later, was a wakeup call for policy-makers, development experts, civil society and the general public that had not deemed climate change as well as the existing skewed development and resource distribution order as an important concern impacting the future of the country. The 2010 and later 2011 floods (in Sindh) exposed the extremely grim conditions that marked the daily lives of a large section of the population that had compromised access to basic amenities of life such as health, education, and shelter, and fundamental human rights, including decent livelihoods.

The 2010 and 2011 floods also drew attention to the patterns of natural disasters occurring in South Asia and the response mechanisms of the respective states, and local and international humanitarian agencies. This also brought into spotlight the extreme vulnerabilities that South Asia as a region, being a climate change red zone, faces. The region which is home to more than 1.5 billion people has around 600 million people living below the poverty line. This part of the population is most vulnerable to the risk of any disaster, be it natural or man-made in nature. History also suggests that South Asia is host to almost all kinds of natural catastrophes. Besides natural disasters, over the years, have Negatively influence the development order in South Asia, and impacted the capacity of the states to respond to humanitarian catastrophes. It is also important to point out that a regional response to natural

disasters, whether in the shape of the SAARC Framework on Disaster Management or other bilateral and trilateral institutional arrangements that states may think of, is extremely important.

The Pakistan Institute of Labour Education and Research (PILER), with the financial support of Terres des hommes (Tdh) and Medico-International (MI), Germany, has initiated a three-year advocacy and research initiative to highlight the core issues that compound the risks and impacts of natural disasters; climate change, under-development, ill-planned development, skewed distribution of resources and ineffective disaster response institutions being a few among many. This study is a part of the said effort. Penned by development expert Naseer Memon, the study a) maps the course of disasters in the region in recent times; b) recounts the vulnerability of the region vis-à-vis disasters; and c) details the national and regional disaster response structures.

We hope this study would contribute to an enhanced understanding of the significance of natural disasters on the development and socio-political order of the region as well as the importance of strengthened national and regional disaster mitigation and response institutions as prime protection structures against vulnerabilities in humanitarian emergencies. n

Introduction

South Asia is facing the wrath of natural disasters with greater frequency and intensity. During the recent years countries in the region have endured a series of catastrophic disasters compounding their pains of poverty and poor performance in various sectors of human development with devastating earthquakes, floods, cyclones and droughts playing havoc with poor communities.

With a very large population base and ever increasing development deficit, countries in the region are scrambling to meet the targets of the Millennium Development Goals (MDGs). Climate change is a growing challenge which is manifesting in frequent disasters. Gains of economic performance are being overshadowed by excruciating devastations. Terrorism, conflicts, political instability, poor governance, lack of efficient service delivery and chronic poverty have already precluded human development. Disasters are leveling off the meager gains accumulated over the decades.

This document is a desk review of disasters and their impacts in various countries of the region. A brief account of disasters in different countries in South Asia provides glimpses of the wrath of the nature faced by poor communities. Considering that the countries in the region have shared water resources and are facing trans-boundary climatic impacts, need for enhanced regional cooperation would attain greater importance in the coming years. Climate change particularly is an emerging threat that may trigger more severe disasters in future. Maplecroft, a British firm specialized in climate related risk analysis has placed South Asia and Africa among the regions

facing biggest risk from climate change. Fast melting Himalayas pose serious risk for water resources in the region. Very large populations in these countries owe their sustenance to water resources. Himalayan fed rivers in these countries shape economy and society in India, Pakistan, Bangladesh and Nepal. Hence any threat to Himalayan glaciers would have serious socio-political implications for the region. Regional cooperation becomes even more desirable in the wake of climate related disasters.

The document also provides insight into policy and institutional responses by different countries. Regional cooperation through SAARC is also briefly discussed.¹

Section I:

Background



South Asia: Human Development Perspective

South Asia is home to more than one fifth of the world population. South Asian countries are typically marked by large population, high poverty, low literacy and poor indicators of human development. On Human Development Index, India, Bangladesh, Nepal, Bhutan, Pakistan and Sri Lanka are ranked at 127, 139, 136, 134, 135 and 93 respectively. Poverty is widespread especially in the rural areas of India, Bangladesh and Pakistan. Some 70 per cent of the South Asian population and about 75 per cent of the continent's poor live in rural areas and mostly rely on agriculture for their livelihood. South Asia is the second poorest region in the world, with 38.6 per cent of the population living below the poverty line. Almost 50 per cent of the children under five are underweight. Gender disparities are stark in every sector e.g. 46 per cent of the boys are underweight compared to 49 per cent of the girls. Although South Asia is home to almost one-quarter of the world's female population, its share in the world's female labour force is less than 14 per cent. South Asia suffers from some of the highest levels of hunger in the world, with just over one fifth of the population not consuming the standard 2200 calories a day. This makes it the second hungriest region on the earth after Sub-Saharan Africa. Likewise South Asian countries suffer from the second highest child mortality rates in the world, with over 7% of children dying before their 5th birthday¹. Maternal mortality rate is also the second highest in the world (490 per 100,000 in 2005) after Sub-Saharan Africa. Less than half of all births are attended by a skilled healthcare personnel - the lowest rate in the world.

While South Asia's share in the world population is 22 per cent,

it contains more than 40 per cent of the world's poor. Nearly half a billion people earn below US \$1 a day, while three-fourth of the population survives on less than US \$2 a day. Over 62 per cent of population is without access to basic sanitation, 42 per cent of the adult population is unable to read or write, 55 per cent of women are illiterate, and 46 per cent of children under five are malnourished².

Natural resources are poorly managed in the region. South Asia does not have as much forest coverage (14.1 per cent of land area) as most other regions of the world. In South Asia, only 6.4 per cent of terrestrial areas, and 1.6 per cent of marine areas are protected, two of the smallest proportions in the world. However Bhutan (28 per cent) Nepal (17 per cent) and Sri Lanka (14.5 per cent) have protected relatively large areas of their marine and terrestrial areas. Unsurprisingly due to the destruction of habitats, increasing pollution, human overpopulation and over-harvesting, a large proportion of species are threatened with extinction - 4 per cent of birds and 14 per cent of mammals are likely to become extinct in South Asia in the near future³. Between 1990 and 2005, South Asian countries witnessed an alarming rate of deforestation. Afghanistan, Pakistan, Sri Lanka and Nepal respectively lost 2.7, 1.9, 1.3 and 1.9 per cent forest annually⁴.n

South Asia: Vulnerability to Climate Change and Disasters

Climate change is a lurking threat for the planet. It has manifested in the form of disasters in every corner of the world. Increased carbon emissions are resulting in global warming which causes climatic variations. Since the start of the Industrial Revolution, CO₂ emissions have risen from 280 parts per million (ppm) in 1780 to over 380 ppm in 2005. This has disturbed the natural equilibrium of CO₂ in the atmosphere. About half of this excess CO₂ is absorbed by the earth's sinks (oceans, forests etc), but the rest gets accumulated in the atmosphere causing greenhouse effect. It increases the atmospheric temperature.

Rising temperature of globe is causing extreme weather events resulting in various disasters. Earth has warmed by 0.74°C over the last one hundred years. Warmer surface temperatures are melting ice sheets and heating oceans. As a result of that sea levels have risen globally by 10-20 millimeters during the 20th century and snow cover has receded by about 10 per cent since the 1960s. Ice cover in the Arctic has melted faster than the global average. Scientists predict that with this pace of melting, summers in the Arctic will be ice free within a century.

Although South Asia is not a major contributor of carbon emissions, yet its large population and high economic growth is demanding more energy at a faster pace. In recent years, high economic growth has reduced poverty substantially yet it also exerts pressure on energy resources. Since 1990 the region has experienced rapid GDP growth, averaging 5.4 per cent a year, which has helped to reduce the consumption

poverty rate substantially: India has reduced poverty rate by 5-10 per cent since 1990; most other countries registered a significant reduction in poverty over the period except for Pakistan where poverty has stagnated at around 33 per cent⁵. This trend of economic growth has consumed more energy resources in the recent years, which is accompanied by increased green house gases. On average, emissions have risen at about 3.3 per cent annually since 1990 - more rapidly than in any other region, except the Middle East. Total emissions exceed 2.5 billion tons of CO₂ equivalents. However, per capita emissions of the region are still extremely low by international standards - less than one-fifth of the developed countries⁶.

By 2050, the South Asia's population is likely to exceed from the current level of 1.5 billion to 2.2 billion. Having more than 600 million South Asians subsisting on less than US\$1.25 a day, a single climate change incident can result into a disaster that may push millions into poverty and miseries.

According to International Disaster Database EM-DAT, in the 1990s, climate-related disasters affected over 2 billion people in developing nations, representing about 40 per cent of the total population in the affected countries⁷. South Asia with a large population base is susceptible to greater disasters in the wake of climate change. More than 750 million people in the region have been affected by at least one natural disaster in the last two decades.

In May 2011, the Secretary General of SAARC presented a draft SAARC Agreement on Rapid Response to Natural Disasters to the Inter-governmental meeting in Colombo, Sri Lanka. He pointed out quoting global statistics, that over the past forty years, South Asia faced as many as 1,333 disasters that killed 980,000 people, affected 2.4 billion lives and damaged assets worth US\$105 billion. This loss is by far the highest among the recorded disasters in various geographical regions⁸.

A major threat comes from the fast melting Himalayas. The Himalayan system shapes the monsoon dynamics in the region. The system is the spinal cord of river networks in the region that impacts the economy, culture, livelihood and life in the region. Flood plains of major rivers e.g. Brahmaputra, Ganges, Indus, and Meghna draw their sustenance from the Himalayan ecosystem and support life for over 1.5 billion people. The Ganges river basin alone is home to about 600 million people. The Gangotri glacier feeds Ganges and the glacier is receding since 1780. In recent years the pace of retreat has accelerated. During the period of 1975 to 1999, the glacier has retreated more than 850 meters, with a 76 meters loss from 1996 to 1999 alone. The Himalayan glaciers are retreating at rates ranging from 10 to 60 meters per year and many small glaciers (<0.2 sq km) have already disappeared. Vertical shift of glaciers as great as 100m have been recorded during the last fifty years⁹. In this context retreating glaciers of the Himalayas could pose far-reaching challenge to the region. Some of the glaciers in Himalayas are receding more rapidly than the global average. This is also causing increased threats of glacial lake outburst floods in certain countries especially in Bhutan and Nepal. As glaciers melt, flood risks would increase in the near future. However in the later years, the region may be deprived of its precious water resources. As glaciers recede, there could be significant declines in flows. By 2050, the annual runoff in the Brahmaputra is projected to decline by 14 per cent and the Indus by 27 per cent¹⁰. The South Asian region is among the water stressed regions of the world and melting Himalayas pose serious risk to sustainability of water resources of the region. Bangladesh, Bhutan, India, the Maldives, Nepal, Pakistan and Sri Lanka account for more than 21 per cent of the world population, yet must make do with barely 8.3 per cent of the global water resources¹¹. This makes China controlled Tibet highly important for the South Asian countries. The water-rich southern Tibetan belt, the Himalayan rim, serves as the headwaters of the two major river systems - the Indus and the Brahmaputra - as well as several other important rivers of

South Asia, such as Karnali and Kosi, which empty into Ganges. The 1,550-kilometre-long Sutlej which flows through India to ultimately drain into Indus in Pakistan, also originates in this belt, from the southern slopes of Mount Kailash¹². Melting ice results in rising sea levels. South Asia has a long and densely populated coastline with low-lying islands that are vulnerable to sea level rise. Having a coastline of 12,000 kilometers and a number of islands, the region is highly vulnerable to cyclones, storm surges, tsunamis and sea level rise. Low-lying islands (the Maldives, coastal areas of Sri Lanka and islands of Bangladesh) are vulnerable to sea rise. Major coastal cities like Chennai, Karachi, Kolkata, Mumbai, and Cochin are exposed to increased risks of climatic disasters e.g. sea intrusion, tsunami and cyclones. Likewise fertile river deltas of the Indus, Krishna, Cauvery, and Narmada are vulnerable to sea intrusion that may alter their fragile ecosystems. The Indus delta has lost almost two million acres of land to the sea. Ground water contamination and salinization of arable land may trigger large scale localized food insecurity and migration in delta areas. Bangladesh, India and Pakistan face threats of cyclones. According to some reports, the Sindh coast had an average of four cyclones in a century. However the frequency and intensity has increased manifold and the period 1971-2001 records 14 cyclones¹³.

Marginalized groups e.g. women, the poor, and indigenous peoples are most vulnerable to climate risks. Data shows that in natural disasters female mortality outnumbers males. As an example women accounted for 90 per cent of the deaths in the 1991 cyclone in Bangladesh. As most of the poor communities are dependent on agriculture for their livelihood they are more vulnerable to climate related disasters. Nearly half of the indigenous population, around 100 million in the world live in South Asia. Hence they are also exposed to greater risk of disasters.

The United Nations Environment Programme (UNEP) in pursuance

of its mandate to review the global environment collaborated with SAARC to present the South Asian Environment Outlook, 2009 (SAEO, 2009) after a wider consultation process involving governments and other partners from the nations of South Asia, sub-regional intergovernmental agencies and experts. The Report reveals the state and trends of the environment - land, air, water and bio-diversity and covers five key issues on Climate Change, Food Security, Water Security, Energy Security and managing Urbanisation. The Report notes: "South Asia occupies about 5 per cent of the world's land mass, but is home to about 20 per cent of the world's population. This is expected to rise to about 25 per cent by 2025. Three-quarters of South Asia's population lives in rural areas, with one-third living in extreme poverty (on less than a dollar a day). Their well-being is further compromised by indoor air pollution, which is a severe health hazard. The report highlights that South Asia is very vulnerable to climate change. Impacts of climate change have been observed in the form of glacier retreat in the Himalayan region. ... These glaciers form a unique reservoir, which supports perennial rivers such as the Indus, Ganges and Brahmaputra, which, in turn, are the lifeline of millions of people in South Asian countries (Bangladesh, Bhutan, India, Nepal, and Pakistan). This will exacerbate the challenges of poverty reduction and improving access to safe drinking water, two of the Millennium Development Goals."¹⁴

Section II:

Natural Disasters in South Asia



Mapping the Course of Disasters

South Asia is extremely vulnerable to natural disasters, with over 900 events reported since 1970 alone. Between 1990 and 2008, over 750 million were affected by a natural disaster, resulting in almost 230,000 deaths and about US\$45 billion in damages¹⁵.

In the 1970-2008 period, floods accounted for half of the total number of events reported, while droughts accounted for 2 per cent but that affected more than 50 per cent of the total number of affectees. The arid and semi-arid regions of Afghanistan, India, and Pakistan experience significant drought. Drought does not claim too many lives or does not bring large scale destruction, yet it has significant effect on livelihood, especially for communities depending on agriculture and livestock. Poor communities in arid areas lose their livelihood resources and ground water that constrains them to migrate to irrigated areas. Droughts cause water shortages that unleashes numerous conflicts between upper and lower riparian communities. These conflicts are spread across the region both within and between the countries. Droughts and floods both sharpen these conflicts and call for larger trans-boundary cooperation frameworks.

South Asia has witnessed a surge in natural disasters in recent years mainly triggered by heavy rains and floods.

Afghanistan: Afghanistan is a chronic victim of humanitarian issues mainly because of unremitting wars and internal strife. Between 1991 and 2002, in addition to the severe disruptions caused by political conflict, Afghanistan experienced nine

significantly large natural disasters. Since the early 1980s, natural disasters in Afghanistan have killed an estimated 19,000 people and displaced 7.5 million people¹⁶. Recurring natural disasters in Afghanistan, including drought, floods, landslides, earthquakes, and avalanches, affecting an average of 400,000 Afghans each year. The 2008 Afghanistan blizzard was a fierce but not a record-breaking blizzard that struck Afghanistan in February. Temperatures fell to a low of -30 C, with up to 180 centimeters of snow in the more mountainous regions, killing at least 926 people. The weather also claimed more than 100,000 sheep and goats, and nearly 315,000 cattle died¹⁷. The 2009 Afghan avalanches occurred near Kabul on 16 January 2009. At least ten people were killed and twelve vehicles and machinery used to clear the road of snow were swept away when the avalanche struck a highway¹⁸. Forty people were rescued, eleven of whom were injured by the avalanches. Afghanistan experienced severe winter conditions, including heavy snowfall and avalanches, early in January 2009 in the central, north and north eastern regions. Subsequently, in mid-March following heavy rains and increased snow melt, flash flooding occurred. A total number of 9,651 families (57,906 individuals) were affected with over 80 people killed and 130 injured. Widespread flooding during the spring and summer of 2010 affected approximately 500,000 people throughout Afghanistan¹⁹. Flash floods and heavy snowfall killed 25 people and damaged up to 3,000 houses in different parts of Afghanistan in February 2011. The latest wave of natural disasters comes amid growing concerns about drought which is anticipated to result in agricultural losses, and exacerbate poverty and food insecurity²⁰.

India: During the past nine years, 84 disasters were recorded in South Asia region. These included 69 floods, 8 earthquakes, 4 spells of extreme temperature and 3 storms. India was the worst hit during the recent years. In fact, 64 of the 69 floods occurred in India; out of the 10 earthquakes, 3 occurred in India; and all 4 episodes of extreme temperature also occurred

in India. Worse, in 2004, India experienced 6 floods, followed by 17 floods each in 2005 and 2006. Frequent occurrence of natural disasters including drought, floods, flash floods, cyclones, landslides, tsunami, avalanche, heat/cold wave, forest fires etc. has caused massive damage to the lives and properties of millions of people in India.

The tsunami of 2004 was the most furious disaster in recent past. According to official estimates 10,136 people were killed and hundreds of thousands were rendered homeless. The Andaman and Nicobar islands comprise of 572 islands (all land masses in both low and high tides) out of which 38 are inhabited, both by people from the mainland and indigenous tribes. The islands lie just north of the earthquake epicentre, and the tsunami reached a height of 15 m in the southern Nicobar Islands. The official death toll is 1,310 and about 5,600 were missing. The unofficial death toll (including those missing and presumed dead) is estimated to be about 7,000²¹.

In July 2007, the monsoon rains and flooding left 660 people dead and more than a million stranded in West Bengal. In September 2008, flooding from the Kosi River in the northern state of Bihar caused the deaths of at least 75 people and the displacement of over 2 million more. At least half a million people were left stranded, while half a million others were forced to live in unsanitary relief camps²². On May 25th, 2009, a tropical disturbance in the south of Kolkata turned into a severe cyclonic storm, namely Cyclone Aila. As of May 27th, 2009, 330 people were killed by Aila and at least 8,208 more were reported missing, while about 1 million were rendered homeless. Over 15,000 people in eight villages were reportedly isolated from relief crews by severe flooding. Throughout the state of West Bengal, an estimated 40,000 homes were destroyed and 132,000 others were damaged. It is estimated that at least 2.3 million were displaced by the storm as 175,000 homes were destroyed and 270,000 others were damaged. The situation was exacerbated as severe drought condition hit India which

damaged large tracts of rice paddies, threatening to upset the fragile food market amid fears of shortages and riots. The weather conditions did not provide any relief in 2010 either as cyclones and powerful storms disrupted life and caused severe damage to the homes of local residents. On April 13th, 500,000 people were left homeless. A North Indian Ocean Cyclone named “Laila” followed in May 2010 causing the deaths of 10 people and rendering 10,000 people homeless. In June 2010, a heat wave struck India as well as some other parts of South Asia, when the temperature reached 53°C killing hundreds of people. Simultaneously, in the state of Maharashtra, heavy rains claimed the lives of 46 people. The wave of natural disasters continued in 2011 when a cold snap that swept across northern India killed 125 people. Surging flood waters in northern and eastern India have affected millions of people, forcing many to abandon their homes as swollen rivers wash away roads and make rescue work difficult. As per estimates provided by aid workers, approximately 5.2 million people have been affected as tail-end seasonal monsoon rains swept the heavily-populated states of Uttar Pradesh, Bihar and Assam where 158 people died in flooding incidents. In the most severely affected state of Uttar Pradesh in north central India, 125 people have died and around 2 million have been affected. Of the 29 districts which have been affected by floods, 10 are in critical state.

Flood-affected areas in South Asia might increase as a result of climate change. In India, the area affected by floods more than doubled between 1953 (19 million hectares) and 2003 (40 million hectares) and currently represents about 11 per cent of that country’s geographic area (World Bank 2007).

The vulnerability of India’s coastal areas is highlighted in Jagatsingpur, where loss of mangroves due to biotic and abiotic pressures in the past few decades has left the coast exposed to the fury of cyclones and storm surges. Household surveys in Orissa, indicate fall in production levels due to floods by 67

per cent in the kharif season. Incidence of sickness, mainly water borne illnesses such as cholera, diarrhea and dysentery have been regularly reported due to poor sanitation, poor sewerage systems and access to potable drinking water facilities during floods. Households cope by reducing food intake to maintain their food supplies for the duration of the flood. Expenditure shifts from food consumption towards shelter and medicine²³.

Bangladesh: A low-lying country with more than 230 waterways, Bangladesh is one of the most disaster-prone nations in the world. Fifteen per cent of its land floods annually on average. In 2004 the figure reached 34 per cent and in 2007 two floods and a cyclone together killed 4,000 people and caused economic losses of about US\$3 billion. In mid November 2007, Cyclone Sidr hit southern Bangladesh killing nearly 3,500 people and as reported by UN, leaving millions homeless²⁴. More than 4 million people in 30 southern districts were affected by the cyclonic storms. The 2007 floods which swept across India, Nepal, Bhutan, Pakistan and Bangladesh, caused large scale damages in all six divisions of Bangladesh resulting in the displacement of five million people with the estimated death toll registered at 500. Cyclone Aila, which caused massive losses in India in 2009, spread similar widespread destruction in Bangladesh with more than 400,000 people reportedly isolated by severe flooding in coastal regions. Numerous villages were either completely submerged in floodwaters or destroyed. Several rivers broke through embankments, causing widespread inland flooding. In one region alone, more than 50,000 people were left homeless. On April 13, 2010, a severe storm struck parts of Bangladesh causing five deaths, 200 injuries and destroying thousands of houses²⁵. In June 2010, powerful landslides triggered by heavy rains killed at least 47 people in southeastern Bangladesh, striking a coastal area as people slept and burying many alive inside their homes²⁶. A severe storm swept over four villages of Nijhum Deep in May 2011 leaving at least 50 people injured and damaging 300 to 400

katcha houses, which were razed to the ground. Extensive damage was also caused to standing crops in the area²⁷. Earlier, in January 2011, a cold spell took 16 lives and made most of the population of northern Bangladesh suffer from pneumonia, cough, fever, asthma and other cold related ailments. Bangladesh lost about half a million tons of rice, or 30 per cent of the country's average annual food grain exports, each year due to floods during 1962-88²⁸. In 1998, prolonged flooding resulted in estimated losses worth 1.5 per cent of the GDP²⁹.

In Bangladesh, 60 per cent of the country is flood prone. In addition, farmers in northeastern Bangladesh have observed that the first flash flood has been arriving earlier in the year. The effect has become more marked in recent years, with particular impact in 2003 and 2004³⁰.

Pakistan: Similar to its counterparts, Pakistan has also suffered its share of natural disasters. In 2005 the country was struck by a disastrous earthquake killing more than 73,000 people. During the last decade, the country has witnessed devastating cyclones and floods. A cyclone struck in the southern province of Sindh in 1999. It wiped out 73 settlements, and resulted in 168 lives lost, nearly 0.6 million people affected and killing of 11,000 cattle. It destroyed 1,800 small and big boats and partially damaged 642 boats, causing a loss of Rs380 million. The losses to the infrastructure were estimated at Rs 750 million. In June 2007, more than 200 people died during severe storms in Karachi³¹. Not a month down the road, Cyclone Yemyin struck the coastal areas of Balochistan resulting in flash floods claiming the lives of 730 people while some 350,000 people were displaced, 1.5 million affected and more than two million livestock perished³². From July through early August 2008, monsoon rains and related flooding affected populations throughout Pakistan, killing 40 individuals and affecting an estimated 241,000 others, including approximately 175,000 people displaced from communities in Khyber Pakhtunkhwa Province. Floods also damaged or destroyed an estimated

12,000 houses, in addition to infrastructure, crops, and agricultural land³³. The 2009 Karachi floods resulting from one of the worst rains in the past thirty years killed at least 26 people and injured more than 150 people in a series of related incidents. A landslide in Attabad village located in the northern part of the country which led to around 40 houses sliding into the Hunza River killed 20 people in January 2010. Debris from the landslide blocked the river, leading to the formation of a large lake which threatened to flood the downstream areas. As a result, by June, some 20,000 people were forced to leave their homes.

This devastating incident was followed by the 2010 floods that ripped through the entire country causing massive damage to property, livelihood and infrastructure. From Mid-July till Mid-August 2010, all four provinces of Pakistan were badly affected during the monsoon rains when dams, rivers and lakes overflowed, killing at least 1,750 people, injuring 2,500 and affecting 23 million people. The flood is considered the worst in Pakistan's history, affecting people of all four provinces and Azad Jammu and Kashmir region of Pakistan. The country was still reeling from, and barely coping with the destruction caused last year when torrential rainfall inundated the southern part of the Sindh province. The impact upon the population is intensifying with over nine million people and all 23 districts of the province affected to some degree. In 2011, the lower half of the Sindh province received record breaking rains. Average rainfall in lower Sindh ranges between 200 to 250 mm which normally occurs from July to August. This year it came late in September and the districts of Mirpurkhas, Badin and Shaheed Benazirabad received 810, 680 and 640 mm rain respectively; way beyond the normal averages. Coastal district Badin received 297 mm rain only in two days on 11-12th August as against its average annual rainfall of 150 mm. This has resulted in a catastrophic devastation. According to the National Disaster Management Authority, 466 people died during the floods, 34,000 villages were affected and 1.6 million houses

were damaged which affected more than nine million people. The rural economy in the province has been ruined as the cropped area of over 2.1 million acres was damaged and more than 116,000 cattleheads were perished. Last year's (2010) floods have already rendered a large number of people food insecure. According to the World Food Program (WFP), by 2009, almost 50 per cent of the population, or 83 million people, were food insecure, up from 38 per cent in 2003. In the aftermath of the flooding, it is believed that this figure may yet have risen to upwards of 90 million³⁴.

Nepal: Because of hazards and calamities such as landslides, avalanche, floods, flash floods, glacial lake outbursts etc., thousands of people are affected every year in Nepal. More than 1,000 people die annually in Nepal because of natural hazards, with almost 300 deaths due to floods and landslides alone³⁵. Heavy flooding in the past years has affected hundreds of families in eastern Nepal. Saptari is one of the most flood-prone districts in the south eastern Terai region where heavy rains in 2007 affected over 50,000 households, displaced nearly 8,300 and destroyed over 3,500 houses. The 2007 South Asian floods killed eighty-four people in Nepal while 9,700 families were displaced. 28 of the country's 75 districts were affected³⁶.

In 2008, at least 10 people, including six in one family, have been reported killed by a mudslide in far western Jajarkot district³⁷. Torrential rains in September 2008 caused heavy flooding in mid-west and far-west regions of Nepal resulting in the displacement of 180,000 people³⁸. Crop failure due to severe drought conditions in nine hill districts of far western and mid-western Nepal resulted in a precarious food situation which affected more than 300,000 people.

A survey done by ICIMOD and UNEP highlights that 26 lakes in Nepal are categorized as dangerous due to the threat of glacier lake outburst floods (GLOFs)³⁹. As highlighted by IPCC (2001), glacial melt is expected to increase under changed climate

conditions, which would lead to increased summer flows in some river systems for a few decades, followed by a reduction in flow as the glaciers disappear. According to some studies, almost 20 per cent of the present glaciated area above 5000 m altitude is likely to be snow and glacier free with an increase of air temperature by 1°C. Similarly, a 3-4°C temperature rise would result in the loss of 58 to 70 per cent of snow and glaciated areas with threat of GLOFs. Shrestha et al (2003) revealed increasing number of flood days and consecutive days of flood events in Nepal. Haritashya et al (2006) used remote sensing techniques to observe surging and variation in the frequency and size of supra-glacial lakes in the Hindukush and Karakoram Himalayas. In Putalibazar municipality of Syangja district, Nepal, disaster losses show an increasing trend over the last 20 years not only due to a recorded increase in rainfall but because of increased settlements in the floodplains and improper road construction⁴⁰.

Nepal is situated in the seismically active Himalayan mountain belt dominated by the northward movement of the Indian tectonic plate towards and below the Eurasian tectonic plate. The role of earthquakes is essentially to catch up with the rate of convergence of these plates. Every year, more than a thousand earthquakes of various magnitudes ranging from 2 to 5 on the Richter scale occur in the country. Nepal has a long record of destructive earthquakes that extends back to 1255 AD. According to historical evidence, Nepal has experienced nine major earthquakes over the last 700 years. Recurring earthquakes during the 20th century claimed more than 23,000 lives⁴¹.

Sri Lanka: The wave of natural disasters that has swept across the South Asian countries in the past decade or so has left a marked impact on Sri Lanka as well; a country frequently exposed to floods, Tsunami, storm surges, drought and landslides amongst other natural disasters. The most recent disaster occurred in November 2011. A storm packing heavy rain and

gusty winds lashed southern Sri Lanka, killing at least 19 and leaving 43 fishermen missing. More than 53,000 people were also forced out of their damaged homes in the southern areas of the country. About 5,700 houses were also damaged. In January 2011, Sri Lanka witnessed worst rains that affected nearly a million people. Climate change is predicted to render the major tea growing areas of Sri Lanka unsuitable for tea growing by 2050. Sri Lanka has witnessed major floods in 1913, 1940, 1947, 1957, 1967, 1968, 1978, 1989, 1992 and 2003 causing severe damages to life and property. Likewise the country has experienced severe droughts in 1935-37, 1947-49, 1953-56, 1974-77, 1981-83, 1993-94, 2000-01 and 2003-04. The country also endured cyclones in 1907, 1922, 1964, 1978 and 2000. From 1980 to 2010, Sri Lanka has faced over 62 different disaster events of which 45 were flood related, six were droughts and three were severe storms that led to large scale destruction to human lives as well as property and infrastructure.

The tsunami of December 2004 was the worst disaster in recent history of Sri Lanka. Authorities report 30,196 confirmed deaths. Many of the dead were adults and the elderly. The south and east coasts were worst hit. One and a half million people were at their homes. About 1,200 dead were counted at in the east. At in the northeast, where the tsunami reached more than inland, 800 were reported dead. In neighbouring Amparai district alone, more than 5,000 were reported dead. The naval base at Trincomalee is reported to have been submerged. About 1,000 more dead were counted in Vadammaradchi East. A holiday train, "Queen of the Sea", was struck by the tsunami near the village of Telwatta as it travelled between Colombo and Galle carrying at least 1,700 passengers, killing all but a handful on board. The agricultural sector has been affected seriously. 259 sq. km of paddy land has been destroyed in the northern, eastern, southern and western coastal belt. In addition, the extensive salinization of paddy lands has rendered them unsuitable for further production. Rubbish has also been deposited on paddy lands. A large number of agricultural vehicles and equipment have been destroyed and canals and

drains have been blocked⁴². Continuous torrential rains in 2008 led to country wide flooding causing the death of 20 people while 400,000 others were driven from their homes. In January 2011, the country was yet again faced with another disastrous flood which affected one million people, displacing 400,000 people⁴³. The Sri Lankan beaches are facing rapid erosion. According to some estimates a rise in sea level would tend to cause a shoreline recession except where this trend is balanced by the influx of sediment. In a 30 cm sea level rise scenario, the study projects a possible shoreline recession of about 30 m and for a 100 cm scenario, the shoreline retreat is expected to be about 100 m. A one metre rise in sea level could drown most of the coastal wetlands in Sri Lanka. Intrusion of salt water is another threat faced by coastal areas. Salt-water intrusion is already affecting approximately 15,000 hectares of paddy fields in the Galle district.

Bhutan: In Bhutan, the entire northern upper land has glacier/snow-fed lakes in the mountaintops. Increased temperature and greater seasonal variability in precipitation will lead to accelerated recession of glaciers and result in increase in the volume of these lakes⁴⁴. This might result in flash floods causing severe damages in terms of loss of lives, economy, and infrastructure in the valley. According to a recent study conducted by the Department of Geology and Mines (DGM) in collaboration with the ICIMOD, there are 2,674 glacial lakes in Bhutan, of which 562 are associated with glaciers. The study has identified 24 glacial lakes as 'potentially dangerous lakes' that could pose a GLOF threat in the near future⁴⁵. In 1994, a glacier lake outburst in the Lunana region flooded and damaged everything in the lower valleys of Punakha and below. Earthquakes are another major source of potential disasters in the country. Records suggest that while four great earthquakes of magnitude exceeding 8 on the Richter scale occurred during 1897, 1905, 1934 and 1950, another 10 earthquakes exceeding magnitude 7.5 have occurred in the Himalayan belt during the past 100 years. In recent years, Thimphu, Paro and Phuentsholing have witnessed the effects of three significant earthquakes⁴⁶.

In the last quarter of 2009, Bhutan, which was already recovering from the after affects of an earthquake, was faced with a series of natural calamities which were triggered by windstorms, the disastrous fire in Wamrong town; and the flooding and mudslides caused by cyclone 'Aila'. The floods resulted in the loss of 12 lives, and the accompanying strong winds left a trail of widespread damages affecting seventeen of the country's twenty districts. The rains also triggered massive landslides at numerous places cutting off communities in affected areas. This hampered provision of external assistance and evacuation of affected population at many places. In total, the estimated damages and losses amounted to approximately US\$ 17 million⁴⁷.

Maldives: The Maldives is the smallest South Asian country in terms of both population and land area. With an average ground level of 1.5 metres (4ft 11in) above sea level, it is the planet's lowest country. It is also the country with the lowest highest point in the world, at 2.3 metres. Over the last century, have about 20 centimetres (8in) and further rises of the ocean could threaten its existence⁴⁸.

Beach erosion is now among the most serious environmental issues facing the islands of Maldives. Over 80 per cent of the land area in the Maldives is less than 1 m above mean sea level. Being so low-lying, the islands of the Maldives are very vulnerable to inundation and beach erosion. Presently, 50 per cent of all inhabited islands and 45 per cent of tourist resorts face varying degrees of beach erosion. Coastal infrastructure is also highly vulnerable to the impacts of sea level rise and extreme events. Given the geophysical characteristics of the islands and the population pressure, all human settlements, industry and vital infrastructure lie close to the shoreline. According to the "State of Environment: Maldives 2004" report, more than 73 per cent of the inhabited islands have buildings less than 100 feet away from the shoreline. Two per cent of the islands have building right at the shore line. And more than 55 per cent of the islands have buildings less than 50 feet from the shoreline⁴⁹.

The tsunami struck the Maldives on 26 December 2004 at 9.20 am, destroying lives and livelihoods of a third of the population. The disaster severely affected the whole country, flooding all but nine islands. Thirteen islands were totally evacuated. The tsunami claimed 82 lives, left 26 people missing and displaced over 15,000 people. The tsunami destroyed much of the country's physical asset base including homes and entire settlements, public service utilities such as hospitals, clinics and schools, transport and communications infrastructure, private businesses and livelihoods. The main industries of fisheries and tourism were badly hit, wiping out two decades of investment and economic development. The total asset loss is estimated to be 62 per cent of the country's GDP⁵⁰.

Table.1 reveals a striking pattern of occurrence of natural disasters in South Asia during the last nine years⁵¹.

Table.1 Frequency of Natural Disasters in South Asia 2000-09

Year	Type of Disaster	Country	Frequency
2000	Floods	India	6
2001	Earthquake	India	1
2002	Extreme Temperature	India	2
	Earthquake	Afghanistan	3
2003	Extreme Temperature	India	2
2004	Earthquake	Sri Lanka	1
	Earthquake	India	1
	Floods	India	6
	Floods	Bangladesh	3
2005	Earthquake	Pakistan	1
	Earthquake	India	1
	Floods	India	17
2006	Floods	India	17

2007	Storm	Bangladesh	2
	Floods	India	2
	Floods	India	16
2008	Storm	Afghanistan	1
2009	Floods	India	2

From 1990 to 2008, South Asian countries have witnessed huge disasters that affected millions in the region. Table.2 and 3 provide a summary of the disasters reported during the time period.

Table.2¹ Reported Natural Disaster Impacts in South Asia (1990-2008)

Country	Population affected (000)	Deaths (000)	People Affected (000)	Population affected (%)	Damages (US\$ 000)
Afghanistan	22,615	6.1	5,410	23.9	69,060
Bangladesh	143,990	155.3	145,713	101.2	12,984,000
Bhutan	602	0.2	66	11	3,500
India	1,071,608	53.4	885,244	82.6	25,743,100
Maldives	279	0	2	0.7	500,100
Nepal	25,278	4.6	2,796	11.1	245,100
Pakistan	162,662	9.4	27,943	17.2	3,573,054
Sri Lanka	19,258	0.5	6,331	32.9	1,670,070
Total	1,368,327	229.5	1,073,504	78.5	44,787,984

Table.3² Deadliest of select Natural Disasters in South Asia, 1990-2009

Type	Country	Year	Deaths (Number of Persons)
Storm	Bangladesh	1991	138,987
Extreme Temperature	Pakistan	2005	73,338
	Sri Lanka	2004	35,399
	India	2004	16,389
	Afghanistan	1998	7,023
Floods	India	1998	2,641
		2002	1,930
		2003	1,610
Floods	India	1998	2,131
		2005	2,129
		2007	2,051
		2008	1,590
		2009	1,197

Both number of disasters and fatalities are on a rise since 1991.

Disasters and Resultant Death Tolls⁵³

Fig.1: Total Number of Natural Disasters in South Asia

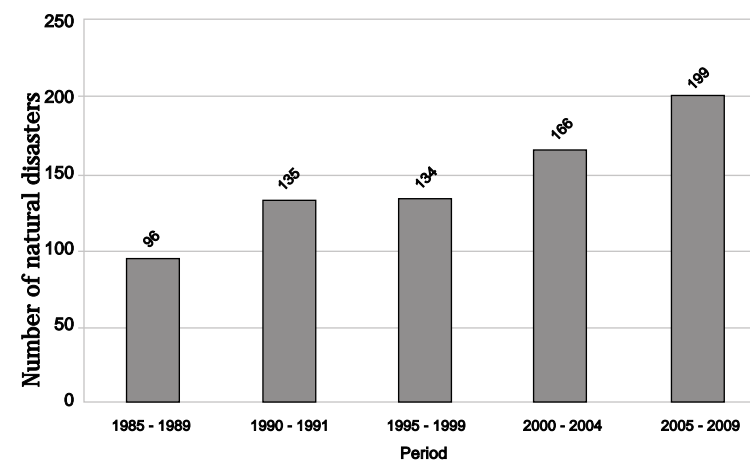


Fig.2: Total Number of Fatalities Due to Natural Disasters in South Asia

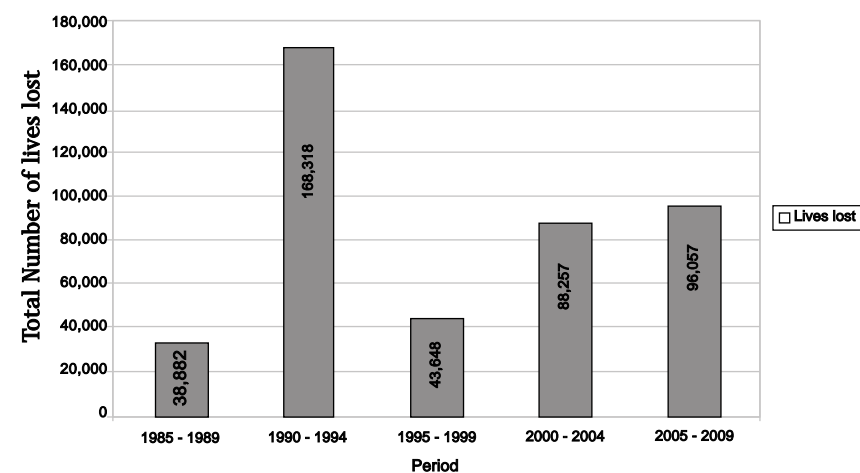


Fig. 4: Total Number of Natural Disasters by Type in South Asia

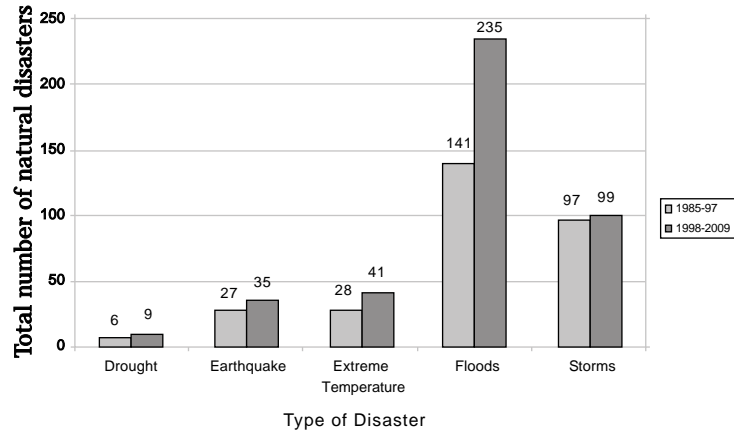
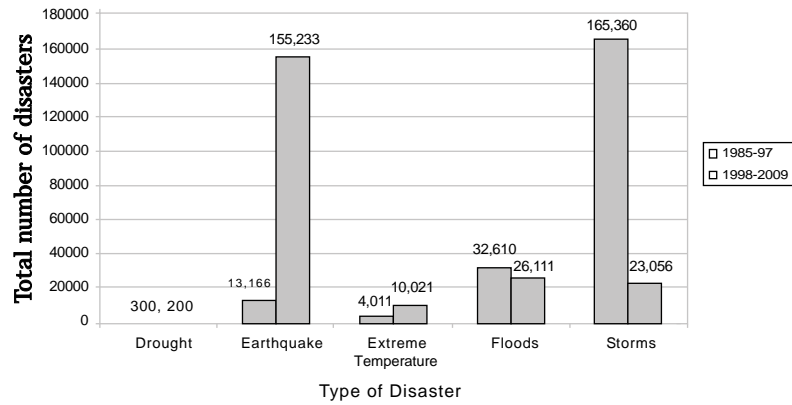


Fig. 5: Total Number of lives lost due to various types of disasters in South Asia



Section III: Disaster Response Mechanisms



Regional Cooperation for Disaster Risk Mitigation

Rising frequency and intensity of disasters in the region has galvanized the South Asian countries to enter into regional cooperation regimes. Several initiatives have been taken in recent years to institutionalize the regional cooperation to mitigate disaster risk. The South Asian Association for Regional Cooperation (SAARC) has been a forum to undertake such initiatives.

SAARC was established on December 8, 1985. Its Member countries include Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka. Afghanistan joined the organization in 2005. In its summits from 1985 to 2004, SAARC recognized the devastating effects and consequences of natural disasters and degradation of environment in member countries and called for strategies and policies to be implemented for sustainable development and poverty alleviation. However, there is no significant development on the issue of disaster management at the regional level. The SAARC countries have shared rivers, common glacial sources and habitats across the borders. This justifies regional cooperation by all accounts.

SAARC Disaster Management Centre (SDMC)

The SAARC Disaster Management Centre (SDMC) was set up in October 2006 at the premises of National Institute of Disaster Management in New Delhi. The Centre has the mandate to serve eight Member Countries of the South Asian Association for Regional Cooperation (SAARC) - Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka - by

providing policy advice and facilitating capacity building services including strategic learning, research, training, system development and exchange of information for effective disaster risk reduction and management in South Asia.

The Centre is a sleek body of professionals working on various dimensions of disaster risk reduction and management in the region. SDMC is networking through the National Focal Points of the Member Countries with the various Ministries, Departments and Scientific, Technical, Research and Academic institutions within and outside the Government working on different aspects of disaster risk reduction and management.

The Centre conducts studies and research, organizes workshops and training programmes, publishes its reports, and documents and provides various policy advisory services to the Member Countries⁵⁴.

Regional Study on the Causes and Consequences of Natural Disasters and the Protection and Preservation of the Environment

In 1992, a Technical Committee on Environment was formed to coordinate regional cooperation in environment and related areas. The Association undertook some valuable initiatives for example, SAARC Regional Study was conducted on the Causes and Consequences of Natural Disasters and the Protection and Preservation of the Environment. Prior to this during the Third SAARC Summit in Kathmandu (1987) a study was commissioned for the Protection and Preservation of the Environment and the Causes and Consequences of Natural Disasters. Accordingly, a group of experts with members from all the SAARC countries was constituted to prepare the study, which was completed in 1991. Its main recommendations were endorsed by the Heads of State of Governments at their Sixth Summit held in Colombo in 1991. The recommendations outlined in the study are categorized as follows:

1. Measures to protect and manage the environment;
2. Measures and programmes for strengthening disaster management capabilities;
3. Implementation mechanisms for the measures outlined in the study.

SAARC Regional Study on Greenhouse Effect and its Impact on the Region

The fourth SAARC Summit held in Islamabad in 1988 stressed to enhance regional cooperation with a view to strengthening disaster management capabilities. It was agreed that a study on Greenhouse Effect and its Impact on the Region should be completed in the shortest period to provide a basis for an action plan for meaningful cooperation among the member states. The Study had the following components:

- i. Regional measures in sharing experiences, scientific capabilities and information on climate change; and
- ii. Global collaboration in Monitoring Climatology, Sea Level Rise, Natural Disaster, Technology Transfer and Finance etc.

SAARC Plan of Action on Environment

The Third Meeting of Environment Ministers held in Malé, in 1997 adopted the SAARC Plan of Action on Environment. The Action Plan is based on the recommendations of the two Studies outlined above. The Plan seeks to evaluate the status of SAARC cooperation in the field of environment, identifies the concerns of the member states at the regional and global levels, and sets out parameters and modalities for enhanced cooperation.

SAARC Common Environment Programme

It was followed by the Colombo Declaration for a Common Environment Programme. The Fourth Environment Ministers

in 1998. The Program recalled various major international Meeting adopted the Common Environment Program in Colombo instruments and declarations on environment and noted the importance of enhanced cooperation in sharing information in the region to promote effective management of the environment for the benefit of all the Member Countries. The Common Environment Program while calling for early implementation of the SAARC Plan of Action on Environment recommended, inter-alia, compilation of a regional directory of scientific and technological institutions in the field of environment and state-of-the-art report on eco-friendly technologies.

Regional Cooperation in Flood Disaster Mitigation in the Hindu Kush Himalayan

Another major initiative is Regional Cooperation in Flood Disaster Mitigation in the Hindu Kush Himalayan (HKH). Actions at the national level cannot provide sustainable solutions since upstream flows from Afghanistan, Nepal, and parts of India impact Bangladesh, most of India and Pakistan. Finding solutions for flood control, irrigation and river transport will require cooperation with upstream countries. Thus, cross-border cooperation on water between India, Bangladesh, and Nepal offers a long-term solution to flood mitigation. There are similar benefits of water cooperation between India and Pakistan and between Pakistan and Afghanistan⁵⁵.

Concern about regional cooperation on hydrological activities was echoed during the second Steering Committee Meeting of the Hydrological Research Network (HKH-FRIEND) held in April 2000 in Kathmandu, Nepal. In response, ICIMOD in collaboration with regional partners and the World Meteorological Organization (WMO) have now started working on a long-term project that aims to establish an operational flood information system for the HKH region. As a first step, ICIMOD and the WMO, supported by the US Department of State (Regional Environmental Office of South Asia), US Office for Foreign Disaster Assistance, and

Danish International Development Assistance (DANIDA), organized a high level consultative meeting on 'Developing a Framework for Flood Forecasting and Information Exchange in the Hindu Kush Himalayan Region' in Kathmandu in May 2001. Participants from Bangladesh, Bhutan, China, India, Nepal, and Pakistan, agreed on an initial Action Plan for Regional Co-operation for Flood Information Exchange. The objective of the Project is to promote regional cooperation in sharing of hydro meteorological information which would lead to a reduction in flood vulnerability by providing timely and reliable warning to save people's lives and properties. The Ministries of Water Resources, Departments of Hydrology and Meteorology and Flood Forecasting units of partner countries will be the lead agencies for this project⁵⁶.

Comprehensive Framework on Disaster Management in South Asia

In the aftermath of Indian Ocean Tsunami of December 2004, a Special Session of the SAARC Environment Ministers was held at Malé on 25 June 2005. The Ministers had concluded the meeting by adopting the Male Declaration, which decided inter alia that an Expert Group of the member countries shall meet at Dhaka, Bangladesh to formulate a Comprehensive Framework on Early Warning, Disaster Management and Disaster Prevention, prior to the Seventh Ministerial Meeting on Environment in Bangladesh.

The Expert Group met on 7-9 February, 2006 in Dhaka and developed a comprehensive framework on disaster management in South Asia. The framework is aligned with the implementation of the Hyogo Framework of Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. The Framework was approved by the SAARC Council of Ministers on 30 July 2006 and by the Fourteenth SAARC Summit in New Delhi on 3-4 April 2007⁵⁷.

Regional Co-operation for Disaster Risk Mitigation within the SAARC Framework is key development towards achieving regional cooperation to mitigate risk of disasters. The framework aims the following initiatives.

- 1- Regional collaboration on enhancing Early Warning Systems
- 2- Standard Operating Procedures for mutual assistance in times of disasters of catastrophic proportions
- 3- South Asian Disaster Resource Inventory
- 4- Regional Action Plan for Disasters

The summit held at Thimphu, Bhutan in April 2010 was dedicated to the theme of Climate Change. The Summit declaration, which was silver jubilee of SAARC, was termed 'Towards a Green and Happy South Asia'. The Thimphu Statement on Climate Change adopted at the Summit meeting called for a review of the implementation of the Dhaka Declaration and SAARC Action Plan on Climate Change and ensure its timely implementation. There was an agreement to establish an Inter-governmental Expert Group on Climate Change to develop clear policy direction and guidance for regional cooperation as envisaged in the SAARC Plan of Action on Climate Change. It was resolved that the Inter-governmental Expert Group on Climate Change shall meet at least twice a year to periodically monitor and review the implementation of this Statement and make recommendations to facilitate its implementation and submit its report through the Senior Officials of SAARC to the SAARC Environment Ministers⁵⁸.

The Thimphu Statement as if anticipating probable failure of Cancun conclave resolved to attempt and carry on with comprehensive regional self-reliance efforts and adopted following:

- (i) Direct the Secretary General to commission a study for presentation to the Seventeenth SAARC Summit on 'Climate Risks in the Region: ways to comprehensively address the

related social, economic and environmental challenges.

(ii) Undertake advocacy and awareness programs on climate change, among others, to promote the use of green technology and best practices to promote low-carbon sustainable and inclusive development of the region;

(iii) Commission a study to explore the feasibility of establishing a SAARC mechanism which would provide capital for projects that promote low-carbon technology and renewable energy; and a Low-carbon Research and Development Institute in South Asian University;

(iv) Incorporate science-based materials in educational curricula to promote better understanding of science and adverse effects of climate change;

(v) Plant ten million trees over the next five years (2010-2015) as part of a regional afforestation and reforestation campaign, in accordance with national priorities and programmes of Member States;

(vi) Evolve national plans, and where appropriate regional projects, on protecting and safeguarding the archeological and historical infrastructure of South Asia from the adverse effects of Climate Change;

(vii) Establish institutional linkages among national institutions in the region to, among others, facilitate sharing of knowledge, information and capacity building programmes in climate change related areas;

(viii) Commission a SAARC Inter-governmental Marine Initiative to strengthen the understanding of shared oceans and water bodies in the region and the critical roles they play in sustainable living to be supported by the SAARC Coastal Zone Management Centre;

(ix) Stress the imperative of conservation of bio-diversity and natural resources and monitoring of mountain ecology covering the mountains in the region;

(x) Commission a SAARC Inter-governmental Mountain Initiative on mountain ecosystems, particularly glaciers and their contribution to sustainable development and livelihoods to be supported by SAARC Forestry Centre;

(xi) Commission a SAARC Inter-governmental Monsoon Initiative on the evolving pattern of monsoons to assess vulnerability due to climate change to be supported by SAARC Meteorological Research Centre;

(xii) Commission a SAARC Inter-governmental Climate-related Disasters Initiative on the integration of Climate Change Adaptation (CCA) with Disaster Risk Reduction (DRR) to be supported by SAARC Disaster Management Centre;

(xiii) Complete the ratification process for the SAARC Convention on Cooperation on Environment at an early date to enable its entry into force.

Agreement on Rapid Response to Natural Disasters

In the recent most development, Seventeenth Summit of the South Asian Association for Regional Cooperation (SAARC) was held in Addu city of Maldives on 10-11 November 2011. In Addu declaration, member countries expressed their consciousness of the environmental degradation and particular vulnerabilities of the region to the threat of climate change. The declaration also welcomed the signing of the SAARC Agreement on Rapid Response to Natural Disasters⁵⁹.

Prior to this in May 2011 an inter-governmental meeting on draft SAARC Agreement on Rapid Response to Natural Disasters

held in Colombo, Sri Lanka reached a broad consensus on the Agreement. This agreement was adopted in Seventeenth SAARC Summit held in Maldives in November 2011. The draft agreement based on the principle of respect for the sovereignty, territorial integrity and national unity of all member states aims to put in place an effective mechanism for rapid response to disasters to achieve substantial reduction in loss of lives and loss of social, economic and environmental assets in times of a disaster.

In a more promising development, the Abu Dhabi Dialogue Group comprising seven states sharing the rivers rising in the Greater Himalayas is expected to meet this year to adopt a joint initiative to minimize the impact of melting of glaciers. The group comprising Pakistan, Afghanistan, Bangladesh, Bhutan, China, India and Nepal was set up in 2006 in Abu Dhabi. Later on, the United Kingdom, Australia and Norway joined it to support its activities.

It would strive to achieve within ten years a cooperative and knowledge based partnership for managing fairly and developing the Himalayan River Systems to bring prosperity, peace and social harmony and environmental sustainability from the source to the sea.

The World Bank has started facilitating the dialogue to focus on the changing conditions in the headwaters and the pressures in the floodplains and deltas. The group has decided to adopt a non-representative and non-formal participation so as not to focus on particular rivers or disputes, no attribution and no requirement for a consensus outcome and instead focus on sharing global experience on international waters and benefit sharing for achieving constructive convergence on major issues. Assisted by the International Centre for Integrated Mountain Development (ICIMOD), the group has convened more than 50 leading knowledge institutions across the region to be part of the process.

On the advice of the World Bank, the participating countries have agreed to have a regional hydro-meteorological system to overcome shortage of reliable data and its sharing mechanism. The World Bank will provide financial support in this regard⁶⁰. The most significant aspect of this initiative is participation of China. Without including China, South Asia's water and hydro-meteorological disaster issues will always remain unresolved.ⁿ

Institutional and Policy Framework in SAARC countries

Recurring natural disasters of varying intensity, in terms of their impact at the household as well as the national level in SAARC countries, have forced the governments to realize the urgent need for formulation of disaster prevention and mitigation policies and mechanisms. While most of the SAARC member countries have developed their disaster preparedness, prevention and mitigation policies, actual implementation of the policies and support mechanisms available that would facilitate the government implementation arms in the adaptation of these policies, is an area which still needs to be looked into. The capacity of governments to respond to natural disasters, remains inadequate due to which additional assistance from bilateral and multilateral donor agencies is oftentimes required to ensure that the immediate relief needs of the affected population are met in a timely and effective manner.

Afghanistan: Disaster mitigation falls under the jurisdiction of Department for Disaster Preparedness (DDP) which was established in 1971. In January 2003, the Government of Afghanistan came out with a Disaster Management Framework for Afghanistan. DDP has been revamped, to form the Afghanistan National Disaster Management Authority (ANDMA), with seven regional offices covering all the provinces of Afghanistan. The Disaster Management Framework is currently under review. A national policy on disaster management has been prepared and also a National Commission on Disaster Management has been setup with 20 line ministries as members⁶¹. DDP adopted a three tiered bottom to top approach to address the disaster management needs, which includes District Response Committee

for Natural calamities (DRC), Provincial Emergency Response Committee for Natural calamities (PERC) and the National Emergency Response Commission at the National level (NERC). In case of a natural calamity contained at the district level, DRC mobilizes its resources and informs PERC of the disaster occurrence. In case, DRC is involved in the management of relief efforts, PERC will not interfere with their interventions, however in the event of multiple disasters, where the DRC is unable to cope with the magnitude of the disaster, the management of relief efforts will fall under the jurisdiction of PERC. Similarly, if the scope of relief efforts is within the capacity of PERC, National Emergency Operation Center (NEOC) is only informed about the scale of the disaster and the corresponding casualties. However, if the situation needs national level intervention, NEOC plays the key role for coordination of humanitarian relief services for the affected population⁶². Government efforts towards disaster preparedness and response work include vulnerability mapping at the regional level, trainings on disaster preparedness and response and incorporation of elements of disaster management under the social protection pillar of the Afghanistan National Development Strategy. A number of NGOs, both national and international, are also actively involved in the provision of humanitarian relief services in Afghanistan in the advent of a disaster. In addition, the developmental organizations are also involved in strengthening resilience of communities, conducting capacity building of the government line agencies at provincial and district levels, feeding experiences of working with communities into policy development framework and holding the state and donors accountable for not fulfilling their responsibilities in accordance with Hyogo Framework of Action. (The Hyogo Framework for Action (HFA) is a 10-year plan, adopted by 168 Member States of the United Nations in 2005, formulated to make the world safer from natural hazards).

Bangladesh: In the past, the Government of Bangladesh (GoB) had mostly been reactive to addressing natural disasters that

focused on relief and rehabilitation activities. This began to change in the 1990s, when the need for a more proactive approach geared towards disaster preparation, prevention and preparedness rather than post disaster management, became apparent. The Ministry of Food and Disaster Management (MoFDM) has the mandate to coordinate all disaster management activities within the country. In 2003 the MoFDM launched the Comprehensive Disaster Management Programme (CDMP) in partnership with DFID and UNDP. The European Commission became the Programme's third major donor in September 2006. CDMP aimed to improve Bangladesh's disaster management system's ability to reduce unacceptable risks, improve response and recovery activities and support policy and planning reforms. Presently, Bangladesh has a comprehensive disaster framework in place, which is being managed through the Disaster Management and Relief Division (DMRD). National Platform for Disaster Risk Reduction (NPDRR) has been established and made functional under DMRD. The platform, comprising of representatives from government, non-government, Civil Society Organizations, humanitarian organizations and professionals from academic and training institutes, is acting as national forum for guiding disaster risk reduction business in Bangladesh. In 2011, revised Standing Orders on Disaster (SOD) has been approved by the National Disaster Management Council (NDMC), which outlines disaster and climate risk reduction tasks for the ministries, agencies, committees, Civil Society Organizations, Non-Government Organizations and citizens. National Plan for Disaster Management (2010-2015) approved in 2010 also approved Bangladesh Climate Change Strategy and Action Plan (BCCSAP 2009). Disaster and climate risk reduction fund and climate change adaptation fund was also allocated during the last two years national budget. Earthquake Preparedness and Awareness Committee (EPAC) has also been formed and made functional. A number of networks/forums including Bangladesh Disaster Management Education Research and Training Network (BDMERT) and Disaster Forum, have been established, which are currently functional. The BDMERT consists

of 244 experts from different public and private universities, training and research institutes. Besides, NIRAPAD and Disaster Forum, the two networks consisted of mostly representatives from the INGOs and NGOs⁶³. Disaster Management and Information Center (DMIC), an information sharing system that uses ICT to connect Government agencies, NGOs, the private sector, regional and international agencies for cooperative action in risk reduction and emergency response, has also been established at the district and national levels.

Bhutan: In view of the geo-physical location of Bhutan in one of the most seismically active regions of the world and the peculiar geo-climatic conditions, the Royal Government of Bhutan (RGoB) established the Department of Disaster Management (DDM) in 2008 to coordinate national response from various agencies, develop contingency plans, raise public awareness and train and equip local and national teams for search and rescue operations. A comprehensive disaster risk management framework has been formulated. Ministry of Home and Cultural Affairs (MoHCA) has been designated as the focal agency for implementation of disaster management at the national level, and coordination of relief efforts between different administrative units, while the administrative units (Dzongkhags, Dungkhangs, Gewogs and the Thromdes) are responsible for implementing disaster risk management activities at the municipal level. Similarly, other branches of the armed forces are also responsible for provision of relief and rehabilitation services in times of need. There have been a few instances registered where His Majesty the King has also been personally involved in relief and rehabilitation of disaster affected communities⁶⁴. A Disaster Management Information System (DMIS), a geo-referenced national database for all disaster events was launched in 2010. The purpose of DMIS is to record pertinent information about all natural disasters especially in terms of their impact which would enable the government to identify, assess and quantify the exact nature of threats posed by natural hazards in the context of specific

geographical areas. The National Disaster Management Authority intends to link DMIS to the national and district emergency operation centres, and to meteorological surveillance, analysis and information services for a more comprehensive and integrated disaster risk mitigation approach.

India: The institutional and policy mechanisms for carrying out response, relief and rehabilitation in India have been well-established since independence; however considering the increased frequency and ferocity of natural calamities, the institutional and policy framework needed revision for a more holistic disaster management approach. Although, the primary responsibility for disaster management is of the concerned State Governments, the Central Government plays a key role by providing financial and logistic support in case of major disasters and coordinate the effort of all Central Ministries/Departments/Organizations. At the apex level, the Cabinet Committee on Drought Management has been re-constituted and converted into a Cabinet Committee on Natural Calamities. A high level committee of ministers under the chairmanship of Minister of Agriculture deals with financial support required to be provided to the state governments from the National Calamity Contingency Fund, if the funds available with the state governments under Central Relief Fund are not adequate. At the district level, District Disaster Management Committees have been constituted. Similarly, sub-divisional and Block/Taluka level Disaster Management Committees have been formulated to provide disaster relief services at the taluka level. Disaster Management Teams have been constituted in villages and are being imparted training in basic functions of first aid, search and rescue, evacuation and related issues. In order to respond effectively to floods, Ministry of Home Affairs in collaboration with UNDP, USAID and European Commission has initiated National Disaster Risk Management Programme in all the flood prone states. Assistance is being provided to the states to draw up disaster management plans at the State, District, Block/Taluka and Village levels. Awareness generation

campaigns to sensitize all stakeholders on the need for flood preparedness and mitigation measures are being undertaken. Elected representatives and officials are being trained in flood disaster management under the programme. Similarly, a comprehensive programme has been taken up for earthquake risk mitigation, cyclone mitigation, and landslide hazard mitigation. A National Core Group for Earthquake Risk Mitigation has been constituted consisting of experts in earthquake engineering and administrators. The Core Group has been assigned the responsibility of drawing up a strategy and plan of action for mitigating the impact of earthquakes and provide advice and guidance to the states on various aspects of earthquake mitigation. A project for Cyclone Mitigation (estimated cost Rs. 1,050 crore) has been drawn up in consultation with the cyclone prone states. This project envisages construction of cyclone shelters, coastal shelter belt plantation in areas which are prone to storm surges, strengthening of warning systems, training and education etc.

This project has also been given in-principle clearance by the Planning Commission and is being taken up with the World Bank's assistance. A National Core Group has been constituted for drawing up a strategy and plan of action for mitigating the impact of landslides, provide advice and guidance to the state governments on various aspects of landslide mitigation, monitor the activities relating to landslide mitigation including landslide hazard zonation and to evolve 26 early warning systems and protocols for landslides/landslide risk reduction. The Government has designated Geological Survey of India (GSI) as the nodal agency responsible for coordinating/undertaking geological studies, landslides hazard zonation, monitoring landslides/avalanches, studying the factors responsible and suggesting precautionary and preventing measures⁶⁵.

Maldives: At the time of the 2004 Tsunami, Maldives had a Committee on Natural Disasters, which was later on merged with the National Commission for Protection of the Environment (NCPE). Following the tsunami, the government undertook a

range of steps to implement the UN's Hyogo Framework for Action on Disaster Risk Reduction (DRR) including setting up a national coordination mechanism, namely the National Disaster Management Centre (NDMC) to coordinate response, recovery and reconstruction effort. The centre has been the focal point for all response, relief and recovery activities. In addition to setting up NDMC, Ministerial Committee and Task Force were formulated to provide relief and rehabilitation services to the affected communities. The Ministry of Defence, Ministry of Finance and Ministry of Planning and Development lead the emergency response and relief efforts in collaboration with other government departments, UN agencies and other development partners. Disaster information and inventory management system was setup and the disaster inventory database was developed. National and five Regional Emergency Operation's Centres (REOC) are now in place and functional. UNDP supported the Ministry of Defence and National Security with equipment to lead emergency management functions at the national and the regional level. Furthermore, a Standard Operating Procedure has also been developed for EOC⁶⁶.

The Government of Maldives (GoM) approved the Disaster Management Bill in 2011, which will provide the legal foundation to establish the necessary institutional and administrative structures such as the National Disaster Management Authority, for addressing all aspects of disaster preparedness. For the first time in the country's history, the government has included disaster risk reduction programmes in 2011 budget, which includes budget allocation for establishment of the National Platform for Disaster Risk Reduction⁶⁷. Safer Island Program (SIP) has also been launched to undertake regional development as well as reduce vulnerability of island inhabitants to environmental disasters. This includes redesigning the physical aspects of the islands by creating elevated areas for vertical evacuation in the event of floods, thus creating safe zones for the residents, establishing transport infrastructure, alternative modes of communication and energy, coastal protection as

well as formulating Disaster Management Plans for each island⁶⁸.

Nepal: The legal framework for disaster management has a long history in Nepal with the Natural Calamity (Relief) Act 2039 promulgated in 1982. The Act, for the first time in history of Nepal, provided for a disaster management administrative structure in the country. At the central level, it constituted the Central Disaster Relief Committee (CDRC). Following a disaster, the CDRC would meet as and when necessary to address the needs of the affected population and on matters related to all sectors (e.g. food, health, shelter, water & sanitation). Because of the devastating effects of the annually recurrent floods, CDRC has been meeting regularly at least twice a year before the floods to take stock of the flood preparedness status and to augment it, and immediately after to evaluate the response. At the regional level, Regional Committees and Regional Service Centers are established, when and where required. However, these centers are closed after the emergency operations are completed. District Disaster Relief Committee (DDRC) is a permanent outfit at the district level to coordinate relief and preparedness. Nepal has taken two very important initiatives recently: a) Formulation of the National Strategy for Disaster Risk Management (NSDRM) and, b) Preparation of a new legislation for Disaster Risk Management to replace the existing Natural Calamity (Relief) Act, 1982. Both these initiatives are focused on internalizing the shift from a response-based national system to emphasizing the disaster risk reduction and effective preparedness approach⁶⁹. Building on NSDRM, the Government of Nepal launched the comprehensive Nepal Disaster Risk Reduction Consortium (NRRC) for the development of a long term Disaster Risk Reduction Action Plan (DRRAP) in 2009. The NRRC is a unique institutional arrangement, bringing together financial institutions, development partners, the Red Cross/ Red Crescent Movement, and the UN in partnership with the Government of Nepal. Based on government priorities and discussions with multi-stakeholder groups, the Consortium members and

the government identified five flagship areas of immediate action for disaster risk management in Nepal, which include amongst others, improved emergency preparedness and response capacity, integrated community based disaster risk reduction/management, and policy/institutional support for disaster risk management⁷⁰. The Nepalese government has also decided to setup National Disaster Management Authority, which will deal with disaster-related issues - prior to the disaster through Local Development Ministry, during disaster through Home Ministry and post disaster through Physical Planning and Works Ministry⁷¹.

Pakistan: Realizing the importance of disaster risk reduction for sustainable social, economic and environmental development, Government of Pakistan embarked upon establishing appropriate policy, legal and institutional arrangements, and implementing strategies and programmes to minimize risks and vulnerabilities. In October 2010 National Assembly of Pakistan passed the National Disaster Management Bill 2010 to provide for establishment of the National Disaster Management System in the country⁷². In November 2010 Senate of Pakistan also passed the bill to make it an Act of parliament. In its statement of object and reasons, the Bill stated that the need for strong institutional and policy arrangement was fulfilled with the promulgation of the National Disaster Management Ordinance, 2006, after passage of resolution by all the four provinces under Article 144 of the Constitution. The promulgation of the ordinance led to the consequential establishment of the National Disaster Management Commission (NDMC) and National Disaster Management Authority (NDMA). Likewise, establishment of the commissions and authorities at provincial as well as district level has been notified. The bill passed by the Senate will now be called National Disaster Management Act 2010⁷³. The act will help regulate the national disaster management system to overcome unforeseen crisis. Under the new law, the federal government will establish the National Disaster Management Commission, which will be headed by Prime Minister. Leader of the opposition in the

National Assembly and the Senate will be members of the commission.

In this regard, National Disaster Management Ordinance (NDMO) was passed in 2006, the implementation of which is ensured by the National Disaster Management Commission (NDMC). The National Disaster Management Authority (NDMA) is the focal point for coordinating and facilitating the implementation of strategies and programmes in disaster risk reduction, response and recovery. For effective management of disaster response and relief activities, disaster management authorities have been established at the provincial, regional, district and municipal levels. In addition, the National Disaster Risk Management Framework has been formulated through a consultative process involving multiple stakeholders from government ministries and departments, technical agencies, UN agencies, NGOs and donors to serve as a guide for the various institutions involved in the implementation of NDMO⁷⁴. In addition to NDMA, there exists a long list of responding agencies in case of a disaster including Civil Defence, Fire Fighting, Army, Police, Pakistan Red Crescent Society (PRCS) etc. However, an issue that needs to be addressed is the lack of linkages between these numerous organizations, which if properly addressed will result in better coordinated relief efforts and timely response in post- disaster scenario. Similar failing is obvious in institutionalizing early warning & information management due to lack of collaborative efforts between NDMA and other relevant organizations such as Pakistan Meteorological Department and SUPARCO. Other important institutions which are not formally linked with the National Disaster Management System include: Federal Flood Commission, Dams Safety Council, Ministry of Environment, National Volunteer Movement (NVM), Geographical Survey of Pakistan etc⁷⁵. Therefore, despite the existence of both policy framework and institutional supports, management of disaster related activities in pre and post disaster situation, is often haphazard and disorganized, chiefly due to lack of coordination and overlapping roles and

responsibilities of the concerned authorities.

Sri Lanka: Following the 2004 Tsunami, Sri Lanka passed the Sri Lanka Disaster Management Act (SDMA) in 2005. As per the act, National Council for Disaster Management (NCDM) was formed. The Disaster Management Centre (DMC) was established under the NCDM as the lead agency on disaster risk management in the country for implementing the directives of NCDM. In December 2005, the Ministry for Disaster Management was established, which was later renamed as the Ministry of Disaster Management & Human Rights. The Department of Meteorology has also been gazetted under the Ministry of Disaster Management and Human Rights, which is the locus of heightened activity, towards a safer Sri Lanka. The Department of Meteorology has also been designated as the lead agency for Tsunami Early Warning. Linkages of the Meteorology Department have been developed with Pacific Tsunami Warning Centre, Hawaii, Japanese Meteorological Centre and California Integrated Seismic Centre for early warning signals and disaster mitigation efforts. In case of receipt of such information, instruction/ message regarding the expected disaster is disseminated in a systematic way through media, police/ military communication, SMS, helicopter etc. Disaster Management Committees (DMC) have also been established in the coastal villages where awareness programs and evacuation drills are carried out on regular basis⁷⁶. Similar DMCs have been established at the provincial, district and divisional levels. One of the important developments through the Ministry of Disaster Management and Human Rights is the formulation of the Road Map for a Safer Sri Lanka, which has been evolved in a very participatory and consultative manner with collaboration of all relevant stakeholders. The Road Map is a document that captures the priority activities to be embarked on by various agencies that have to play a role in different areas of disaster risk management, over the short, medium and long term⁷⁷. Under the Ministry of Social Services (MoSS), Sri Lanka has established a disaster management information system called Social

Management Information System (SOMIS). The National Disaster Management Centre (NDMC) of Sri Lanka is also developing a database which will incorporate various aspects of disaster management integrated with SOMIS. Disaster Mitigation related centres have been established in almost all the universities to carry out research; development; policy assistance; data collection, storage and dissemination.

Conclusion

Apart from security and economy, climate change and disasters are just one more reason for effective regional cooperation for overall wellbeing of more than a billion inhabitants of the region. Considering the scale of poverty and vulnerability to natural disasters, all countries in the region have no option but to enhance regional cooperation to safeguard their own populations and national interests. Information sharing, capacity building and prudent policies on shared water bodies could be the key areas of regional cooperation for SAARC countries. While almost every country has developed some policy framework and strategies to mitigate and manage disasters in their won remits, trans-boundary cooperation with neighboring countries would be inevitable in the coming years. A long term vision and strategies in the wake of pernicious climate change effects is of critical importance among the SAARC members. Shared water bodies and sources of water would be the climatic hotspots in coming years and a basin-wide approach to manage hydro-disasters would be much desirable.

Another important dimension in regional cooperation is bringing China on board. The challenges faced by South Asian countries pertaining to climate change and disasters have their roots in China as major rivers of the region originate from Chinese controlled Tibet plateau. It is therefore of utmost importance that SAARC should engage meaningfully with China for regional cooperation on climate change and disasters. Likewise trans-boundary cooperation among SAARC countries is attaining greater importance in the wake of rising frequency of disasters in the region. n

Acronyms

ANDMA	Afghanistan National Disaster Management Authority
BCCSAP	Bangladesh Climate Change Strategy and Action Plan
BDMERT	Bangladesh Disaster Management Education Research and Training Network
CDMP	Comprehensive Disaster Management Programme
CDRC	Central Disaster Relief Committee
CO ₂	Carbon Di-Oxide
DANIDA	Danish International Development Assistance
DDM	Department of Disaster Management
DDRC	District Disaster Relief Committees
DMIC	Disaster Management and Information Center
DMIS	Disaster Management Information System
DRRAP	Disaster Risk Reduction Action Plan
EM-DAT	Emergency Disasters Database
EPAC	Earthquake Preparedness and Awareness Committee
GDP	Gross Domestic Product
GLOF	Glacier Lake Outburst Floods
GoM	Government of Maldives
GSI	Geological Survey of India
HAF	Hyogo Framework for Action
HKH	Hindu Kush Himalayan
ICIMOD	International Centre for Integrated Mountain Development
ICT	Information and Communication Technology
INGO	International Non Governmental Organization
IPCC	Intergovernmental Panel on Climate Change
MoHCA	Ministry of Home and Cultural Affairs
MoFDM	Ministry of Food and Disaster Management
NDMA	National Disaster Management Authority
NDMC	National Disaster Management Council
NGO	Non Governmental Organization
NRRC	Nepal Disaster Risk Reduction Consortium

NSDRM	National Strategy for Disaster Risk Management
NVM	National Volunteer Movement
PPM	Parts Per Million
REOC	Regional Emergency Operation's Centres
RGOB	Royal Government of Bhutan
SAARC	South Asian Association for Regional Cooperation
SDMC	SAARC Disaster Management Centre
SIP	Safer Island Programme
SDMA	Sri Lanka Disaster Management Act
SOMIS	Social Management Information System
SUPARCO	Space and Upper Atmosphere Research Commission
UNEP	United Nations Environment Programme

End Notes

1. Measuring South Asia's progress towards the Millennium Development Goals: By Andrew Jackson and Anil Singh
2. The Human Development in South Asia Report 2006 titled Poverty in South Asia: Challenges and Responses
3. Measuring South Asia's progress towards the Millennium Development Goals: By Andrew Jackson and Anil Singh
4. South Asia Region towards a Climate Change Strategy - The World Bank
5. <http://www.moe.gov.pk/MDGs/Millennium%20Development%20Goals%20Regions%20South%20Asia.htm>
6. South Asia Region towards a Climate Change Strategy - The World Bank
7. EM-DAT: The International Disaster Data Base, <http://www.em-dat.net>
8. Dr. Suman Sharma: Existential Threat to Human Security in South Asia and Regional Response: A case study of Climate Change and SAARC Initiatives
9. Samjwal Ratna Bajracharya, Pradeep Kumar Mool, Basanta Raj Shrestha: Global Climate Change and Melting of Himalayan Glaciers
10. IPCC Report 2001
11. Brahma Chellaney: Water Asia's New Battleground
12. Brahma Chellaney: Water Asia's New Battleground
13. A Review of Disaster Management Policies and Systems in Pakistan for WCDR 2005
14. Dr. Suman Sharma: Existential Threat to Human Security in South Asia and Regional Response: A case study of Climate Change and SAARC Initiatives
15. World Bank. 2009. Why is South Asia Vulnerable to Climate Change? <http://go.worldbank.org/OJ4FWPUB10>
16. Disaster Management Framework for Afghanistan: January 2003
17. "Bitter winter a killer in Afghanistan" CBC News. 2008-02-10
18. "Afghanistan avalanches kill 10". The Belfast Telegraph. .2009-01-18.
19. Afghanistan: Appeal 2009-2010 (MAAAF001) - Annual report - IFRC
20. Read more: : <http://www.rawa.org/temp/runews/2011/02/14/afghanistan-floods-heavy-snow-kill-25-in-two-weeks.html#ixzz1cctUFDyK>
21. http://en.wikipedia.org/wiki/Effect_of_the_2004_Indian_Ocean_earthquake_on_India
22. Read more: Floods, Avalanches, and Tidal Waves – Infoplease.com
23. South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development: Ulka Kelkar and Suruchi Bhadwal
24. Read more: 2007 Disasters - Infoplease.com <http://www.infoplease.com/ipa/A0934966.html#ixzz1cdag9JyP>
25. "Cyclonic storm kills 96". Hindustan Times. April 14, 2010
26. "At least 47 killed in Bangladesh landslides"; Associated Press
27. "Severe storm swept over Nijhum Deep, Sirajganj, Kachua; about 200 people injured"; news.priyo.com
28. Paul and Rashid 1993
29. Mirza 2002
30. South Asia Region towards a Climate Change Strategy - The World Bank
31. Read more: 2007 Disasters - Infoplease.com <http://www.infoplease.com/ipa/A0934966.html>

32. <http://listphobia.com/2010/08/17/10-worst-natural-disasters-in-history-of-pakistan/>
33. USAID/DCHA Pakistan Humanitarian Assistance Fact Sheet #1 (FY 2009)
34. <http://www.wfp.org/countries/Pakistan/Overview>
35. Nepal Contingency Report 2008 by the Nepal Inter-Agency Standing Committee (IASC)
36. "Millions flee 'worst ever' floods". CNN. August 3, 2007
37. Natural Disaster Updates; Asian Disaster Preparedness Center
38. Emergency Events Database (EM-DAT) (<http://www.em-dat.net>) and United Nations World
39. WWF 2005
40. Shreshtha 2006
41. DISASTER RESPONSE PREPAREDNESS PLAN: UN Nepal's Inter-Agency
42. http://en.wikipedia.org/wiki/Effect_of_the_2004_Indian_Ocean_earthquake_on_Sri_Lanka
43. "Troubled waters in need of bridges"; The Economist (07.01.2011)
44. IPCC 1998
45. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK-Reducing Disaster Risks for a Safe and Happy Bhutan
46. NATIONAL DISASTER RISK MANAGEMENT FRAMEWORK-Reducing Disaster Risks for a Safe and Happy Bhutan
47. Learning from Natural Disasters - Lessons Learned from Bhutan; UN System in Bhutan/Department of Disaster Management (DDM).
48. <http://en.wikipedia.org/wiki/Maldives>
49. South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development: Ulka Kelkar and Suruchi Bhadwal
50. National Recovery and Reconstruction Plan: Ministry of Planning and National Development, Republic of Maldives: March2005
51. Working Paper 2010/06: Natural Disasters in South Asia- Raghav Gaiha, Kenneth Hill, Ganesh Thapa: February 17, 2010
52. Working Paper 2010/06: Natural Disasters in South Asia- Raghav Gaiha, Kenneth Hill, Ganesh Thapa: February 17, 2010
53. Working Paper 2010/06: Natural Disasters in South Asia- Raghav Gaiha, Kenneth Hill, Ganesh Thapa: February 17, 2010
54. <http://saarc-sdmc.nic.in/home.asp>
55. South Asia Region towards a Climate Change Strategy - The World Bank
56. A Review of Disaster Management Policies and Systems in Pakistan for WCDR 2005
57. <http://saarc-sdmc.nic.in/framework.asp>
58. Dr. Suman Sharma: Existential Threat to Human Security in South Asia and Regional Response: A case study of Climate Change and SAARC Initiatives
59. Addu declaration of 17th SAARC summit
60. Daily Dawn, Pakistan-28th Dec 2011, <http://www.dawn.com/2011/12/28/meeting-planned-on-himalayan-rivers.html>
61. Status of Disaster Management Efforts in Afghanistan
62. Reporting System and Response Mechanism - SAARC; SDMC
63. Bangladesh - National Progress Report on the Implementation of the Hyogo Framework for Action; Mr. Ahsan Zakir
64. National Disaster Risk Management Framework

65. Disaster Management in India; A Status Report (August 2004)
66. Disaster Risk Reduction Activities Implemented in Maldives; Asian Conference on Disaster Reduction 2007
67. Maldives Updates UN on Disaster Management Policies; 11 May 2011
68. Integration of Disaster Risk Reduction into Post-tsunami and other Disaster related Rehabilitation and Re-construction in Maldives; Asian Conference on Disaster Reduction
69. National Strategy for Disaster Risk Management (NSDRM) in Nepal
70. National Strategy for Disaster Risk Management (NSDRM) in Nepal
71. "Nepal to set up National Disaster Management Authority" Article CCTV.com October 14th, 2009
72. http://www.dailytimes.com.pk/default.asp?page=2010%5C10%5C05%5Cstory_5-10-2010_pg7_22
73. <http://www.brecorder.com/top-stories/single/595/0/1123558/>
74. National Disaster Risk Management Framework
75. "Legal Framework for Managing Disasters in Pakistan: Key Challenges" Article by Ahmed Iqbalabadi
76. Towards a Safer Sri Lanka - Development of a Tsunami and Multi-hazards Early Warning System; Disaster Management Center
77. Towards a Safer Sri Lanka - Road Map for Disaster Risk Management; Ministry of Disaster Management and Human Rights