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Nexus of Sustainable Development and Climate Change: South Asian Countries Perspective

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Abstract

This present work, is an attempt to present and discuss the Nexus of Sustainable Development and Climate Change: South Asian Countries Perspective. It is believed that this work will add to the existing literature in this context.

Key words: nexus, sustainable development, climate change, South Asian Countries.

Introduction

In recent years, there has been growing public awareness of the important implications of the various issues relating to climate change. Indeed, climate change is one of the central areas of concern which is part of the current world-wide attention on the theme of environment and development. This theme is being increasingly addressed in the context of the United Nations Conference on Environment and Development (UNCED) held in Rio de Janeiro, from 3 to 14 June 1992. The quest for Sustainable Development is part and parcel of the considerations. Climate and Climate change will certainly have an effect on the future sustainable development of much of our planet's resources such as those relating to biodiversity, water, forests, land and oceans as well as in relation to various sectoral activities like agricultural and industry. Global warming is more of a global issue than that of a particular nation. However, its ever widening effects have significant impacts on SAARC countries with Bangladesh, Maldives and Nepal being few of the most vulnerable countries to the effects of global warming respectively. With the end of civil wars in Nepal and Sri-Lanka in recent times the most significant issues that SAARC should start addressing seriously is the issue concerning global warming. Rising sea levels, floods, drought and threat of extinctions of several species biodiversity remain the major threats to Bangladesh and its development attempts for sustainable future. The increase in global temperature has multiplier effects on the nation's progress as it is yet develop the economy and is not in a position to tackle the effects of climate change. Although there are very few industries contributing significantly to the world's carbon emission equation, they do contribute at some levels and more importantly the country as a whole is affected by the production plans of other countries like the USA.

Climate Changes affects the entire planet and must be managed through an equitable international regime. The effects of a global warming that would destroy the balance of nature would be truly disastrous. Increasing sea-levels would inundate low-lying coastal areas and obliterate entire island states. Rain-fall patterns would be altered, increasing the frequency of floods drought. It is evident that prospects for sound management of the environment are greatly improved by economic development and the alleviation of poverty.

South Asia, home to more than 40% of world poor people is among the regions that will be most affected by climate change in the World. All the eight SAARC member countries are getting severely affected by the adverse impacts of climate change. Though the SAARC region is contributing very little towards climate change and global warming in terms of emission of Green house gases (GHGs), Pollution and environmental degradation, it is suffering the most due to the adverse climate change. The climate change is also creating grounds for newer and more severe risks of disasters in the South Asia region.

Because of climate change, the frequency and intensity of natural disasters like floods, cyclones and droughts are being increased in South Asia. Higher temperature, more extreme weathers, rising sea levels, increasing cyclonic activities in the Bay of Bengal and the Arabian Sea as well as floods in the region's complex river systems and perennial droughts in most parts of South Asia will probably complicate existing development and poverty reduction initiatives. Due to climate change, the crop yields could decrease in South Asia. This will have a severe impact on the economies of South Asian Countries which mainly rely on agriculture, forestry, fisheries, water supply and rural development sectors.

Some Definitions from the Intergovernmental Panel on Climate Change:

VULNERABILITY TO CLIMATE CHANGE: The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and the rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity.

ADAPTION TO CLIMATE CHANGE: Adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits beneficial opportunities.

DEFINITIONS OF SUSTAINABLE DEVELOPMENT:

Sustainable development defined as "development that meets the needs of the present without compromising the ability of the future generations to meet their own needs. Sustainable development does not mean economic stagnation or giving up economic growth for the sake of the environment; it should entail promoting economic development as a requisite for maintaining environmental quality. Maintaining environmental quality, in turn, is essential for sustainable development.

The link between climate change and sustainable development stems from the fact that climate change is a constraint to development.

Initiatives to Promote Cooperation on Environment at Regional Level:

Three inter-governmental organizations are notable in the context of regional cooperation on environmental issues in South Asia. These are (i) the South Asian Association for Regional Cooperation (SAARC) (ii) the South Asia Cooperative Environment Programme (SACEP); and (iii) the South Asia Regional Seas Programme.

SAARC(South Asian Association for Regional Cooperation): Envisaged as “a political organization” and established in 1985, SAARC has during the past two and a half decades paid increasing attention to environmental concerns and challenges. Since 1987, references to environmental issues have figured in the speeches made and declarations issued by SAARC Summits. Since the late 1980s, Ministers of Environment have held over a dozen meetings, including a meeting in 1997 which adopted the first SAARC Environment Action Plan, the meeting in 2005 in the wake of the Asian Tsunami which led to the consideration of a regional disaster cooperation framework, and the meeting in 2008 at which a Declaration and an Action Plan on Climate Change were adopted ahead of the 2009 climate change meeting in Copenhagen. The 16th SAARC Summit hosted by Bhutan in April 2010 had, as its main theme, the topic of Climate Change and issued a statement on climate change. The broad-based SAARC Convention on Environment was signed at the Summit and has since been ratified by most member-states. An expert-level Technical Committee on Environment was set up in 1992 an inter-governmental Expert Group on climate change was set up at the 16th Summit in Thimphu. In pursuance of the 1997 and 2008 plans of action, a number of SAARC centers have been established, including the SAARC Forestry Centre in Thimphu, the SAARC Disaster Management Centre in New Delhi, the SAARC Meteorological Research Centre in Dhaka, and the SAARC Coastal Management Centre in Maldives. The Dhaka Climate Change Action Plan had identified seven thematic areas for consultation and cooperation. These include mitigation; adaptation; technology transfer; finance and investment; education- and awareness- enhancement, management of climate change impacts and risks; and capacity building for intergovernmental negotiations.

SACEP(the South Asia Cooperative Environment Programme):The South Asia Cooperative Environment Programme (SACEP) was set up by the Ministers of Environment of the SAARC member-countries. Its secretariat is located in Colombo (Sri Lanka) which, in addition to implementing the SACEP Work Plan, also administers the South Asia Regional Seas Programme and several other regional programmes. SACEP’s objectives include promotion of mutually beneficial cooperation in priority areas of environment, promotion of exchange of knowledge and expertise, and formulation, financing and implementation of environmental projects.

South Asia Regional Seas Programme:The South Asia Regional Seas programme was established, with, support from UNEP in 1982. This initiative focuses on integrated coastal zone management, oil-spill contingency planning, human resource development, and pollution of marine resources caused by land-based activities. A South Asian Regional Seas Action Plan was finalized and adopted in 1995 which will, hopefully, lead to the negotiation of a Regional Seas Convention modelled on the Conventions adopted in other regions. The Action Plan contains proposals on crucial issues such as integrated zone management, development and implementation of national and regional oil-spill contingency plans, and coral reef protection and management.

COUNTRY PROFILE:

BANGLADESH:

The People’s Republic of Bangladesh borders the Bay of Bengal, between Burma and India. It occupies the delta where the rivers Padma, Brahmaputra, Meghna, and their tributaries meet and drain into the Bay of Bengal. The annual rainfall between ranges from 2300-5000 mm. Such a wet environment creates arable land, and therefore the economy is traditionally agrarian. Formally known as East Pakistan, Bangladesh won independence after a brief war in 1971.

The main disasters that strike Bangladesh are floods, tropical cyclones and landslides.

Floods: Floods are annual occurrence in Bangladesh. The four main kinds of natural flood affecting Bangladesh are flash floods, river floods, rainwater floods and storm surges. Many floods attributed to human activities too.

CYCLONES: Due to the geographical location of Bangladesh, severe cyclones are common in the 710 km long coastal belt and cause vast damage to life and property. In April 1991, flooding occurred due to tidal surges caused by a cyclone in the Bay of Bengal causing the death of about 140,000 people and damage of several thousand hectares of crops and property.

DROUGHTS: Droughts are common in Bangladesh. They affect water supplies and plant growth leading to loss of production, food shortage and starvation. It is affected that in 1983 drought affected 20 million people.

INSTITUTIONAL STRUCTURE: Bangladesh at present has an elaborate disaster management system, from national down to Union level. The structure of the Bangladesh Disaster management System comprises:

1. Ministry of Disaster Management and Relief (MDMR)
2. Disaster Management Bureau (DMB)
3. National Disaster Management Council (NDMC)
4. Inter-Ministerial Disaster Management Coordination Committee(IMDMCC).
5. National Management Advisory Committee (NDMAC).
6. District, Upazila and Union Disaster Management Committees.

The Government of Bangladesh has initiated both structural and non-structural measures for disaster mitigation. The structural mitigation measures include construction of over 1840 cyclone and 200 flood shelters, construction of 3,900 km of coastal embankments and construction of drainage channels extending 4,774 km. The non-structural mitigation action includes legislation, training and public awareness raising institution building and awareness systems.

Bangladesh - Disaster Statistics

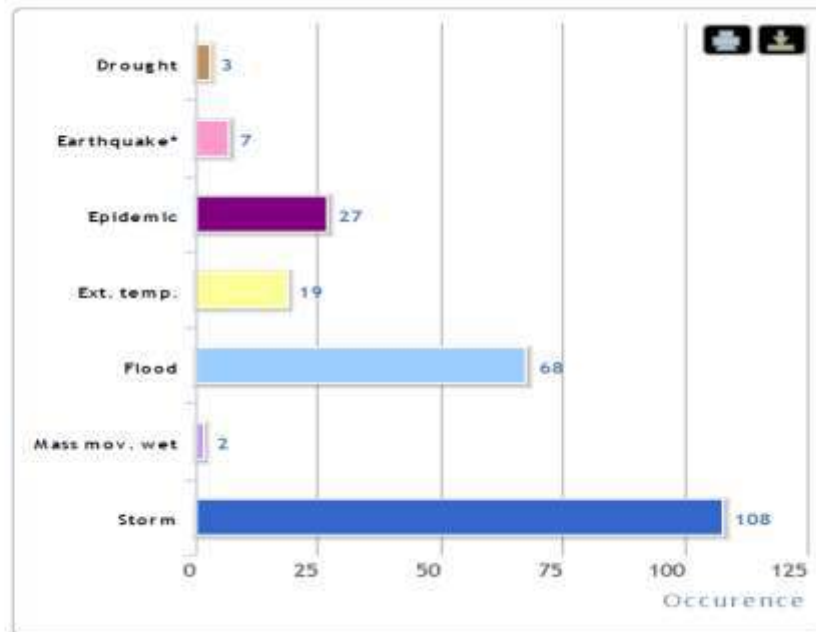
Data related to human and economic losses from disasters that have occurred between 1980 and 2010.

Natural Disasters from 1980 - 2010

Overview

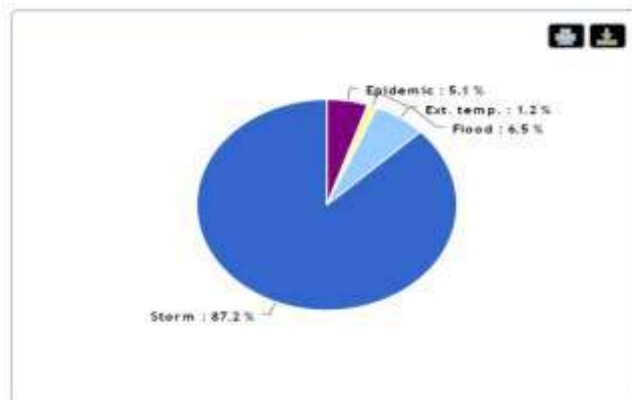
No of events:	234
No of people killed:	191,836
Average killed per year:	6,188
No of people affected:	323,480,264
Average affected per year:	10,434,847
Economic Damage (US\$ X 1,000):	17,072,500
Economic Damage per year (US\$ X 1,000):	550,726

Natural Disaster Occurrence Reported

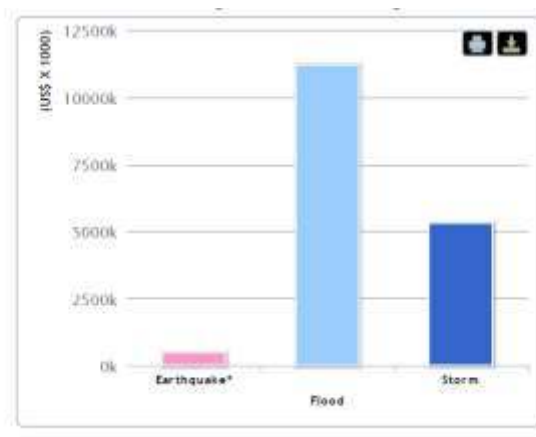


Statistics by disaster type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)



INDIA:

Covering an area of 3,287,509 sq. km, India shares its borders with Pakistan, Nepal, China, Bangladesh, Burma, and Bhutan. At present the Republic of India comprises 25 states and 7 Union Territories.

Different parts of India are affected by different calamities: floods, tropical cyclones, droughts, earthquakes, hailstorms, avalanches, fires and accidents from time to time.

FLOODS: The country is divided into four flood regions according to the river systems. They are the Brahmaputra region, Ganga region, Indus region and the Central and Deccan regions. It is estimated that an average of 40 million hectares are subjected to floods annually.

DROUGHTS: Thirty percent of the land area receives less than 750mm rainfall per year and is classified as drought-prone.

CYCLONES: The coastline of India extends over up to about 8,000km, and is affected by 5 to 6 cyclones every year, out of which 2 to 3 are more often than not severe.

EARTHQUAKES: 56 percent of the total area constitutes an active seismic zone.

INSTITUTIONAL STRUCTURES NATIONAL ORGANIZATIONS FOR DISASTER MANAGEMENT:

Disaster management is the responsibility of the state Governments. There is a national Crisis Management Committee (NCCM) constituted in the cabinet secretariat.

State-level Organization: Disaster preparedness and response in the State is delegated to the Relief and Rehabilitation department or the Department of revenue. Each state has a Calamity Relief Fund (CRF) administered by a State-level committee.

INDIA –DISASTER STATISTICS

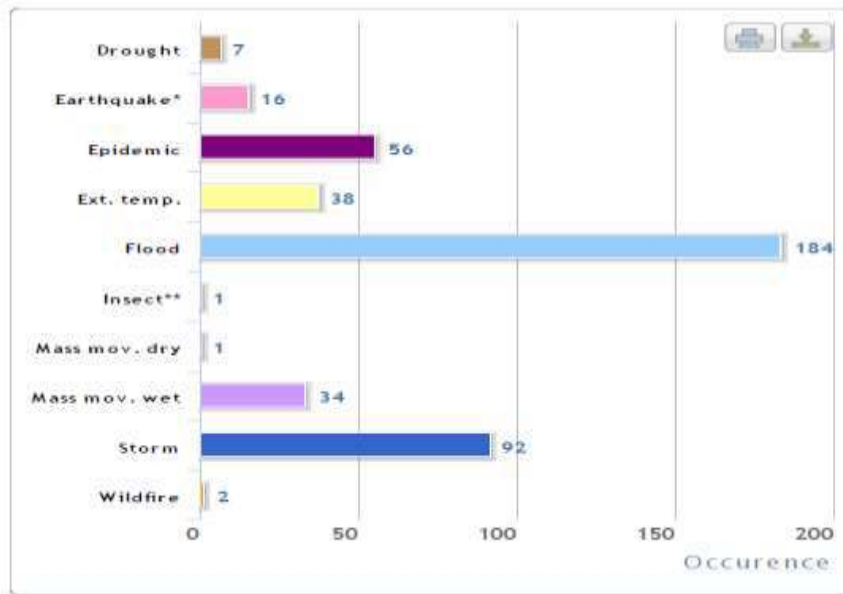
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Natural Disasters from 1980 - 2010

Overview

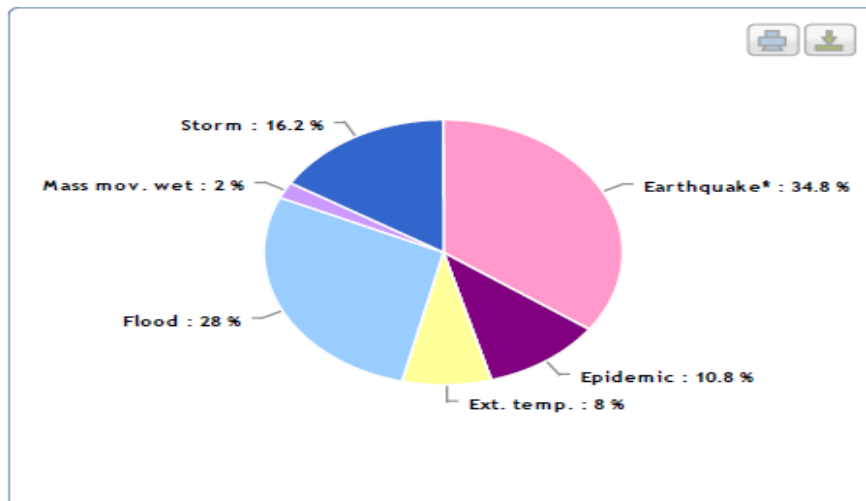
No of events:	431
No of people killed:	143,039
Average killed per year:	4,614
No of people affected:	1,521,726,127
Average affected per year:	49,087,940
Economic Damage (US\$ X 1,000):	48,063,830
Economic Damage per year (US\$ X 1,000):	1,550,446

Natural Disaster Occurrence Reported

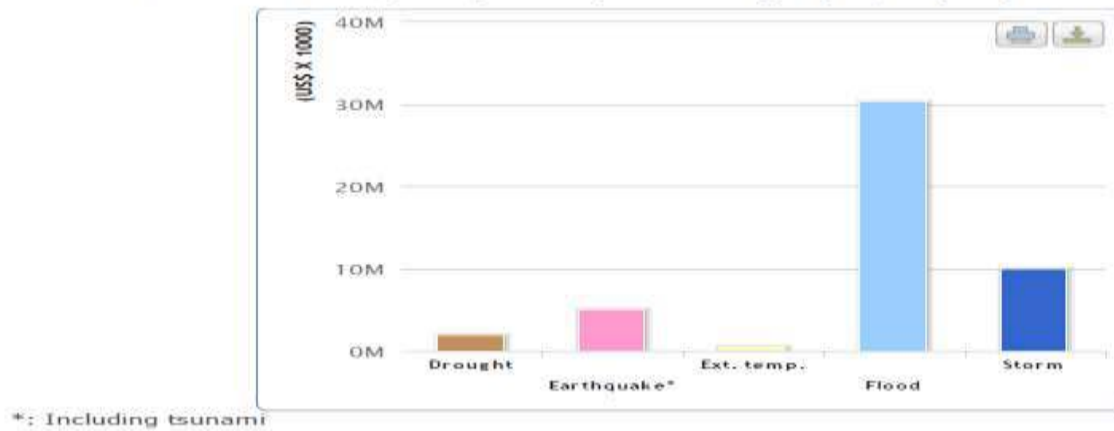


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)

**NEPAL:**

Nepal boasts seven of the world's eight highest peaks, including Mount Everest. 80% of the land area of 147,181 sq. km is made up of mountains and hills. It is also a landlocked country with its nearest point to the sea being 960 km away.

Nepal is exposed to most disaster types including earthquakes, floods, landslides, droughts, storms, avalanches, hailstorms, fires, epidemics and ecological hazards. A wide range of Physiological, geological, ecological, meteorological and demographic factors contribute to the vulnerability of the country to disasters.

EARTHQUAKES: Nepal lies in a region of high seismic activity. Earthquake with magnitude of 5 to 8 on the Richter scale have been experienced throughout the country and 279 earthquakes with experience in Nepal and magnitudes above 3.9 have been recorded.

FLOODS AND LANDSLIDES: Floods and landslides are often interrelated in Nepal. Some landslides are triggered by riverbank erosion, and some flash floods are aggravated by landslides in the areas adjoining riverbanks. Both these phenomena occur during the monsoon season.

FIRE: Most fires occur during summer, particularly in the Terai region when the temperatures are high and strong winds occur.

INSTITUTIONAL STRUCTURE:

The national policy on disasters has two main components: precautionary measures and emergency response and relief.

The Ministry of Home (MOH) is the key agency in the institutional structure for disaster management. Other agencies involved include the Ministry of Forest and Soil Conservation. Agencies such as the Department of Irrigation, Mines and Geology, and Department of Roads have linkages with disaster management.

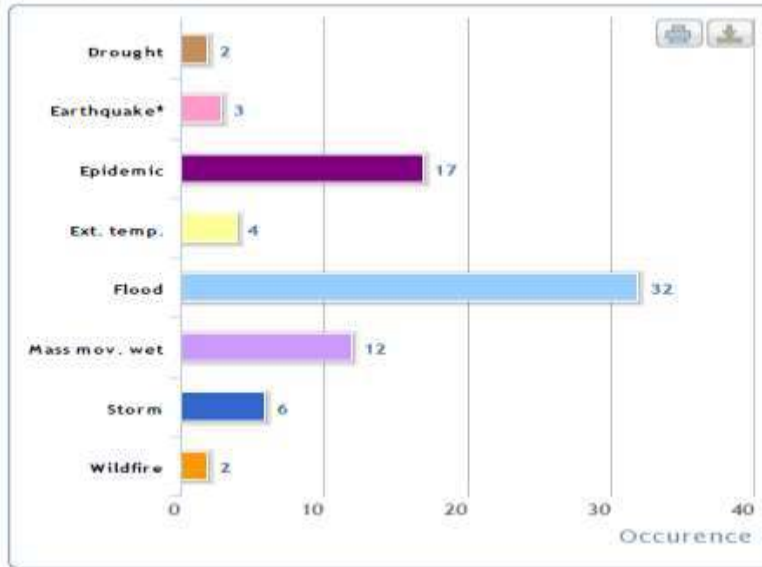
Nepal - Disaster Statistics

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Natural Disasters from 1980 - 2010**Overview**

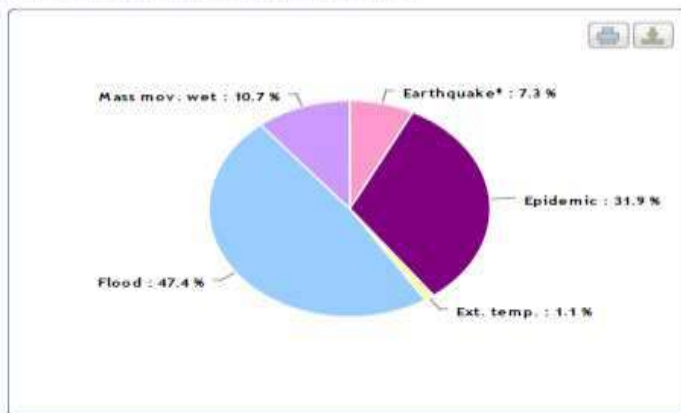
No of events:	78
No of people killed:	11,112
Average killed per year:	358
No of people affected:	5,165,810
Average affected per year:	166,639
Economic Damage (US\$ X 1,000):	1,351,229
Economic Damage per year (US\$ X 1,000):	43,588

Natural Disaster Occurrence Reported

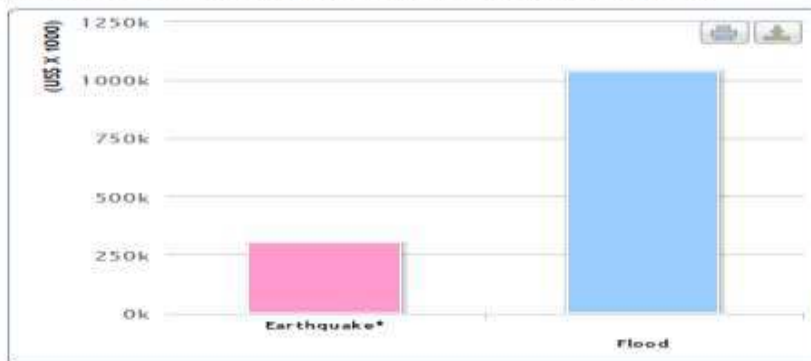


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)



*: Including tsunami

PAKISTAN:

The Islamic Republic of Pakistan lies between latitudes 24 and 37 degrees north and longitudes 62 and 75 degrees east covering a total land area of 798,095 sq km. Pakistan is a land of great topographic and climatic contrasts. The topography varies from coastal beaches, sandy deserts, plateaus, plains, high mountains to snow-covered peaks. The climate of Pakistan is characterized by low rainfall and extreme variations in temperature. Pakistan has four seasons. The monsoons are between July and August.

VULNERABILITY to NATURAL HAZARDS: Pakistan is vulnerable to most natural hazards. It is prone to floods, earthquakes, droughts and cyclonic storms.

FLOODS: Floods are by far the most frequent hazard and can have devastating effects: those of 1950, 1992 and 1998 caused by many deaths (2900, 1334 and 1000 respectively).

DROUGHTS: The main reason for drought is failure of monsoon. In recent years, drought is reported to have brought extensive damages to Balochsistan, Sindh and Southern Punjab where the average annual rainfall is low (200-250 mm).

EARTHQUAKE: Pakistan lies in a seismic belt and therefore suffers from frequent earthquakes of small magnitudes. There was a major earthquake in Quetta, Balochistan, in 1935 when the entire city was destroyed, and 30,000-60,000 people perished. The most recent significant earthquake occurred in 2001, in Sindh (which also hit Gujarat in India) resulting in 12 deaths and over 90,000 becoming affected.

CYCLONES: Although not a frequent phenomenon, cyclone can cause large scale damage. The period 1975-2001 records 14 cyclones. Economic losses were severe with over 75,000 houses destroyed and crops and agricultural land inundated.

INSTITUTIONAL STRUCTURE: While disaster management is recognized as an important discipline, the institutional structure to support effective disaster management remains limited. The Emergency Relief Cell (ERC) in the cabinet Division at the federal level serve for as the focal point for disasters. There is no disaster management policy except for the National disaster Plan prepared by ERC way back in 1974. The meteorological Department with its 73 Met Stations spread across the main agency engaged in disaster management. The Federal Flood commission is another key agency in disaster management.

Pakistan - Disaster Statistics

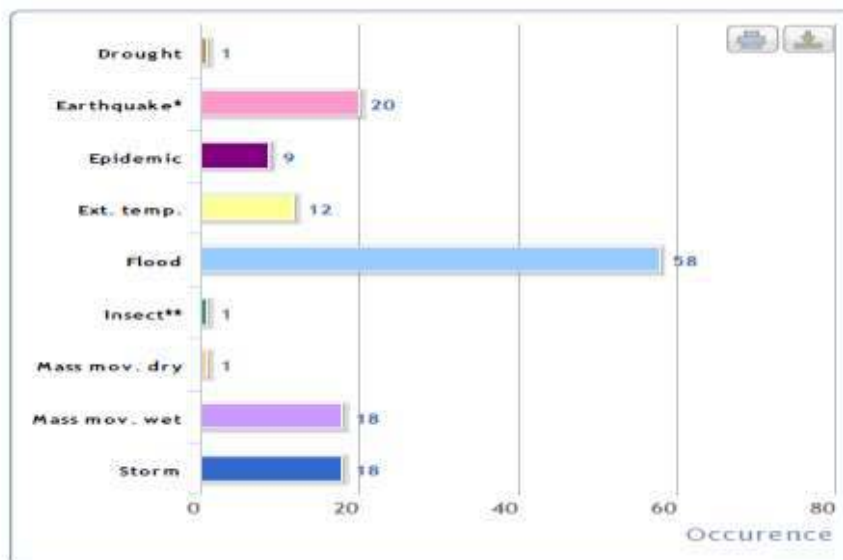
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Natural Disasters from 1980 - 2010

Overview

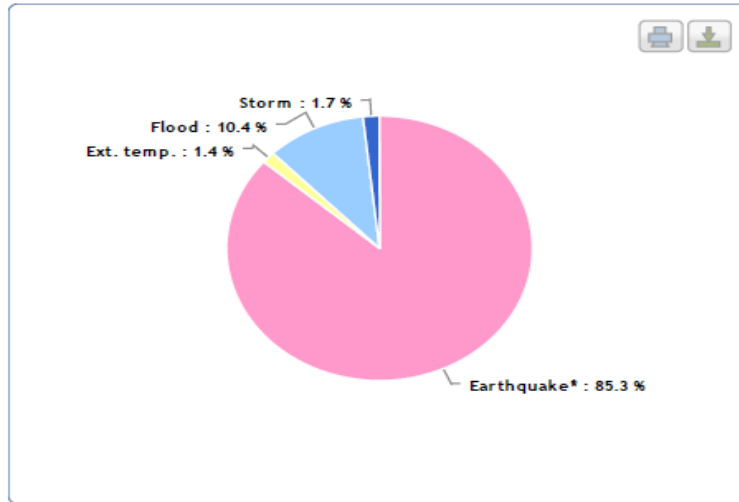
No of events:	138
No of people killed:	87,053
Average killed per year:	2,808
No of people affected:	58,098,719
Average affected per year:	1,874,152
Economic Damage (US\$ X 1,000):	18,402,814
Economic Damage per year (US\$ X 1,000):	593,639

Natural Disaster Occurrence Reported

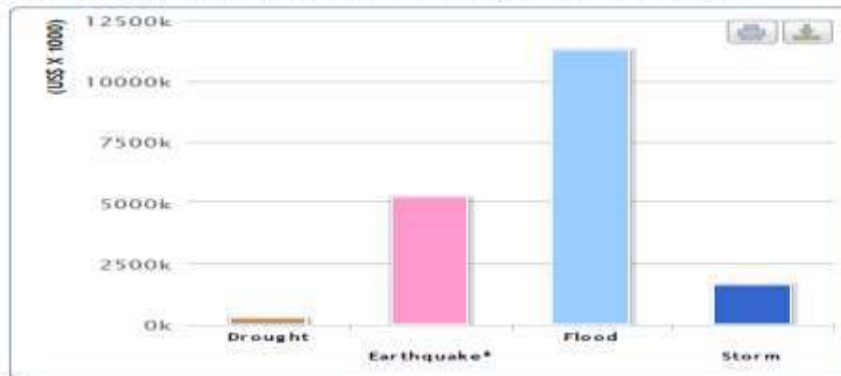


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)



*: Including tsunami

SRILANKA:

Sri Lanka is an island situated south of India and separated from the Indian Subcontinent by strip of shallow water, the Palk Strait, which at its narrowest is about 40 km wide. Because of its shape and location it is called the teardrop of India. Sri Lanka is mountainous in the central region and all rivers originate from the central hills and flow down to the sea. Sri Lanka is a prone to floods, cyclones, droughts and landslides. Floods and landslides are more localized and seasonal while droughts and cyclones are more widespread and occasional.

FLOODS: The main causes of the frequent occurrence of floods are heavy seasonal rainfall, deforestation, lack of flood protection schemes and unplanned development activities. Among the most disasters floods reported are those of 1989 (which took 325 lives), 1969, 1984, 1986 and 1982.

LANDSLIDES: Landslides occur in areas that receive 1000-4000mm of annual rainfall. The last two decades recorded a number of large landslides, with axial lengths over one kilometer.

DROUGHTS: Severe droughts have been reported in Sri Lanka every decade since the 1930s. During the most recent drought in 2001 approximately 370,000 families were affected in the dry plains of the country. Relief meted out to these families cost Rs. 400 million. The drought of 1987 affected 2,200,000 people.

CYCLONES: In Sri Lanka cyclonic storms and gale-force winds are also bound up with monsoon activity or severe weather changes in the Bay of Bengal. During the period 1881-2001 eleven cyclonic storms and five cyclones crossed the Sri Lankan Coast.

NATIONAL POLICIES AND STRUCTURES:

Disaster management in Sri Lanka has taken a new turn since 1991. An initial framework for a 'Disaster Counter Measures Act' was prepared in 1992, which was later made in to a complete document, to be passed in the Parliament.

Sri Lanka - Disaster Statistics

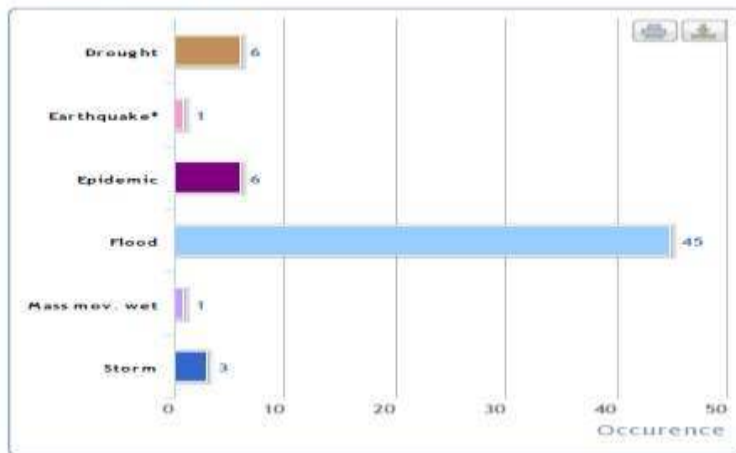
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Natural Disasters from 1980 - 2010

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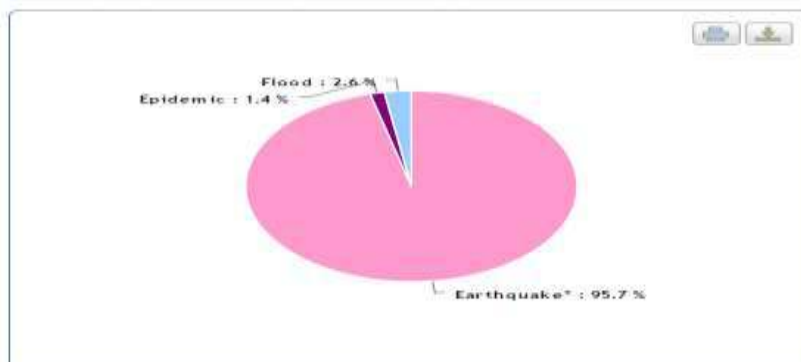
No of events:	62
No of people killed:	36,982
Average killed per year:	1,193
No of people affected:	17,457,668
Average affected per year:	563,151
Economic Damage (US\$ X 1,000):	1,674,364
Economic Damage per year (US\$ X 1,000):	54,012

Natural Disaster Occurrence Reported

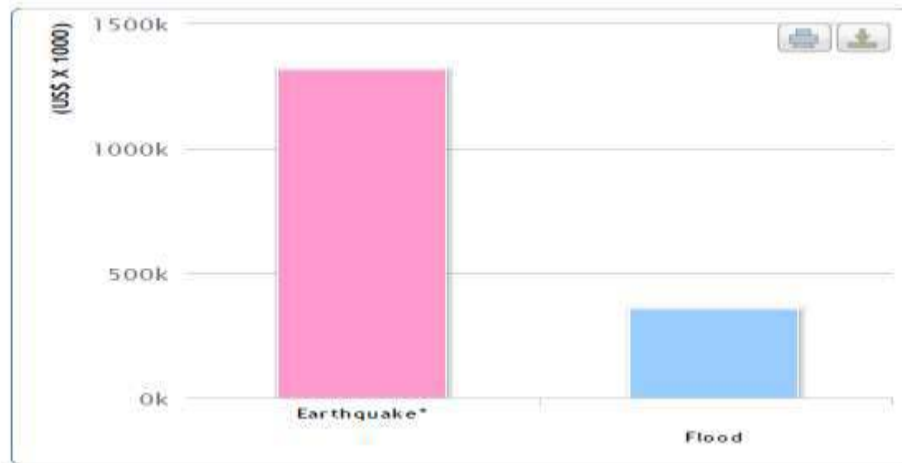


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)



*: Including tsunami

AFGANISTAN:

Afghanistan is a mosaic of ethnic groups, and a cross roads between the East and the West. It has been an ancient focal-point of trade and migration. The region of modern Afghanistan has seen many invaders and conquerors come and go, including the Persian Empire, Alexander the Great, Muslim Arabs, Turkic and Mongol nomads, the British Empire and the Soviets. Afghanistan was accepted as the eighth member of SAARC on November 13, 2005. Since 1979, Afghanistan has suffered almost continuous conflict, beginning with the Soviet invasion followed, by a civil war and finally by the 2001 US intervention in which the ruling Taliban Government was toppled. In December 2001, the United Nations Security Council authorized the creation of an International Security Assistance Force (ISAF). As the country continues to rebuild and recover, it is still struggling against poverty and poor infrastructure.

Environmental issues in Afghanistan

It encompasses approximately 637,397 square kilometers and is completely landlocked, surrounded by the Soviet Union, Iran and Pakistan. In Afghanistan, environmental conservation and economic concerns are not at odds; with 80% of the population dependent on herding or farming, the welfare of the environment is critical to the economic welfare of the people. About 50 earthquakes are reported each year. The general climate of the country is typical of arid or semiarid steppe, with cold winters and dry summers. In the mountains the annual mean precipitation, much of which is snowfall, increases eastward and is highest in the Koh-i-Baba range. In 2007, the World Health Organization released a report ranking Afghanistan as the lowest among non-African nations in deaths from environmental hazards.

Afghanistan - Disaster Statistics

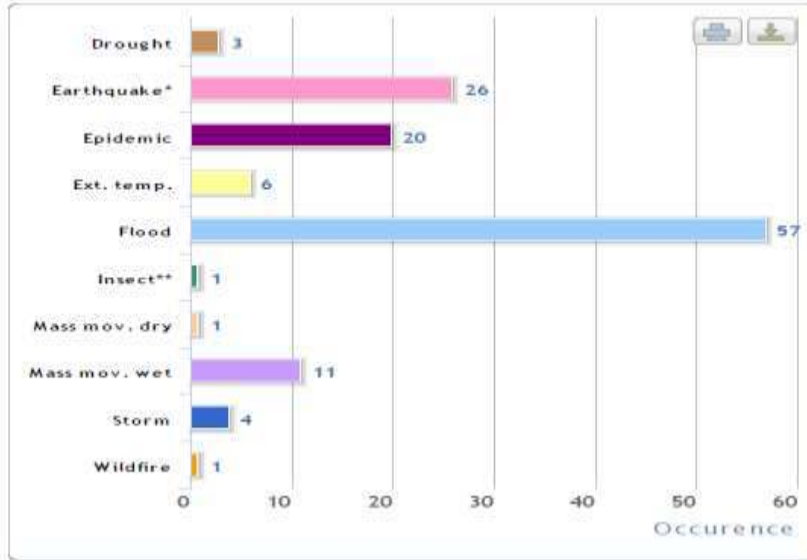
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Natural Disasters from 1980 - 2010

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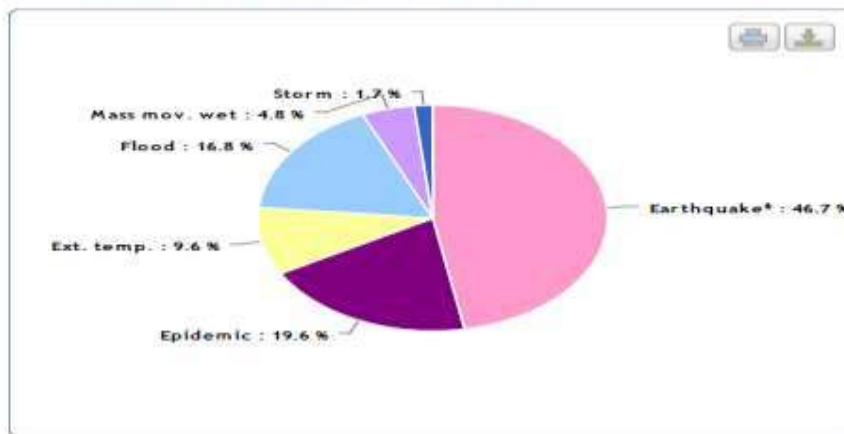
No of events:	130
No of people killed:	19,655
Average killed per year:	634
No of people affected:	6,820,793
Average affected per year:	220,026
Economic Damage (US\$ X 1,000):	378,120
Economic Damage per year (US\$ X 1,000):	12,197

Natural Disaster Occurrence Reported

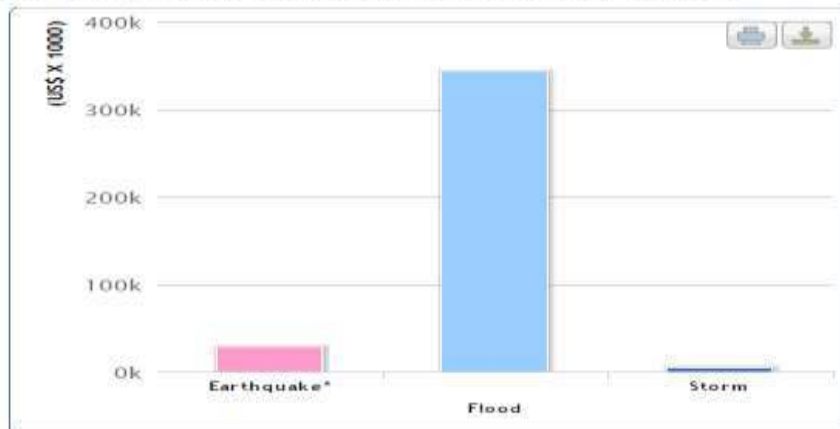


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)



*: Including tsunami

MALDIVES:

Maldives, officially the Republic of Maldives, is an island nation consisting of a group of atolls in the Indian Ocean. The Maldives are located south of India's Lakshadweep islands, and about seven hundred kilometers (435 mi.) south-west of Sri Lanka. It consists of approximately 1,196 coral islands grouped in a double chain of 27 atolls, spread over roughly 90,000 square kilometers, making this one of the most disparate countries in the World. The country's name may stand for "Mountain Islands" (malai in Tamil, meaning "Mountain" and teevu in Tamil meaning "islands" or it may mean "a thousand islands". Maldives is the smallest Asian country in terms of population. There are no rivers or mountains in Maldives. The highest point of land is 2 meters or about 6 feet above sea level. Environmental issues in the Maldives include dwindling freshwater supply and inadequate sewage treatment. Recent estimates indicate that the nation's water supply may be exhausted in the near future, and population increases have created a sanitation problem that threatens the waters surrounding this island nation. Another significant environmental problem is a rise in sea levels due to global warming. The islands are particularly susceptible to flooding. Environmental preservation is complicated by the unique problems of a nation consisting of 1,200 islands spread over 510 miles of the Indian Ocean. Preservation of the desert island ecology, protection of marine life and coral reefs, and coconut tree rehabilitation are additional environmental goals. The hawksbill turtle, green turtle, and blue whale are on the endangered list. A World Bank-financed project aims to reverse this alarming trend. A key objective is to enhance stewardship of the assets that protect communities. Through the [Maldives Environment Management project](#), a \$13.5 million IDA credit, the Bank is working with the Government of the Maldives to effectively manage environmental risks to fragile coral reefs and other marine habitats.

The project has three main components that are targeted to the most immediate environmental needs:

- Solid waste management;
- Capacity building for environmental management; and
- Technical assistance for monitoring and management of key natural assets.

Environmental issues in Maldives: Since the Maldives is a country surrounded on all sides by the sea, its basic wealth is for the most part, dependant on the marine environment. Therefore conservation of the environment is a fundamental issue of survival. Any global increase in the sea level would spell catastrophe for the Maldives. The destruction of coral reefs, freshwater depletion and saline intrusion into island aquifers, coastal erosion, dangers of marine pollution due to improper methods of sewage and waste disposal, are some of the main concerns. In 1989, the first National Environmental Action Plan was developed, forming a base for future actions to prevent environmental hazards. When the TSUNAMI struck the Asia-Pacific region in December 2004, the Maldives was among the countries most affected by the devastation. The tsunami's impact on the Maldivian economy has been enormous, with a direct loss equivalent to more than 60 percent of gross domestic product (GDP).

Maldives - Disaster Statistics

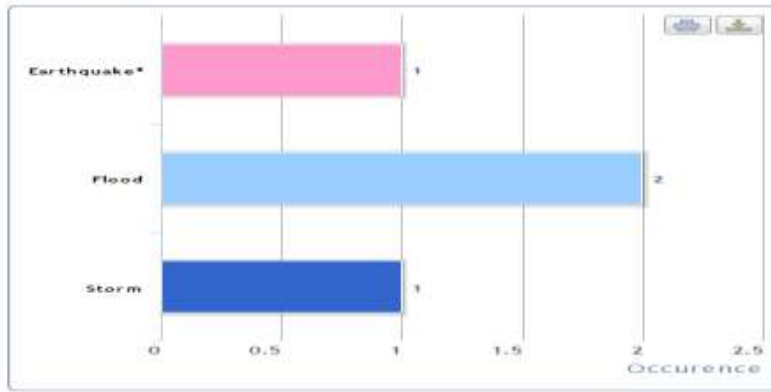
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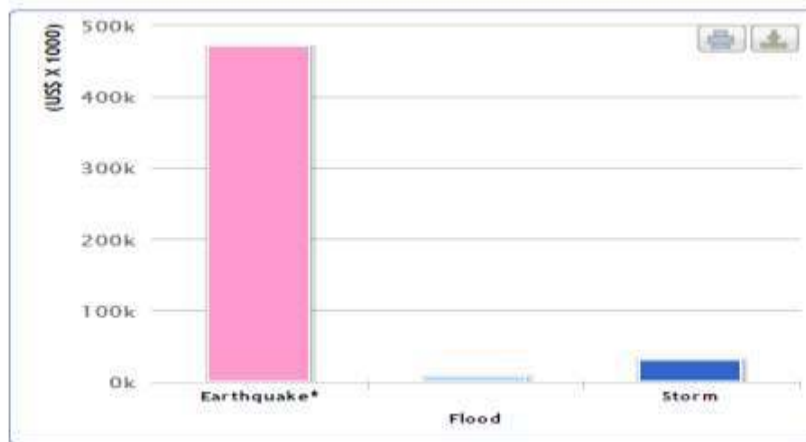
No of events:	4
No of people killed:	102
Average killed per year:	3
No of people affected:	53,012
Average affected per year:	1,710
Economic Damage (US\$ X 1,000):	506,100
Economic Damage per year (US\$ X 1,000):	16,326

Natural Disaster Occurrence Reported



Statistics By Disasters Type

Percentage of reported people killed by disaster type



*: Including tsunami

BHUTAN:

Equal to Switzerland in size (north to south 110 miles and east to west 200 miles) and the quality of mountainous life, Bhutan is needed a marvel of nature with its large number of climes and eco-systems. Archaeological evidence show that Bhutan was inhabited as early as 2000 BC.

Bhutan is a small mountainous country, landlocked between India and China situated on the southern slopes of eastern Himalayas between 26.7°-28.4° North and longitudes 88.7°-92.2° East. With an area of 38,394 square kilometers (National Statistical Bureau 2004) and a population estimated at 7,34,340 (NSB 2004). Bhutan has been declared as one of the ten biodiversity ‘hotspots’ in the world due to very high biodiversity concentration in its forests which covers 72.5% (NESB 1998) of the total surface area of Bhutan.

Bhutan's development philosophy has been constantly marked by a fair balance between preserving its cultural heritage and natural environment and pressing forward with economic development. The unique development approach "Gross National Happiness(GNH)" that Bhutan follows, focuses on people's cultural, spiritual and emotional needs, which are far beyond mere economic indicators of the well being of every Bhutanese. A long term development strategy is set out in the policy document "BHUTAN 2020: A vision for Peace, prosperity and happiness, 1999" with the main principles of self reliance , sustainability, preservation of cultural heritage, balanced and equitable development, try of improving quality of life, human resource development, environmental conservation and strengthening national security. Environmental issues in Bhutan: Bhutan is a prone to disasters like floods, flashfloods, forest fires, drought and earthquake of which landslides and flashfloods is a recurrent phenomenon causing extensive damages to infrastructures and properties every year. This is because of the rugged and fragile geophysical structures, complex geological setting, vulnerable ecosystem, variable climate conditions and active tectonic processes taking place in the Himalayas. The lack of proper disaster management system and coordination among different agencies and the lack of technical manpower and other resources combined with difficult geo-physical situation have been some of the obstacles in coping with disasters in Bhutan.

Bhutan - Disaster Statistics

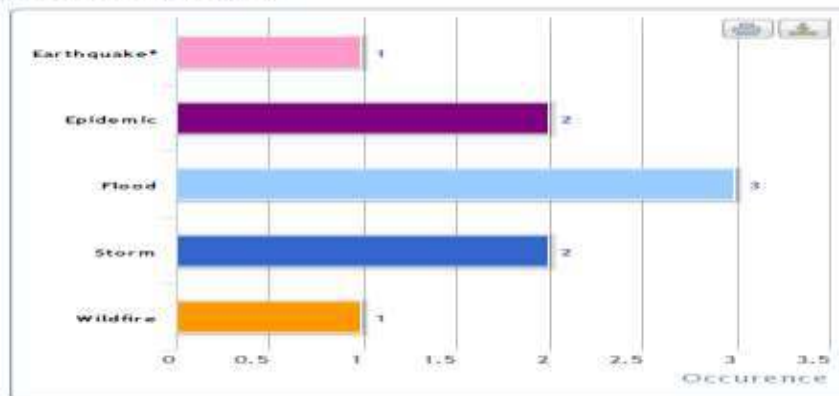
Data related to human and economic losses from disasters that have occurred between 1980 and 2010.

Natural Disasters from 1980 - 2010

Overview

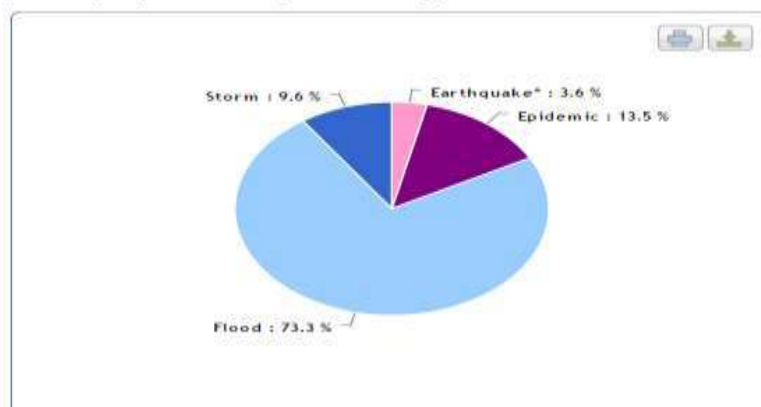
No of events:	9
No of people killed:	303
Average killed per year:	10
No of people affected:	67,353
Average affected per year:	2,173
Economic Damage (US\$ X 1,000):	3,500
Economic Damage per year (US\$ X 1,000):	113

Natural Disaster Occurrence Reported

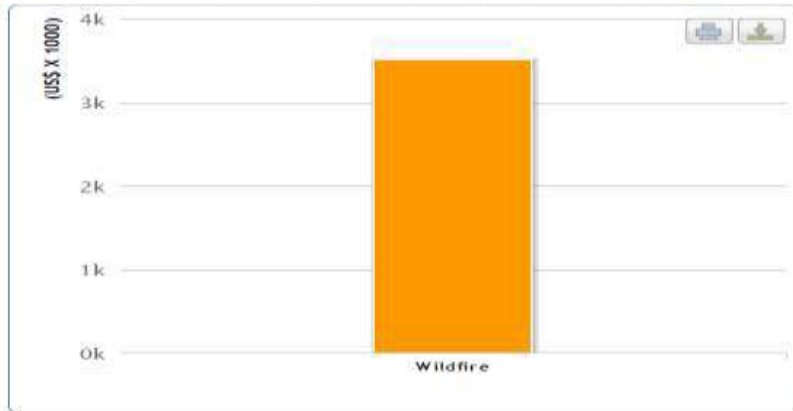


Statistics By Disasters Type

Percentage of reported people killed by disaster type



Estimated economic damages reported by disaster type (US\$ X 1,000)

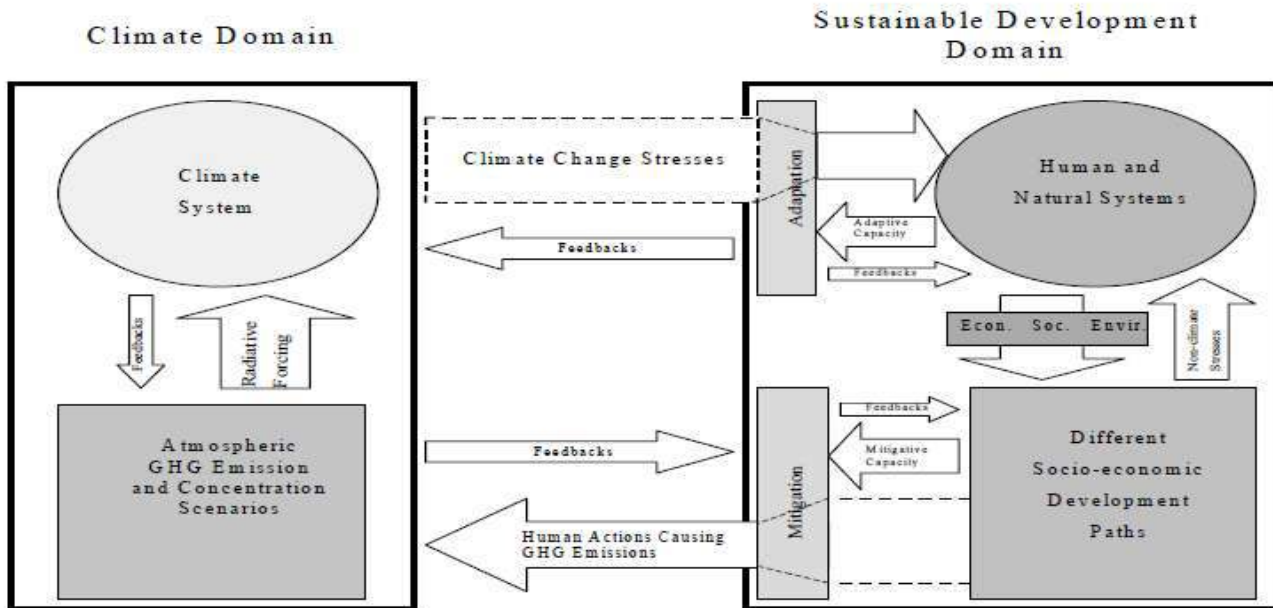


*: Including tsunami

NEXUS OF SUSTAINABLE DEVELOPMENT AND CLIMATE CHANGE:

Circular Relationship between Climate change and Sustainable Development

Integrated Assessment Modelling Framework for Analysing Climate Change and Sustainable Development linkages



To summarize, the climate and sustainable development domains interact in a dynamic cycle, characterized by significant time delays. Adaptation reduces the impact of climate stress on human and natural systems, while mitigation lowers potential greenhouse gas emissions. In this way adaptation and mitigation strategies are dynamically connected with changes in the climate system and the prospects for ecosystem adaptation, food production and long-term economic development. Economic development affects ecosystem balance and, in turn, is affected by the state of the ecosystem. Poverty can be both a result and a caused of environmental degradation. In addition, critical impact thresholds, and vulnerability to climate change impacts, are directly connected to environment, social and economic conditions, an institutional capacity.

IMPACT OF CLIMATE CHANGE IN SOUTH ASIA:

The consequences of such environmental changes include:

- Decreased water availability and water quality in many arid and semiarid regions.
- An increased risk of floods and droughts in many regions
- Reduction in water regulation in mountain habitats
- Increased incidence of waterborne diseases such as malaria, dengue, and cholera
- Increased damages and deaths caused by extreme weather events.
- Decreased agriculture productivity
- Adverse impacts on fisheries

Much of these damages would come in the form of severe economic shocks. In addition, the impacts of climate change will exacerbate existing social and environmental sustainability.

South Asia is one of the most climate impacted regions in the world. Many studies are now available to support that fact. For instance, the World Bank has identified three unique factors that make South Asia vulnerable to the impacts of climate change:

- Poverty and population increase;
- Threats to water supply and agriculture; and
- Vulnerability to natural disasters.

First, South Asia has the highest density of poverty in the world. With an estimated 600 million South Asians subsisting on less than \$1.25 a day, even small climate shocks can cause irreversible losses and tip a large number of people into destitution.

Second, South Asia is endowed with great rivers, which are the lifelines of the regional economy. The ice mass covering the Himalayan-Hindu Kush mountain range is the source of the nine largest rivers of Asia, including the Ganges, Brahmaputra, and Indus. Glacial melt coupled with more variable precipitation could severely compromise livelihoods and the future prospects of agriculture.

Third, South Asia suffers an exceptionally high number of natural disasters. Between 1990 and 2008, more than 750 million people -50% of the region's population – were affected by a natural disaster, leaving almost 60,000 dead and resulting in about \$54 billion in damages. As climate related risks intensity, there will be a need to respond proactively to build resilience through prevention and preparedness rather than through relief and response.

Our leaders issued a statement on Climate change at their meeting in April 2010, at Thimpu. They recognize that the member states of SAARC as developing countries face the dual challenge of addressing the negative impacts of climate change and pursuing socio-economic development. The Statement emphasizes the overriding importance of socio-economic development and poverty eradication in our region, and that reducing dependence on carbon in economic growth and promoting climate resilience will promote both development and poverty eradication in a sustainable manner.

These points to the imminence of development strategy that is both sustainable and inclusive. Our governments have to work together to share knowledge, technology, and finance. Work on this is already underway within the rubric of SAARC as well as various bilateral agreements. This will have to be followed-up with speed and sincerity.

South-South Cooperation for Sustainable Development

A marked shift from the 1992 Rio Earth Summit to the 2012 Rio+20 Summit is the role of emerging Asia in driving both challenges and solutions to the world's climate crisis. Global climate policy in 1992 was heavily characterized by the North-South dynamics that have defined the International system for decades, with international mechanisms often "locked into a 'rich country' vs. 'poor country' dichotomy" as noted by UNDP's 2012 Human Development Report for the Asia-Pacific region.

As it re-emerges at the center of the world economy, South Asia is also rapidly expanding its role as a global partner for development and with this comes an opportunity to shape global solutions. While global climate policy during the past 20 years was largely defined by north-south flows of technical assistance and carbon finance, the next 20 years will see a greater role for south-south cooperation on climate mitigation and adaptation. Many countries in Asia have begun to show leadership at home as they seek to overcome resource scarcity and create the foundations for a resource conserving, green economy.

An opportunity is arising to engage in south-south cooperation to mainstream low-emission, climate resilient approaches into Asia's outward flows of trade, investment and official development assistance. As noted by the Asia-Pacific HDR, "concerted action to address climate change requires cooperation and coordination" while "effective partnerships can significantly reduce the global cost of addressing climate change." Beyond south-south potentials within Asia, for example under the SAARC Action Plan on Climate Change or the ASEAN-China Environmental Cooperation process, new south-south partnerships between Asia and partner countries around the world can help catalyzing access to sustainable energy and water for the poor in LDCs, and lay foundations for new global green growth partnerships. In 2010 the world saw a record \$386 billion market capitalization in clean technology sectors, with Asia leading the way with 60% of the total.

As we look to the future, what potentials exist for expanding south-south cooperation to build on these successes through global partnerships, so that other regions can partner with Asia on clean tech development, market-based approaches, and public-private partnerships? As the social and ecological footprint of Asia's outward FDI and ODA expands around the world, what scope exists to integrate low-emission, climate-resilient approaches and address Asia's growing footprint in globally critical ecosystems in Africa and the Americas? What role could exist for multilateral entities like the UN to facilitate such partnerships towards the Rio+20 green economy agenda?

Both public and private sectors in South Asia are beginning to explore the benefits of joining forces across borders to integrate green economy options into international cooperation strategies. South-south cooperation could see a growing component of low-emission, climate resilient approaches in Asia's outward trade, investment and official development assistance in coming years. With its growing position in the world, south-south cooperation could be an important trend not only for Asia and its emerging partners, but for a world seeking a more multi-polar form of climate governance.

Kathmandu to Copenhagen: A Regional Climate Change Conference

- South Asia is endowed with great rivers, which are the lifelines of the regional economy.
- Impacts of climate change are shared by many countries across the Himalaya Region.
- Regional cooperation can play a key role in adaptation and development in the Himalayan region.

August 31, 2009 - The Government of Nepal hosted a Regional Climate Conference titled "**Kathmandu to Copenhagen**," from August 31 to September 1, 2009. It bring together Ministers, high level officials, climate change experts, and key civil society members around the theme of climate change and the South Asian Himalayas. The conference was supported by ADB, DANIDA, DFID, and the World Bank.

Nepal represents one of the iconic examples of climate vulnerability with threats posed by the melting glaciers of the Himalayas and impacts that transcend political boundaries. Its geographic location in the Himalayan headwaters of many of the region's major river systems provide it with strategic climate change adaptation opportunities, to monitor and regulate river flows.

The primary objectives of this conference are to: (i) provide a forum for the countries of the South Asia Himalayas and other countries in the region to share knowledge and experience about common climate change risks; and (ii) forge a common vision on how to tackle the Himalayan climate challenges. The Conference is expected to contribute to thinking about climate change threats and opportunities for South Asia including to discussions in the Ad Hoc Working Group on Long-term Cooperative Action (AWG-LCA) and AWG-Kyoto Protocol.

Climate vulnerabilities of South Asia:

Speaking in about the conference, **Richard Damania, Lead Environmental Economist at the World Bank** said South Asia faces daunting climate-related development challenges.

"The impacts of higher temperatures, more variable precipitation, and increased occurrence of extreme weather events are already being felt in the region," said **Damania**.

He said the South Asia Himalayas comprise the world's highest mountains and their glaciers store the largest body of ice outside of polar region. "These are the source of *some of the world's greatest rivers, fed by a unique monsoon. These rivers supply the world's most densely populated flood plains, settled by over 700 million people.*"

The risks of climate change in the Himalayas are great, he said. Its effects on glaciers, mountain ecosystems, monsoon behavior, and flood and drought intensity are already impacting the livelihoods of millions of people. "Yet our understanding of the extent and consequences of climate change today and in the future is limited. As a result the plight of the Himalayas and the implications for the floodplains has received little global attention," said **Damania**.

The most significant impacts of climate change are shared by many countries across the Himalaya Region and all of South Asia. It will require communication, cooperation and joint actions to address these common threats.

Damania listed four unique factors that make South Asia vulnerable to the impacts of climate change:

- Poverty and population increase;
- Threats to water supply and agriculture;
- Urbanization; and
- Vulnerability to natural disasters.

First, South Asia has the highest density of poverty in the world. With an estimated 600 million South Asians subsisting on less than \$1.25 a day, even small climate shocks can cause irreversible losses and tip a large number of people into destitution.

Second, South Asia is endowed with great rivers, which are the lifelines of the regional economy. The ice mass covering the Himalayan-Hindu Kush mountain range is the source of the nine largest rivers of Asia, including the Ganges, Brahmaputra, and Indus. Glacial melt coupled with more variable precipitation could severely compromise livelihoods and the future prospects of agriculture.

Third, projections indicate that by 2050 about half the region's population will dwell in cities. Given current trends, South Asia will host five of the world's 11 megacities—Mumbai, Delhi, Dhaka, Karachi, and Kolkata. The cities of South Asia already face immense challenges, including poorly maintained infrastructure, unplanned growth, scant livelihood opportunities, and susceptibility of the poor populations to ill health.

Fourth, South Asia suffers an exceptionally high number of natural disasters. Between 1990 and 2008, more than 750 million people—50 percent of the region's population—were affected by a natural disaster, leaving almost 60,000 dead and resulting in about \$45 billion in damages. As climate-related risks intensify, there will be a need to respond proactively to build resilience through prevention and preparedness rather than through relief and response.

Need for regional cooperation:

Regional cooperation can play a key role in adaptation and development in the Himalayan region. With climate change, the monsoons (and hence droughts and floods) are expected to become more intense and less predictable. Coping with these mounting extremes in the river basins of South Asia will require more basin-wide information to predict and warn against floods, for example. It will also call for more basin-wide river management, with coordinated capacity to lower flood peaks and augment low-season flows.

Regional and country initiatives:

There have been many initiatives taken by individual countries and the **South Asian Association for Regional Cooperation (SAARC)** toward addressing the challenges of the climate change. The SAARC Environment Ministers adopted the SAARC Action Plan and Declaration on Climate Change at the SAARC Environment Ministerial Meeting in Dhaka in July 2008.

The 15th SAARC summit held in Colombo in August 2008 reiterated the need for strengthening cooperation within the region to deal with climate change issues. Following the COP 13 in Bali, the Government of Bangladesh launched its **Climate Change Strategy and Action Plan (BCCSAP)** at a UK-Bangladesh conference in London in September 2008. In early 2009, Pakistan's Ministry of Environment held a Corporate Summit on Climate Change aimed at increasing the involvement of corporations in Pakistan on the climate challenge.

Projected climate change impacts in South Asia:

Afghanistan: Already extreme climate variability (drought/flood shocks) will increase, intensifying existing livelihood fragility and compounding social and economic risks.

Bangladesh: Exceptional scale of impacts including sea-level rise directly affecting at least 30% of the population, coupled with intensified monsoons and changes in rainfall patterns yielding flood and drought shocks, and cyclones, all stretching current community adaptation to the limit. Massive climate out-migration is likely to happen.

Bhutan: The knowledge base is limited. However, rising temperatures and the associated glacial melt, Glacial Lake Outburst Flood (GLOF) and varying agricultural yields are likely to be the greatest threats to the country.

India: Increased intensity and frequency of storm surges, cyclones, floods and droughts, negative impact on agricultural yields, decrease in river flows, sea level rise and its impact on coastal livelihoods and consequences of Himalayan snow melt and associated risks are the major climate change-induced issues. The magnitude of every climate change impact is likely to be among the world's highest, but this massive challenge is crowded out by mitigation concerns.

Maldives: Sea-level rise and tidal surges threaten to displace the majority of the population.

Nepal: Severe climate change impacts through snow melting and glacial lake outburst and lowland floods and potential threat on hydroelectricity generation due to low river flow; however, unique opportunity for compensation for environmental services as country is potential key to adaptation in the river basins through adoption of renewable and/or clean energy development path including hydroelectricity development and forest management.

Pakistan: Potentially huge and rapid reductions in (50% glacier-fed) Indus flows, coupled with intensified droughts and sea-level rise, will require major livelihood transitions and economic transformation, with consequent risks of social upheaval if unplanned.

Sri Lanka: Sea-level rise and increased cyclone incidence impacting dense coastal populations and livelihoods.

Implementation of the 'Thimphu' Statement on Climate Change: "Towards a Green and Happy South Asia":

Experts from the South Asian countries including Bhutan discussed the implementation of Thimphu Statement on Climate Change at the Banaras Hindu University in Varanasi September 2013.

The SAARC Consultation Workshop on 'Implementation of Thimphu Statement on Climate Change Adaptation and Disaster Risk Reduction' was organized jointly by the SAARC Disaster Management Center (SDMC) and United Nations International Strategy for Disaster Reduction (UNISDR).

Aimed at implementing the Thimphu Statement on Climate Change, a comprehensive document on policy, institutional landscape and resource allocation for climate change adaptations and disaster management in the SAARC countries was released. The document will also be sent to the officials at the United Nations for further implementation.

The organizing secretary of the workshop, Dr RK Mall of the Institute of Environment and Sustainable Development (IESD), said this is the first document on climate change and disaster management prepared comprehensively for SAARC countries and is a major step ahead for the implementation of Thimphu Statement.

"This document would help the South Asian countries to develop and adopt strategies and coordinate with each other to prevent the hazards turning into disaster," said Dr RK Mall.

He added that almost all the South Asian countries are at present vulnerable to climate change and the study outcomes will raise awareness among policy makers, local bodies, researchers and experts to develop planning and investment allocation in SAARC countries.

The workshop also focused on capacity building initiatives developing institutional capacities, developing personal expertise and legislative basis need to support an institutional structure for addressing the climate change and disaster requirements.

Experts from Bhutan suggested some key recommendations for the combination of Disaster Impact Assessment and Environment Impact Assessment for the development projects. The Integration of Climate Change Adaptation and Disaster Risk Reduction were also discussed.

During a country-wise presentation, the Chief Program Officer of the Ministry of Home and Cultural Affairs, Pelden Zangmo, presented various scenarios of Bhutan regarding disaster vulnerabilities.

She said Bhutan, being a least developed country, has recently switched to climate change adaptations and disaster management mechanism and a Disaster Management Act which has also been enacted.

The Director of SDMC, Professor Santosh Kumar, said droughts, floods, cyclones, sea level rise and increase in temperature are the challenges for south Asian countries as they are vulnerable for such disasters.

He also explained the need for collective work of SAARC countries to reduce these risks future and suggested participatory approach for solving the problems of disaster risk reduction.

Policy Recommendations

Despite the significant growth of knowledge and awareness of environmental problems and efforts by the South Asian countries to respond to them, the ground situation does not show any significant improvement. SAARC countries face multiple environmental challenges such as high rates of population growth, urbanization, rampant poverty which is both a cause and a consequence of environmental degradation, growing indoor and outdoor air pollution, reduction in per capita availability of and deterioration in the quality of drinking water, soil degradation, increase in waterborne diseases, degradation of marine resources, increase in the frequency, duration and severity of natural and climate change-related disasters, trans-boundary air- and water-pollution, deforestation and desertification, health hazards caused by unsafe and hazardous chemicals and waste, etc. These challenges entail growing economic, financial and social costs. SAARC countries other than India are unlikely to achieve the environmental goal and benchmarks prescribed by the Millennium Development Goals (MGDs). The escalating degradation of the environment and the ecosystems has been driven mainly by population growth and policy- and institutional-failures. The situation is likely to get worse as the full impacts of climate change become evident. Geographic/topographic/climatic factors, population explosion, critical dependence on agriculture and the sector's dependence on irrigation, and long coastline make the entire South Asian region, especially the low-lying areas in Bangladesh, Sri Lanka and Maldives particularly vulnerable to the adverse impacts of climate change. In the UN Conference on Climate Change held from 28 November to 9 December 2011 in Durban, South Africa, Bangladesh emphasized the urgency of establishing the adaptation fund body as a means of getting easy and direct access to the fund from 2012. And from my personal view of point, it is now very high time to establish a “**SAARC-Climate Change Adaptation Fund for Sustainable Development**”.

Clearly, the efforts of South Asian countries at domestic, regional and global levels need to be significantly augmented and strengthened. This will require

- Renewed political commitment to the protection and development of the environment
- Environmental imperatives in general and responses to climate change challenges in particular need to be integrated into the overall processes of planning, financing and implementation. None of the South Asian countries has done this so far but significant progress has been made more recently.
- Ministries of Environment, environmental protection agencies, tribunals, laboratories, R&D institutions urgently need significant strengthening and adequate resources to fulfill their tasks.
- Monitoring and assessment of overall environmental trends and sector-specific assessments need to be carried out at state, city, town and even village levels. All stakeholders – especially the key economic and commercial sectors – must comply with mandatory reporting on the environmental footprint of their activities and take steps to mitigate the damage.
- Much greater attention needs to be paid to enhancing the authority and capacity of organizations and institutions established at regional level in pursuance of decisions of
- SAARC Summits. Additional institutions need to be set up, in order to better address the negative impacts of climate change The relevant areas requiring attention are disaster management, integrated and joint management of shared river basins, energy 10 conservation and efficiency, development of clean and renewable sources of energy, climate-related health hazards etc.
- Climate change should be on the agenda of all SAARC Summits which should review the progress achieved and agree on arrangements for better results.
- The status and profile of Ministers of Environment should be enhanced. Environment Ministers should meet prior to each SAARC Summit to review the state of environment and submit their findings to the Summit. They need to pay greater attention to SACEP and the other regional cooperation arrangements.
- Effective participation of all stakeholders, especially the private sector and the civil society, is the key to the success of efforts to address the threats posed by climate change and other environmental issues. SAARC may consider negotiating a comprehensive cooperation agreement with the UN and the European Union on the pattern of the ones signed by ASEAN with a view to maximizing the benefits of cooperation with multilateral institutions in line with their cooperation processes.

Conclusion

Climate change issues encompass all the sectors of the economy. A multi-dimensional approach is needed for the formulation of policies and implementation of programs related to climate change. Poverty, environmental degradation and sustainable livelihood, all interact in a complex Managing Climate Change. A comprehensive approach is also needed for implementation of policy measures in respect of climate change issues in SAARC countries. Public-private sector cooperation in the management of environment and climate change is to be encouraged and concerted efforts are to be undertaken.

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