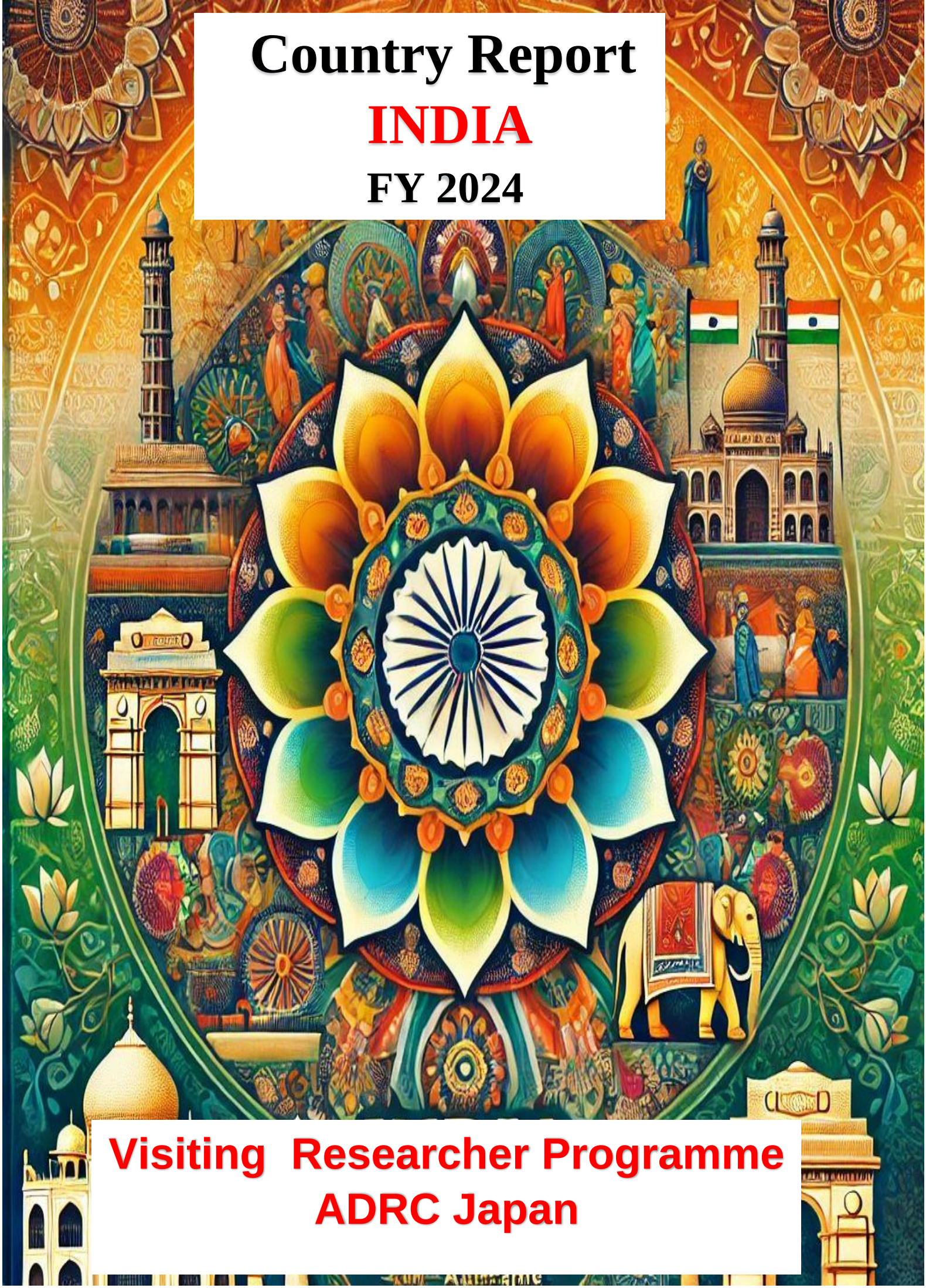
Country Report

INDIA

FY 2024



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Introduction

“INDIA is the cradle of the human race, the birthplace of human speech, the mother of history, the grandmother of legend and the great grandmother of tradition. Our most valuable and most instructive materials in the history of man are treasured up in India only.” — *Mark Twain*

India is one of the oldest civilizations in the world, spanning a period of more than 10,000 years, and witnessing the fusion of several customs and traditions, which are reflective of the rich culture and heritage of the Country. This tradition boasts an unequalled heritage of art and craftsmanship that has been passed down from generation to generation.

The history of India gives a glimpse into the magnanimity of its evolution - from a Country reeling under colonialism, to one of the leading economies in the global scenario. More than anything, the nationalistic fervour of the people is the contributing force behind the culmination of such a development. This transformation of the nation instils a sense of national pride in the heart of every Indian within the Country and abroad.

India is a land of diversity with different religions, cultures, languages and regions. It is a fast- developing country and has made remarkable progress in science and technology, agriculture and industry, education, health and other socio-economic fronts. India is now one of the leading countries in information technology, biotechnology, nuclear energy, space exploration and other fields. It is among the ten most industrialised nations in the world. The best-developed industries are in software engineering, petrochemicals, electronics, and the production of building materials and manufactures everything from ships and aeroplanes to computers, machines, software, tea, coffee, and spices. The jute, cotton, textile, silk, woodwork, jewellery and paper industries also contribute to its development. Agriculture, with its allied sectors, is unquestionably the largest livelihood provider in India, more so in the vast rural areas. It also contributes a significant figure to the Gross Domestic Product (GDP). Sustainable agriculture, in terms of food security, rural employment, and environmentally sustainable technologies such as soil conservation, sustainable natural resource management and biodiversity protection, are essential for holistic rural development.

Indian culture, often labelled as an amalgamation of various cultures, spans across the Indian subcontinent and has been influenced and shaped by a history that is several thousand years old. India is also known for its ancient scriptures and philosophies, such as the Upanishads and Vedas. Indian-origin religions Hinduism, Jainism, Buddhism, and Sikhism are all based on the concepts of dharma and karma. The country also has a rich and varied cultural heritage, with various forms of art, music, dance and literature. It is a vibrant democracy with the world's largest electorate and is also a member of the United Nations, the Commonwealth and other international organisations.

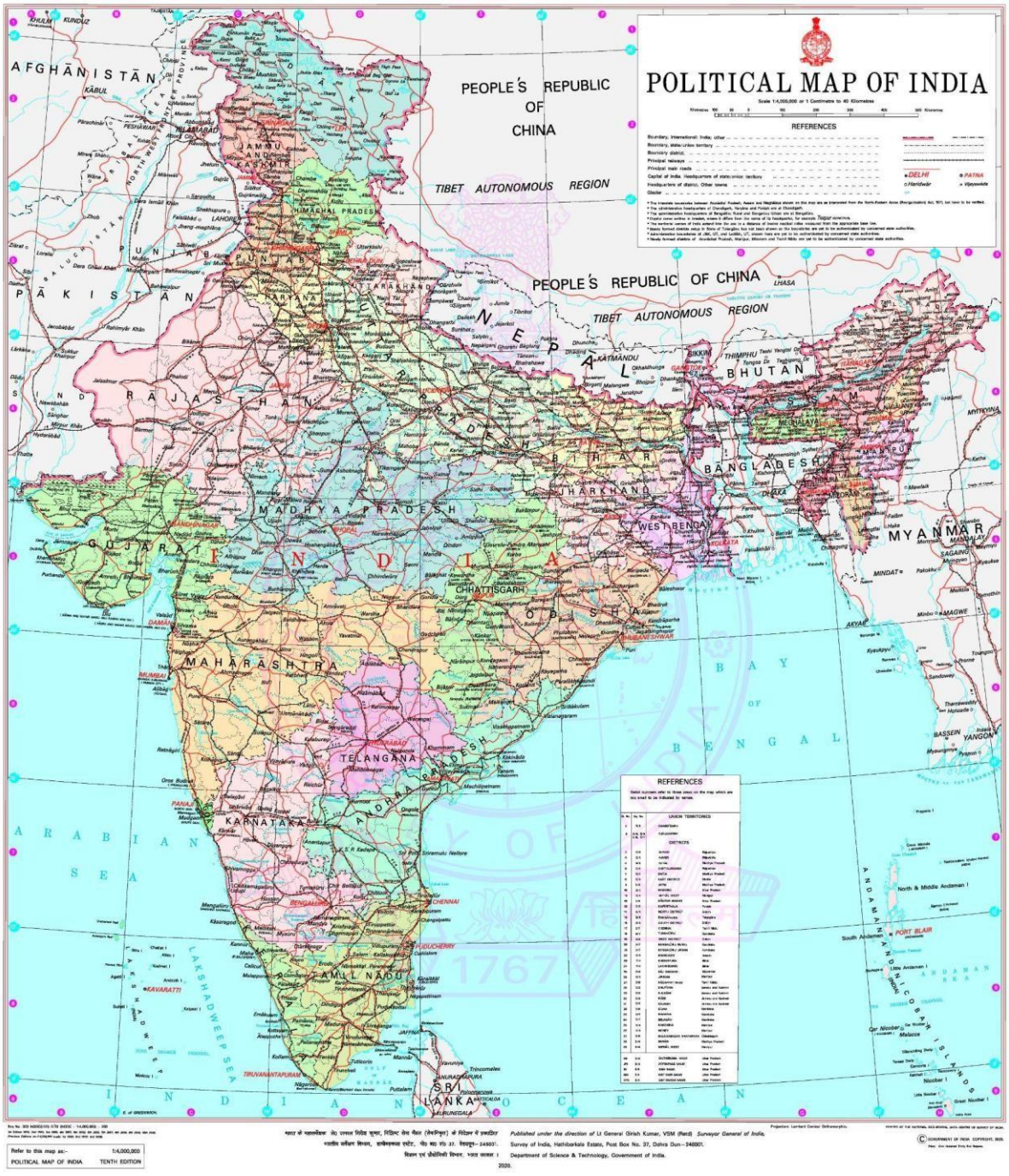

Figure-1: Political Map of India

A. General Information about India:

1. **Country Name:** Republic of India; Bharat Ganrajya

2. **Capital City:** New Delhi

3. **Official Languages:** English and Hindi

4. **Constitutional Languages:** 22

5. **Currency:** Indian Rupee

6. **Time zone:** GMT+5:30 (IST)

7. **Government:** Parliamentary Republic

8. **Head of the State:** Hon'ble President of India

9. **Head of the Government** Hon'ble Prime Minister of India

10. **Head of Disaster Management (Chairman, NDMA):** Hon'ble Prime Minister of India

11. **Physical Features:**

The mainland comprises four regions, namely, the great Himalayan mountain zone, plains of the Ganga and the Indus, the desert region and the southern peninsula.

The Himalayans comprise three almost parallel ranges interspersed with large plateaus. and valleys, some of which, like the Kashmir and Kullu valleys, are fertile, extensive and of great scenic significance. Some of the highest peaks in the world are found in these ranges. The high altitudes allow travel only through a few passes, notably the Jelep La and Nathan La on the main Indo-Tibet trade route through the Chumbi valley, north-east of Darjeeling and Ship La in the Satluj valley, north-east of Kalpa (Kinnaur). The mountain wall extends over a distance of about 2,400 km with a varying depth of 240 to 320 km.

Geographical Area: 32,87,263 sq. km (seventh largest country in the world)

Latitude & Longitude: The mainland extends between latitudes 8°4' and 37°6' north, longitudes 68°7' and 97°25' east.

Distance: from **north to south is about 3,214 km** between the extreme latitudes and about **2,933 km from east to west** between the extreme longitudes.

Land frontier of about 15,200 km. The **total length of the coastline** of the mainland, Lakshadweep Islands and Andaman and Nicobar Islands **is 7,516.6 km**.

Bordering Countries: Afghanistan and Pakistan to the north-west, China, Bhutan and Nepal to the north, Myanmar to the far East and Bangladesh to the east. Sri Lanka is separated from India by a narrow channel of sea formed by the Palk Strait and the Gulf of Mannar.

Divided into six zones mainly north, south, east, west, central and north- east zone and It

In the east, between India and Myanmar and India and Bangladesh, hill ranges are much lower. Garo, Khasi, Jaintia and Naga Hills, running almost east-west, join the chain to Mizo and Rakhine Hills running north-south.

The plains of the Ganga and the Indus, about 2,400 km long and 240 to 320 km broad, are formed by basins of three distinct river systems— the Indus, the Ganga and the Brahmaputra. They are one of the world's greatest stretches of flat alluvium and one of the most densely populated areas on the earth. Between Yamuna at Delhi and the Bay of Bengal, nearly 1,600 km away, there is a drop of only 200 metres in elevation.

The desert region can be divided into two parts— the 'great desert' and the 'little desert'. The great desert extends from the edge of the Rann of Kutch beyond the Luni river northward. The whole of the Rajasthan-Sind frontier runs through this. The little desert extends from the Luni between Jaisalmer and Jodhpur up to the northern west. Between the great and the little deserts lies a barren zone, consisting of rocky land, cut up by limestone ridges.

The Peninsular Plateau is marked off from the plains of the Ganga and the Indus by a mass of mountain and hill ranges varying from 460 to 1,220 metres in height. Prominent among these are the Aravali, Vindhya, Satpura, Maikala and Ajanta. The Peninsula is flanked on one side by the Eastern Ghats where the average elevation is about 610 metres and on the other by the Western Ghats where it is generally from 915 to 1220 metres, rising in places to over 2,440 metres. Between the Western Ghats and the Arabian sea lies a narrow coastal strip, while between the Eastern Ghats and the Bay of Bengal, there is a broader coastal area. The southern point of the plateau is formed by the Nilgiri Hills where the Eastern and the Western Ghats meet. The Cardamom Hills lying beyond may be regarded as a continuation of the Western Ghats.

12. **Geology:**

The geological regions broadly follow the physical features, and may be grouped into three regions: The Himalayas and their associated group of mountains, the Indo- Ganga Plain, and the Peninsular Shield.

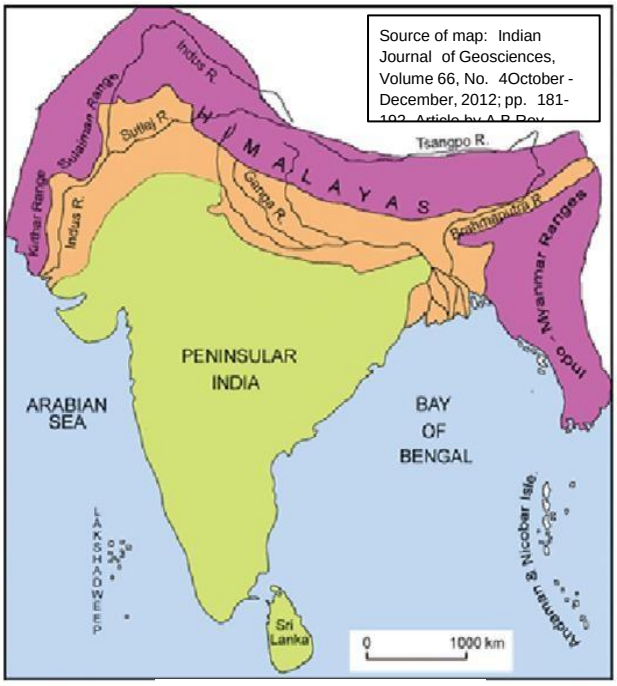

Figure-2: Geology of

The Himalayan mountain belt to the north and the Naga-Lushai mountain in the east, are the regions of mountain-building movement. Most of this area, now presenting some of the most magnificent mountain scenery in the world, was under marine conditions covered by an ocean known as Tethys about 600 million (60 crore) years ago. In a series of mountain- building movements commencing about 70 million (7 crore) years ago, the sediments and the basement rocks rose to great heights.

In the south of the Himalayas, there is a foreland basin known as Indo-Gangetic plains which is highly fertile in nature and mainly consist of alluvium deposited by the rivers draining from the Himalayas and the peninsular regions. The Indo-Ganga plains separates the Himalayas in the north from the Peninsula in the south.

The peninsular region is shaped like an inverted triangle and considered a storehouse of economic minerals for India. It is a region of relative stability and occasional seismic disturbances. Highly metamorphosed rocks of the earliest periods, dating back as far as 380 crore years, occur in the area; the rest being covered by the coastal-bearing Gondwana formations, lava flows belonging to the Deccan Trap formation and younger sediments.

13. **Climate:**

The climate of India can broadly be classified as a tropical monsoon one. But, in spite of much of the northern part of India lying beyond the tropical zone, the entire country has a tropical climate marked by relatively high temperatures and dry winters. There are four seasons as designated by the Indian Meteorological Department, namely:

a. Winter (December-February)

b. Summer (March-June)

c. South-west monsoon season (June-September)

d. Post monsoon season (October-November)

14. **Population:**

As per the Census of India 2011, the population of India stood at 1,210.9 million (623.3 million males and 587.6 million females) as on March 1, 2011. Out of this 833.7 million (68.9 percent) lived in rural areas and the rest 377.1 million (31.1 per cent) lived in urban areas. With a population of 1,028.7 million in 2001, the decadal growth rate of population in India between 2001 and 2011 was 17.7 per cent.

The population of India is estimated to have reached 1363.0 million in 2021 and is projected to reach 1,522.3 million by 2036. As a consequence, the population density will increase from 368 to 463 persons per square kilometre.

B. Disaster Risk Profile of India:

India has been vulnerable, in varying degrees, to a large number of natural, as well as, human- made disasters on account of its unique geo-climatic and socio- economic conditions. It is highly vulnerable to floods, droughts, cyclones, earthquakes, landslides, avalanches and forest fires. Out of 36 states and union territories in the country, 27 of them are disaster prone. Almost 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) are prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 per cent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches.

1. India is one of the ten most disaster prone countries of the world. The country is prone to disasters due to a number of factors like adverse Geo-climatic conditions, topographic features, environmental degradation, population growth, urbanisation, industrialization, non-scientific development practices, etc. The factors accelerating the intensity and frequency of disasters are responsible for the heavy toll of human lives and disrupting the life support system in the country. As far as the vulnerability to disaster is concerned, the five distinctive regions of the country i.e. Himalayan region, the alluvial plains, the hilly part of the peninsula, and the coastal zone have their own specific problems. While on one hand the Himalayan region is prone to disasters like earthquakes and landslides, the plain is affected by floods almost every year. The desert part of the country is affected by droughts and famine while the coastal zone is susceptible to cyclones and storms.
2. The natural geological setting of the country is the primary basic reason for its increased vulnerability. The geo-tectonic features of the Himalayan region and adjacent alluvial plains make the region susceptible to earthquakes, landslides, water erosion, etc. Though peninsular India is considered to be the most stable portions but occasional earthquakes in the region shows that geo- tectonic movements are still going on within its depth.
3. The tectonic features, characteristics of the Himalaya are prevalent in the alluvial plains of Indus, Ganga and Brahmaputra too, as the rocks lying below the alluvial plains are just extensions of the Himalayan ranges only. Thus this region is also quite prone to seismic activities. As a result of various major river systems flowing from Himalaya and huge quantities of sediment brought by them, the area is also suffering from river channel siltation, resulting in frequent floods.
4. The western part of the country is hit very frequently by drought situations. If the Monsoon worsens the situation spreads in other parts of the country too. The disturbance in the pressure conditions over oceans, results in cyclones in coastal regions. The Geo-tectonic movements going on in the ocean floor make the coastal region prone to tsunami disaster.
5. The extreme weather conditions, huge quantity of ice and snow stored in the glaciers, etc. are other natural factors which make the country prone to various forms of disasters.
6. Along with the natural factors discussed in the preceding text, various human induced activities like increasing demographic pressure, deteriorating environmental conditions, deforestation, unscientific development, faulty agricultural practices and grazing, unplanned urbanisation, construction of large dams on river channels etc. are also responsible for accelerated impact and increase in frequency of disasters in the country.

C. Hazards and Vulnerabilities in India

1.Natural Hazards

a. Cyclone and Wind

India's long coastline of nearly 7,500 km consists of 5,400 km along the mainland, 132 km in Lakshadweep and 1,900 km in the Andaman and Nicobar Islands. About 10 percent of the World's tropical cyclones affect the Indian coast. Of these, the majority have their initial genesis over the Bay of Bengal and strike the east coast of India. On an average, five to six tropical cyclones form every year, of which two or three could be severe. Cyclones occur frequently on both the west coast in the Arabian Sea and the east coast in the Bay of Bengal. More cyclones occur in the Bay of Bengal than in the Arabian Sea. An analysis of the frequencies of cyclones on the East and West coasts of India during 1891-2000 shows that nearly 308 cyclones (out of which 103 were severe) affected the East Coast.

In India, tropical cyclones occur in the months of May-June and October-November. The cyclones of severe intensity and frequency in the northern part of the Indian Ocean are bimodal in character, with their primary peak in November and secondary peak in May. The disaster potential is particularly high at the me of landfall in the northern part of Indian Ocean (Bay of Bengal and the Arabian Sea) due to the accompanying destructive wind, storm surges and torrential rainfall. Of these, storm surges are the greatest killers of a cyclone, by which sea water inundates low lying areas of coastal regions and causes heavy floods, erodes beaches and embankments, destroys vegetation and reduces soil fertility.

The coastal states and union territories (UTs) in the country, encompassing 84 coastal districts which are affected by tropical cyclones. Four states (Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and one UT (Puducherry) on the east coast and one state (Gujarat) on the west coast are highly vulnerable to cyclone disasters.

b. Flood

Floods affect an average area of around 7.5 million hectares per year. According to the National Commission on Floods, the area susceptible to floods was estimated in 1980 to be around 40 million hectares and it is possible to provide a reasonable degree of protection to nearly 80 per cent (32 million ha). Riverine flooding is perhaps the most critical climate-related hazard in India. Flood control is a key element of national policies for water resource management. The occurrence of floods and droughts is closely linked to the summer monsoon activity. Floods occur in almost all river basins of the country. Heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/rivers are the main causes of floods. Ice jams or landslides blocking streams; and cyclones also cause floods. Out of 40 million hectares of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectares per year. Floods in the Indo-Gangetic-Brahmaputra plains are an annual feature. On an average, a few hundred lives are lost, millions of people are rendered homeless, lakhs of hectares of crops are damaged, thousands of animals are affected (killed and injured). The National Flood Control Programme was launched in 1954. Since then, sizable progress has been made in the flood protection measures. The global climate change and the resultant increase in extreme weather events will naturally worsen the uncertainties associated with floods.

c. Urban Flood

The problem of urban flooding is a result of both natural factors and land-use changes brought about by urban development. Urban flooding is significantly different from rural flooding as urbanisation leads to developed catchments which increases the flood peaks from 1.8 to 8 metres and flood volumes by up to 6 metres. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes. Urban flooding is caused by the combination of meteorological, hydrological, and human factors. Due to land-use changes, flooding in urban areas can happen very rapidly with large flows. The challenges of Urban Floods Disaster Management (UFDM) tend to be considerably different from that of flooding in other areas. Problems associated with urban floods range from relatively localised incidents to major incidents, resulting in inundation of some or large parts of urban areas for several hours to many days. The impact can vary from being limited to widespread. It may result in temporary relocation of people, dispersal of animals, damage to civic amenities, deterioration of water quality and risk of epidemics.

d. Earthquake

Nearly 59 per cent of India's territory is prone to moderate to severe earthquakes. Three recent major earthquakes affected Gujarat in January 2001, Jammu and Kashmir in October 2005 and Sikkim in 2011. Many smaller- quakes have been occurring in various parts of India. Seven states in North East (Assam, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura and Meghalaya), the Andaman and Nicobar Islands and part of eight other States/UTs (Bihar, Gujarat, Himachal Pradesh, Uttarakhand, Jammu & Kashmir, Ladakh, Punjab and West Bengal) are in Seismic Zone V i.e., prone to very high damage risk. Wide-spread losses—human and material, collapse of infrastructure and services may be the major consequences of the earthquake. Hundreds of thousands may be displaced, often in remote mountainous areas in the North and North-East.

e. Tsunami

Tsunamis (Japanese for "harbour wave"), also known as a seismic sea wave, are a series of very large waves with extremely long wavelengths, in the deep ocean, the length from crest to crest may be 100 km and more. It is usually generated by sudden displacements in the sea floor caused by earthquake, landslides, or volcanic activity. Most tsunamis, including the most destructive ones, are generated by large and shallow earthquakes which usually occur near geological plate boundaries, or fault-lines, where geological plates collide. When the seafloor abruptly deforms the sudden vertical displacements over large areas disturb the ocean's surface, displace water, and generate tsunami waves. Since the wave height in the deep ocean will be only a few decimetres or less (i.e., a few inches), tsunamis are not usually felt aboard ships. Nor are they visible from the air in the open ocean. The waves could travel away from the triggering source with speeds exceeding 800 km/hr over very long distances. They could be extremely dangerous and damaging when they reach the coast, because when the tsunami enters shallow water in coastal areas, the wave velocity will decrease accompanied by an increase in wave height. In shallow waters, a large tsunami crest height may rise rapidly by several metres even in excess of 30 m causing enormous destruction in a very short time.

As seen on Indian Ocean shores in December 2004, tsunamis can cause massive death and destruction. They are particularly dangerous close to their sources, where the first waves in the tsunami train can arrive within a few to tens of minutes of the triggering event. The earthquake and resulting tsunami in the Indian Ocean on 26 Dec 2004 had devastating effects on India. Many people died and millions were displaced. The hardest hit areas were on the Southern coast and the Andaman and Nicobar Islands. Tsunamis have the potential of causing significant casualties, widespread property damage, massive infrastructure loss and long-term negative economic impacts. People caught in the path of a tsunami often have little chance of survival. People die from drowning or debris crushing them.

f. Landslide

Landslides occur in the hilly regions of India such as the Himalaya, North-East India, the Nilgiris, Eastern Ghats and Western Ghats. It is estimated that 30 percent of the World's landslides occur in the Himalayan ranges. The Himalayan range, which constitutes the youngest and most dominating mountain system in the World, is not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3 ,400 kilometres. Landslides are also common in Western Ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about one hundred landslides which caused severe damage to communication lines, tea gardens and other cultivated crops. Scientific observations in north Sikkim and Garhwal regions in the Himalayas clearly reveal that there is an average of two landslides per sq. km. The mean rate of land loss is to the tune of 120 metre per km per year and annual soil loss is about 2500 tons per sq. km. Landslides have been a major and widely spread natural disaster that often affect life and property, leading to major concern.

g. Snow avalanche

Avalanches are blocks of snow or ice descending from the mountain tops at a river like speedy flow. They are extremely damaging and cause huge loss to life and property. In the Himalayas, avalanches are common in Drass, Pir Panjal, Lahaul-Spiti and Badrinath areas. As per Snow and Avalanche Study Establishment (SASE), of Defence Research and Development Organisation (DRDO), on an average, around 30 people are killed every year, due to this disaster in various zones of the Himalayan range. Beside killing people, avalanches also damage the roads, properties, and settlements falling in its way. Traffic blockage, structural damages of roads, and retaining wall damages occur most frequently due to avalanches. Snow avalanches occur in several stretches of the Himalayan range with the following areas being more vulnerable:

- Western Himalaya – the snowy regions of J&K, Ladakh, HP and Uttarakhand, especially Tehri Garhwal and Chamoli districts
- J&K and Ladakh – Higher reaches of Kashmir and Gurez valleys, Kargil, Ladakh and along some of the major roads
- HP – Chamba, Kullu-Spi and Kinnaur

h. Drought

To determine the beginning of drought, operational definitions specify the degree of departure from the long-term (usually at least 30 years) average of precipitation or some other climatic variable. Broadly, drought is perceived as a sharply felt water deficit caused by variations in the natural hydro-meteorological factors, agro-ecological conditions, moisture requirements of crops under prevailing cropping choices (systems, patterns).

The World Meteorological Organisation considers drought as a slow creeping natural hazard that occurs in part due to the natural climatic variability. Droughts affect vast areas of the country, transcending State boundaries. A third of the country is drought prone. Recurrent drought results in widespread adverse impact on people's livelihoods and young children's nutrition status. It affects parts of Rajasthan (chronically), Gujarat, Maharashtra, Madhya Pradesh (MP), Uttar Pradesh (UP), Chhattisgarh, Jharkhand, and Andhra Pradesh. Drought is not uncommon in certain districts. Droughts cause severe distress in the affected areas.

Drought is a phenomenon that is widely considered as a 'creeping disaster' whose onset, end, and severity are difficult to determine. Unlike the suddenly occurring disasters, a drought may develop very slowly over several months affecting a very large geographical area without causing little or no structural damage. The impacts depend on natural conditions, socio-economic situation, and the kind of land and water resources as well as the use patterns in the affected region.

Mostly, the occurrence of droughts is a result of natural climate variability in all the drought-prone regions and it usually exhibits a certain pattern of occurrence. While droughts are quite frequent in arid and semi-arid regions, it can occur even in humid regions blessed with abundant rainfall with lower frequency. The capacity to cope depends largely on the technical, institutional, political, and social mechanisms to manage the water resources anticipating the severity of the drought. Effective mitigation measures must prevent a drought turning into a famine due to water and food shortages.

i. Cold waves and Frost

Cold waves and frost are seasonal and localised hazards occurring only in the parts with severe winter. Prolonged frost conditions and cold waves can damage certain frost - sensitive plants causing crop loss. The susceptibility to frost varies widely across crops. The extent of damage caused by cold waves depends on temperature, length of exposure, humidity levels, and the speed at which freezing temperature is reached. It is difficult to predict a definite temperature level up to which crops can tolerate cold waves/frost because many other factors also affect it. Cold waves can cause death and injury to human beings, livestock and wildlife. Higher caloric intake is needed for all animals, including humans to withstand exposure to cold and poor nutritional status can prove deadly in extreme cold conditions. If a cold wave is accompanied by heavy and persistent snow, grazing animals may be unable to get the requisite food. They may die of hypothermia from prolonged exposure or starvation.

j. Thunderstorm

Thunderstorms occur round the year in different parts of the country. However, their frequency and intensity is maximum in summer months (March to June). As the most important factor for occurrence of thunderstorms is the intense heating of the atmosphere at surface level and maximum heating takes place in summer months, the frequency of occurrence is maximum in summer months. A thunderstorm is said to have occurred, if the thunder is heard or lightning seen. Usually the thunder can be heard up to 40 km from the source of origin. Thunderstorms fall in the category of Meso-gamma weather systems with spatial extent of around 2~20 km and temporal scale of a few hours.

k. Squall

A squall is defined as a sudden increase of wind speed by at least 29 kmph (16 knots) with the speed rising to 40 kmph (22 knots) or more and lasting for at least one minute. The frequency and intensity of squall are maximum over eastern and northeastern states. Comparing different seasons, the frequency of squall is maximum in the pre-monsoon season (March-May) in different parts of the country. However, there is a secondary maximum in the winter season over northwest India. The intensity of squall is maximum in the month of May followed by April.

l. Dust Storm

The northwest India experiences convective dust storms called “aandhi” locally during the pre- monsoon season. The frequency of dust storms is maximum over the States of Rajasthan followed by Haryana, Punjab and west UP. The dust storm mainly occurs in the pre-monsoon season and it is maximum in the month of May in terms of frequency and intensity.

m. Lightning

Lightning is a high-current electric discharge that occurs in the earth's atmosphere and has a total path length of the order of a few kilometres. The peak power and total energy in lightning are very high, the peak power that is dissipated by a lightning discharge is on the order of 100 million was per metre of channel and the peak channel temperature approaches 30,000 °C. Peak currents in a lightning discharge range from several to hundreds of kilo amperes (kA), with typical value being 40 kA. Prediction of lightning as to the precise time and location is very difficult. In the atmosphere, three types of discharges take place: a) Thundercloud (intra-cloud), b) One cloud to another (inter- cloud) and c) Cloud to ground (CG). Aircrafts can be hit by the first two while the third type takes a toll on life and property on the ground.

n. Cloudburst

A cloudburst is an extreme amount of precipitation in a short period, sometimes accompanied by hail and thunder, that can create flood conditions. It is not, as is sometimes understood, the breaking open of a cloud resulting in the release of huge amounts of water. According to the IMD, if rainfall of about 100 mm or above per hour is recorded over a place that is roughly less than 100 sq km area, it is classified as a cloudburst event. By this definition, 50 mm rainfall in half an hour

would also be classified as a cloudburst. To put this in perspective, India, in a normal year, gets about 1160 mm annual rainfall. A cloudburst would therefore account for 10-12 percent of the annual rainfall of that area in just an hour. At times, a large amount of runoff from higher elevations is mistakenly conflated with a cloudburst. They are difficult to forecast because they occur over a very small area. Forecasts for a very small area are difficult to predict. However, using Doppler radars it is possible to forecast the possibility of cloudbursts about six hours and sometimes 12-14 hours in advance.

However, cloudbursts are infrequent as they occur only via orographic li, i.e., occasionally when a warm air parcel mixes with cooler air, resulting in sudden condensation. Cloudbursts do happen in plains as well, but there is a greater probability of them occurring in mountainous zones; it has to do with the terrain. Hilly terrains aid in heated air currents rising vertically upwards, thereby, increasing the probability of a cloudburst situation. The rainfall itself does not result in the death of people, though sometimes, the raindrops are big enough to hurt people in a sustained downpour. It is the consequences of such heavy rain, especially in the hilly terrain, that causes death and destruction. Landslides, flash floods, houses and establishments getting swept away and cave-ins lead to the deaths. There is a paucity of past data on cloudbursts; in addition, since only some of them get counted – only those that result in death and destruction – there is a problem of accuracy as well. Under global climate change scenarios, the frequency of high intensity rainfall events is expected to increase and consequently frequency of cloudburst events may also increase.

o. Hailstorms

India is among the countries in the world with the highest frequency of hail. There are about 29 hail days per year of moderate to severe intensity. The hailstorm activity that occurs usually in the months of April and May occurred during February-March in 2014. About 25% of total occurrence in the past recorded hailstones of 3-cm or more diameter. The hailstorms are mainly observed in the winter and pre-monsoon seasons with virtually no events after the onset of the southwest monsoon.

Hail is a solid, frozen form of precipitation that causes extensive damage to property and crop. Hot, humid afternoon hours during the summer are the most congenial for development of hailstorms, which usually form over a relatively small area and pass over within a very short period. At times, it can cause considerable crop damage in brief spells lasting a few minutes. Hail is often associated with thunderstorm activity and changing weather fronts. This is formed in huge cumulonimbus clouds, commonly known as thunderheads. The IPCC reports caution that there are indications that a warming climate would favour an increase in the intensity and frequency of extreme events such as heat waves and precipitation extremes. Hail and thunderstorms are extreme forms of weather events that deserve special attention in view of climate change.

p. Glacial Lake Outburst Flood (GLOF)

A Glacial Lake Outburst Flood (GLOF) is a type of flood occurring when water dammed by a glacier or a moraine is released. When glaciers melt, they sometimes form lakes on mountaintops. The water in these glacial lakes accumulates behind loose naturally formed ‘dams’ made of ice, sand, pebbles and ice residue. Glacial lake volumes vary, from several MCM to hundreds of MCM of water.

But these are inherently unstable and disturbances such as avalanches, falling boulders, earthquakes, or even simply the accumulation of too much water can breach the 'dam', unleashing sudden, potentially disastrous floods in nearby communities. A catastrophic failure of the containing ice or glacial sediment can release this water over periods of minutes to days. Peak flows as high as 15,000 cubic metres per second have been recorded in such events. GLOF events have killed thousands in many parts of the world and some of the largest events occurred in the Himalayas.

The Indian Himalayan Region (IHR), with geographical coverage of over 5.3 lakh kilometre square, extends over 2,500 kilometres in length between the Indus and the Brahmaputra river systems. While glacial lake hazards and glacial lake distributions are investigated in many glaciated regions of the world, relatively, there has been less attention to these in the Indian Himalayas. In physiographic terms, the IHR extends from the foothills in the south (Shivalik) to Tibetan plateau in the north (Trans - Himalaya). Three major geographical entities, the Himadri (Greater Himalaya), Himachal (Lesser Himalaya) and the Shivalik (Outer Himalaya), extending almost uninterrupted throughout its length, are separated by major geological fault lines. The National Mission for Sustaining the Himalayan Ecosystem (NMSHE), one of the eight missions under the National Action Plan on Climate Change (NAPCC) is dedicated to sustainable development of the region, understanding climate change impacts and examining adaptation strategies for the region. The Himalayan states /UTs include—J&K, Ladakh, HP, Uttarakhand, Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya, and two partial hill states, namely Assam and West Bengal.

The climatic change/variability in recent decades has made considerable impacts on the glacier lifecycle in the Himalayan region. Scientific studies have noted glacier retreat occurring in most parts of the Hindu Kush Himalaya, which has given rise to the formation of numerous new glacial lakes. Glacial lakes are an indirect indicator of glacier change and unstable lakes can present hazards to downstream locations. The Geological Survey of India (GSI) lists 9,575 glaciers in IHR, of which 267 are over 10 sq km. One of the pioneering regional glacial lake inventories has provided a qualitative classification of 251 glacial lakes greater than 0.01 sq km in area. These glacial lakes are present in J&K, Ladakh, HP, Uttarakhand, Sikkim and Arunachal Pradesh. Many of these glacial lakes present moderate to severe risks to the downstream locations. The hazard of Glacial Lake Outburst Flood (GLOF) can get aggravated in case of cloud burst in the area.

In Sikkim Himalaya many glacial lakes are in the process of formation. There are high chances of bursting of these lakes due to their formation in weak moraine structures. It may cause huge devastation downstream in the case of bursting. The GLOF hazard from South Lhonak glacial lake, located in the extreme North-western part and one of the fastest growing lakes in Sikkim Himalaya, is of particular concern. The lake is rapidly increasing in its size in an extremely abnormal way due to the melting of the South Lhonak glacier attached with the lake and addition melt water from adjoining North Lhonak glacier and main Lhonak glacier. The study of past satellite data of Lhonak glacier lake area revealed that the area of the lake has increased from 0.18 km^2 in 1976 to 1.26 $km^2$by 2013. The abnormal growth of the volume of the lake greatly increases the risk of a GLOF event. Based on the current inventory and recognising the risk of GLOF events in the IHR, the CWC is monitoring 467 glacial lakes and water bodies with water spread area more than nearly 0.4 Sq.km.

q. Heat wave

Heat wave is a period of abnormally high temperatures that leads to physiological stress, which sometimes can claim human life. The World Meteorological Organization defines a heat wave as five or more consecutive days during which the daily maximum temperature exceeds the average maximum temperature by five degrees Celsius. Different countries define heat waves differently in context of their local conditions. Heat Waves typically occur between March and June, and in some rare cases even extend until July. Heat waves are more frequent over the Indo-Gangetic plains of India. On an average, 5-6 heat wave events occur every year over the northern parts of the country. In the northern plains of the country, dust in suspension occurs in many years for several days, bringing minimum temperature much higher than normal and keeping the maximum temperature around or slightly above normal.

Higher daily peak temperatures and longer, more intense heat waves are becoming increasingly frequent globally due to climate change. India too is feeling the impact of climate change in terms of increased instances of heat waves that are more intense in nature with each passing year and have a devastating impact on human health thereby increasing the number of heat wave casualties. The health impacts of Heat Waves typically involve dehydration, heat cramps, heat exhaustion and/or heat stroke. This unusual and uncomfortable hot weather can impact human and animal health. It can cause major disruption in community infrastructure such as power supply, public transport and other essential services. Heat waves are considered a “silent disaster” as it develops slowly.

2. Human Induced Hazards

a. Chemical (Industrial) Disasters

With rapid economic development, there has been a spread of industries from small to large across the country. There is a relatively higher presence of the industrial sector along the west coast, largely due to the proximity to raw materials and ports. The states with a very large number of chemical industries are Gujarat, Maharashtra, Uttar Pradesh (UP), Tamil Nadu (TN), Madhya Pradesh, and Punjab. Due to the regional concentration of chemical companies in certain pockets, the chemical hazard has increased many folds. The growth of industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM) and hazardous materials (HAZMAT). These events occur due to mishaps or failures in industry and negligence in following international codes and standards for chemical handling which affects the industrial functioning, and productivity. While the common causes for chemical accidents are deficiencies in safety management systems or human errors, natural calamities or sabotage may also trigger such accidents. Chemical/ industrial accidents are significant and have a long term impact on the community and environment. It leads to injuries, pain, suffering, loss of lives, damage to property and environment. Hence, a robust plan and mitigation measure needs to be adapted to overcome the hazard. The suggestions from several industry associations have recommended the implementation of the updated and relevant International Organization for Standardization (ISO) and Occupational Health and Safety Assessment Series (OHSAS) standards to production and

storage of chemicals. There are specific norms applicable to industries producing, storing or handling hazardous chemicals.

b. Nuclear and Radiological Emergencies (NRE)

A nuclear disaster is construed as potentially a low probability event, however very high in damage impact, could be caused by detonation of nuclear warhead or explosion of an Improvised Nuclear Device (IND) with associated release of large amounts of devastative energy due to Blast, Thermal and Radioactive material. Secondary effects occurring later might result in fall out of radioactive dust. The nuclear and radiological emergencies could be due to accidents at operating nuclear facilities/ incidents in the public domain that could potentially release radioactive materials. The cause of these events could potentially arise from nuclear facility/ malicious acts of radioactivity dispersal by explosion of Radiological Dispersal Device (RDD). The occurrence of these kinds of emergencies could be of probability marginally higher but based on the scale of the accident/ incident, the potential impact of damage will be restricted to less domain.

Nuclear weapons, a major accident in a nuclear power plant or an accidental exposure of radiation, due to accident with the radioactive material during transportation, faulty practices, and mechanical failure in a radiation facility can lead to nuclear or radiological emergency. Even though such situations may not arise easily, everyone needs to be prepared to face such emergencies. All organisations dealing with nuclear and radiological material have an inherent culture of safety, follow best safety practices in the sector, and they apply high standards to ensure minimum risk. However, nuclear emergencies can still arise due to factors beyond the control of the operating agencies from human error, system failure, sabotage, extreme natural events like earthquake, cyclone, flood, tsunami or a combination of these. Such failures, even though of very low probability, may lead to on-site or off- site emergencies. To counter this, proper emergency preparedness plans must be in place so that there is minimum loss of life, livelihood, property, and impact on the environment.

c. Biological and Public Health Emergencies (BPHE)

Disasters related to this sub-group are biological emergencies and epidemics, pest attacks, cattle epidemics and food poisoning. Biological emergency is one caused due to natural outbreaks of epidemics or intentional use of biological agents (viruses and microorganisms) or toxins through dissemination of such agents in ways to harm human population, food crops and livestock to cause outbreaks of diseases. This may happen through natural, accidental, or deliberate dispersal of such harmful agents into food, water, air, soil or into plants, crops, or livestock. Apart from the natural transnational movement of the pathogenic organisms, their potential use as weapons of biological warfare and bioterrorism has become far more important now than ever before. Along with nuclear and chemical agents, many biological agents are now considered as capable of causing large-scale mortality and morbidity.

Handling exotic pathogens warrants suitable infrastructure, notably, high containment laboratories of biosafety levels 3 and 4; recruitment of highly committed, dedicated and trained professionals; continuous availability of diagnostic reagents; enhancement of skills at various echelons of health professionals in early identification of such infections, investigation of outbreaks and institution of

specific control measures. Current system of surveillance and mechanism to control the outbreak of endemic diseases are through the National Programme for Surveillance of Communicable Diseases.

Natural outbreaks of disease may become epidemics and assume disastrous proportions if not contained in the initial stages. Pest infestations have recurred as major disasters for the agrarian economy of India since immemorial. Locust swarms coming from Central Asia used to be a major cause for concern. Besides such consolidated events, infestation of localised pests is a threat to plant as well as human life. A major factor responsible for deterioration and the loss of food grains, their products and the economic losses besides health hazards is the contamination caused by rodents and insects. Pest control is achieved primarily through chemical methods subject to safety standards and regulatory norms for the safe use of such chemicals.

d. Accidents – Rail, Air, Road and Water

The fast pace of development brings with it increasing frequency of various types of accidents as more and more people are involved in diverse economic activities. The number of air accidents, cases of boat capsizing, building collapses, fires in built environments – residential, commercial and industrial, festival related incidents involving large number of people, forest fires, emergencies in mines (flooding, collapse, etc.), oil spills, rail accidents, road accidents, stampedes, transportation of hazardous material (HAZMAT) related accidents etc . are increasing. While all these are matters of utmost concern, not all of them fall within the purview of the NDMP. Certain specific agencies such as the Indian Coast Guard have the primary responsibility of addressing incidents of oil spills and ships in the coastal waters. While the cases of fires in the built environment and forests are included in the plan, local authorities address them in accordance with the relevant emergency management systems. The primary way to reduce risks is through mainstreaming risk reduction in development and governance. As part of the overall DRR plan, systems for disaster preparedness and response are being strengthened at all levels, which in turn will help in reducing the number of accidents and improve the capacity to respond.

e. Emergencies Associated with Mass Gatherings

Throughout the country, frequently, there are various kinds of events that attract crowds large and small, at varying types and styles of venue. The degree and quality of preparedness to cope with expected or unforeseen emergencies arising from such events vary greatly. Inadequate planning can increase risks associated with insufficient or ineffective spectator management or service provision. The evidence lies in the large number of public events where multiple injuries, illness and deaths have occurred. Emergencies and disastrous incidents associated with mass gatherings is a world-wide phenomenon.

During festivals or events attracting mass gathering - railways, roadways and airways etc. may experience unexpected temporary surge in number of people at such locations. Agencies responsible for operation and management at such places would need to include “crowding” and ‘crowd behaviour’ as hazard risk while formulating strategic plans for public safety. Accordingly, it will be necessary to pay attention to implementing special arrangements necessary for managing the crowds and crowd behaviour.

f. Fire in Built Environment

Fires can start due to human activities or from natural causes. Forest fires can start from either natural causes or human activity or from a combination of both. The most common fires are the residential and non-residential structural fires caused usually by human activities. Most industrial and chemical fires are triggered by human activity. They are sometimes caused by human errors, faulty designs, or mechanical failures. Fire can also be the secondary effect of a disaster like an earthquake. Secondary fires after a disaster like earthquakes constitute a substantial and heavy risk. Damage to natural gas systems during an earthquake can lead to major fires and explosions. Damages to electrical systems during a disaster can ignite major fires. The growth of fire-services in the country has been on an ad- hoc basis and needs to be professionalised. Varying risk scenarios need different types of equipment. The risk varies with geographical location such as hilly area, coastal-area, desert–area, and with different types of residential (medium/ low-rise/ high-rise) buildings, industrial, commercial area or a combination of these. There is considerable need for skill upgrade of the staff and modernization of the entire fire service system.

g. Forest Fire

India is one of the richest areas of biodiversity in the world having nearly seven lakh square kilometres of forest cover. Increasing human interference is a major cause for the incidents of the forest fires. Despite its natural and essential roles, fire has negative consequences when it conflicts with the public interest. Examples of negative impacts include loss of homes, property and critical infrastructure, damage to domestic watersheds and destruction of commercially valuable timber. Smoke from forest fires can also interfere with road and air transport, inhibit tourism, and cause serious public health problems. It is also a threat to human settlements dwelling within or adjacent to the forests.

Forest fires in India are generally ground fires. As per Forest Survey of India (FSI), which has been conducting field investigations since 1965, human activities trigger nearly 95 per cent of the forest fires in India. Forest fire is a major cause of injury and loss to forests. Area affected by forest fires annually is nearly 35 million hectares. In general, all over the world the main causes of forest fires are anthropogenic. The data on forest fires in India is very weak and needs to be improved. FSI's 1995 data considers nearly 50 per cent of the forest areas as fire prone with 43 percent having occasional fire incidents. According to this assessment, very high, high, and frequent forest fires occur in 0.84 per cent, 0.14 percent and 5.16 percent of the forest areas respectively. The states with frequent occurrence of forest fires are: 1) Andhra Pradesh 2) Himachal Pradesh 3) Karnataka 4) Manipur 5) Madhya Pradesh 6) Nagaland 7) Orissa 8) Rajasthan 9) Telangana 10) Uttar Pradesh and 11) Uttarakhand. The moist deciduous forest is the most vulnerable to fire in India. Nearly 15 percent of this ecosystem is frequently disturbed by fire and 60 percent is occasionally affected. In the case of wet/semi— evergreen forests, fire occurs somewhat frequently in nine per cent, and occasionally in additional 40 per cent. In the North-Eastern region of India, recurrent fires annually affect up to 50 per cent of the forests. The coniferous forests in the Himalayan region are also very fire prone with many wildfires occurring during the winter drought. The proportion of the forest areas prone to forest fire ranges greatly across different states.

D. Recent Significant Disasters in India (2018-2024)

1. Disaster that occurred in India during 2018:

- May: Indian dust storms (North India)
- May: Nipah Virus outbreak in Kerala
- August: Kerala floods
- September: Kolkata bridge collapse
- October: Amritsar train disaster

2. Disaster that occurred in India during 2019:

- February: Seemanchal Express derailment (Bihar)
- February: Delhi hotel fire
- February: Bandipur wildfire
- March: Mumbai bridge collapse
- March: Dharwad building collapse
- May–June: Heat wave India
- May: Surat fire
- June: Bihar encephalitis outbreak
- June: IAF An-32 crash (Arunachal Pradesh)
- June: Kullu bus accident (Himachal Pradesh)
- July: Tiware dam failure (Maharashtra)
- July-August: Floods (Kerala & Gujarat)
- September: Pune flood
- December: Delhi factory fire

3. Disaster that occurred in India during 2020:

- January-present: COVID-19 pandemic
- June: Locust infestation India
- May: Visakhapatnam gas leak
- May: Aurangabad railway accident (Maharashtra)
- May: Cyclone Amphan
- May: Uttarakhand forest fires
- May: Assam gas and oil leak
- May - August: Assam floods
- June: Cyclone Nisarga
- June: Dahej chemical plant explosion
- August: Kerala floods
- August: Vijayawada fire
- August: Srisailam hydroelectric power plant fire
- August: Tariq Garden building collapse in Mumbai
- October: Hyderabad floods
- November: Ahmedabad chemical factory blast
- November: Cyclone Nivar
- November: Cyclone Burevi
- December: Eluru outbreak (Andhra Pradesh)

4. Disaster that occurred in India during 2021:

- January : present: COVID-19 pandemic
- January: Shivamogga quarry explosion

- February: Uttarakhand flood
- February: Sidhi bus accident (Madhya Pradesh)
- March: Mumbai hospital fire
- April: Virar-Mumbai hospital fire
- May: Bharuch hospital fire
- May: Cyclone Tauktae
- May: Cyclone Yaas
- July: Maharashtra floods
- September: Saurashtra floods
- September Cyclones Gulab and Shaheen
- November: South India floods
- December: Cyclone Jawad

5. Disaster that occurred in India during 2022:

- January – present: COVID-19 pandemic
- January: Vaishno Devi Temple stampede
- January: Surat gas leak
- January: Bikaner-Guwahati train accident (West Bengal)
- April: Trikut cable car accident (Jharkhand)
- May: Cyclone Asani
- May: Delhi fire
- May: Northeast floods
- June: Hapur chemical plant explosion
- June: Mumbai building collapse
- June: Manipur landslide
- July: Amarnath floods (Cloudburst)
- October: Uttarakhand avalanche
- October: Kanpur road accident
- October: Bhadohi fire (Uttar Pradesh)
- October: Morbi bridge collapse (Gujarat)

6.Disaster that occurred in India during 2023:

- April - Heatwave, Nationwide
- June - Cyclone Biparjoy, neared the coastline of western India
- June - Train Accident - Balasore district, Odissa
- July- August - Flash floods, Himachal Pradesh Uttarakhand Northeast India
- July- August - Flash floods, Himachal Pradesh Uttarakhand Northeast India
- July- August - Flash floods, cloudbursts, Himachal Pradesh Jammu and Kashmir (Anantnag district)
- July- August - Fire incident in Train, Near Madurai, Tamil Nadu
- October - Derailment of Train, Northeast Express near Buxar, Bihar
- October - Andhra Pradesh train accident, Howrah-Chennai Train

7. Disaster that occurred in India during 2024:

- January - Golaghat highway accident
- February - Virudhunagar explosion
- March - Bangalore cafe bombing

- March – September Bahraich wolf attacks
- April – June Indian heat wave
- May - Cyclone Remal
- May - Mumbai hoarding collapse
- May - Thane explosion
- May - Rajkot fire
- June - Uttarakhand snowstorm
- June - Reasi terrorist attack
- June - West Bengal train collision
- June - Tamil Nadu alcohol poisoning
- June - Virudhunagar explosion
- July - India floods
- July - Uttar Pradesh crowd crush
- July - Surat building collapse
- July - Ankola landslide
- July - Vilangad landslide
- July - Wayanad landslides
- August - Atchutapuram explosion
- September - Vijayawada floods
- September - Jivitputrika tragedy
- October - Tamil Nadu train collision
- October - Mumbai stampede
- October - Nileshwar temple fireworks disaster
- November - Almora bus accident
- December - Mumbai boat accident

E. Institutional Framework

1. National Level

The overall coordination of disaster management vests with the Ministry of Home Affairs (MHA). The Cabinet Committee on Security (CCS) and the National Crisis Management Committee (NCMC) are the key committees involved in the top-level decision-making regarding disaster management. The NDMA is the agency responsible for the approval of the NDMP and facilitating its implementation. Figure 3 below provides a schematic view of the basic institutional structure for DM at national level.

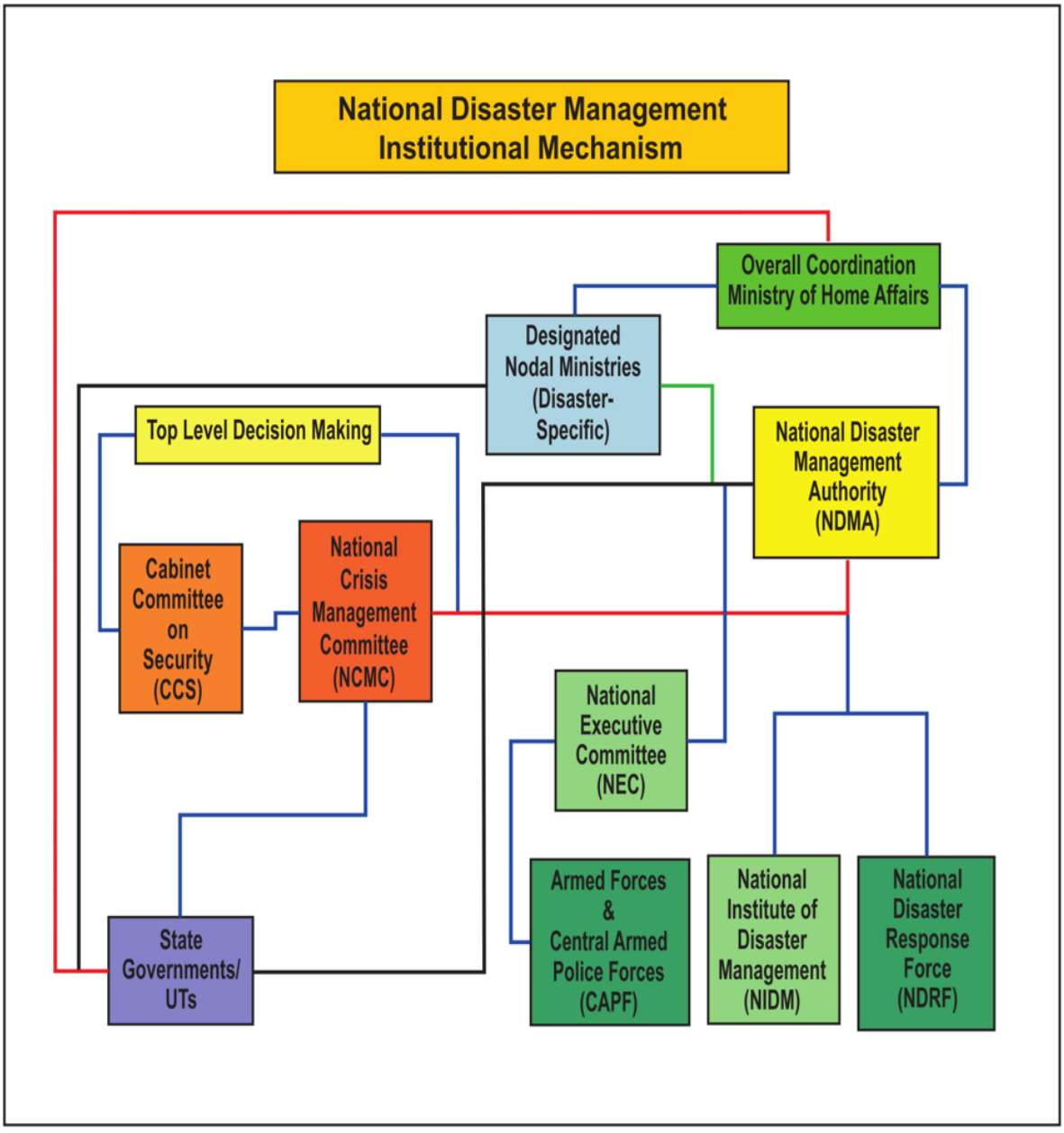

Figure-3: National-level disaster management - Basic institutional

In most cases, state governments will be carrying out disaster management with the central government playing a supporting role. Generally, the central agencies will participate on the request from the state government. Within each state, there is a separate institutional framework for disaster management at the state-level.

The DM Act of 2005 provides for the setting up of Disaster Management Authorities (DMA) at national (NDMA), the state (SDMA) and the district (DDMA) levels. The role, composition and the role of the key decision-making bodies for disaster management at national level are briefly described in the Table below. The extent of involvement of central agencies will depend on the type, scale, and administrative spread of the disaster. If the situation requires the direct assistance from the central government or the deployment of central agencies, the central government will provide all necessary support.

Key National-Level Decision-Making Bodies for Disaster Management

	Name	Composition	Vital role
1	**Cabinet Committee on Security (CCS)**	Prime Minister, Minister of Defence, Minister of Finance, Minister of Home Affairs, and Minister of External Affairs	• Evaluation from a national security perspective, if an incident has potentially security implications • Oversee all aspects of preparedness, mitigation and management of Chemical, Biological, Radiological and Nuclear (CBRN) emergencies and of disasters with security implications • Review risks of CBRN emergencies from me to me, giving directions for measures considered necessary for disaster prevention, mitigation, preparedness and effective response
2	**National Crisis Management Committee (NCMC)**	• Cabinet Secretary (Chairperson) • Secretaries of Ministries/ Departments and agencies with specific DM responsibilities	• Oversee the Command, Control and Coordination of the disaster response • Give direction to the Crisis Management Group as deemed necessary • Give direction for specific actions to face crisis situations
3	**National Disaster Management Authority**	• Prime Minister (Chairperson) • Members (not exceeding nine, nominated by the Chairperson)	• Lay down policies, plans and guidelines for disaster management • Coordinate their enforcement and implementation throughout the country • Approve the NDMP and the DM plans of the respective Ministries and Departments of Government of India • Lay down guidelines for disaster management to be followed by the

			different Central Ministries, Departments and the State Governments
4	**National Executive Committee (NEC)**	• Union Home Secretary (Chairperson) • Secretaries to the GOI in the Ministries/ Departments of Agriculture, Atomic Energy, Defence, Drinking Water and sanitation, Environment, Forests and Climate Change Finance (Expenditure), Health and Family Welfare, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources, River Development and Ganga Rejuvenation, The Chief of the Integrated Defence Staff of the Chiefs of Staff Committee, ex officio as members. • Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport and Highways, Chairman, Central Water Commission and Secretary, NDMA are special invitees to the meetings of the NEC.	• To assist the NDMA in the discharge of its functions • Preparation of the National Plan • Coordinate and monitor the implementation of the National Policy • Monitor the implementation of the National Plan and the plans prepared by the Ministries or Departments of the Government of India • Direct any department or agency of the Govt. to make available to the NDMA or SDMAs such men, material or resources as are available with it for emergency response, rescue and relief • Ensure compliance of the directions issued by the Central Government • Coordinate response in the event of any threatening disaster situation or disaster • Direct the relevant Ministries/ Departments of the GOI, the State Governments and the SDMAs regarding measures to be taken in response to any specific threatening disaster situation or disaster. • Coordinate with relevant Central Ministries/ Departments/ Agencies which are expected to assist the affected State as per protocols and Standard Operating Procedures (SOPs) • Coordinate with the Armed Forces, Central Armed Police Forces (CAPF), the National Disaster Response Force (NDRF) and other uniformed services which comprise the GOI's response to aid the State authorities • Coordinate with all relevant specialised scientific institutions/ agencies responsible for providing early warning and monitoring Coordinate with SDRF, civil defence volunteers, home guards and fire services, through the relevant administrative departments of the State Governments

5	**National Disaster Response Force**	• Specially trained force headed by a Director General. Structural forces for rapid deployment	• A specialist response force that can be deployed in a threatening disaster situation or disaster. • Assist the relevant State Government/ District Administration in the event or in its aftermath.
6	**National Institute of Disaster Management (NIDM)**	Union Home Minister; Vice Chairman, NDMA; Members including Secretaries of various nodal Ministries and Departments of Government of India and State Governments and heads of national levels scientific, research and technical organisations, besides eminent scholars, scientists and practitioners.	• Human resource development and capacity building for disaster management within the broad policies and guidelines laid down by the NDMA • Design, develop and implement training programmes • Undertake research • Formulate and implement a comprehensive human resource development plan • Provide assistance in national policy formulation, assist other research and training institutes, state governments and other organisations for successfully discharging their responsibilities • Develop educational materials for dissemination • Promote awareness generation

From time to time, the central government notifies hazard-specific nodal ministries to function as the lead agency in managing specific disasters. Below is the current list of disaster-specific nodal ministries notified by GOI.

Different Disasters

SN	Disaster	Nodal Ministry/ Department
1	**Accident- Air (Civil Aviation)**	Ministry of Civil Aviation
2	**Accident-Rail**	Ministry of Railways
3	**Accident-Road**	Ministry of Road Transport and Highways
4	**Avalanche**	Ministry of Defence (MOD) – Border Road Organization (BRO)
5	**Biological Emergencies**	Ministry of Health and Family Welfare (MHFW)
6	**Cold-Wave**	Ministry of Agriculture and Farmers Welfare (MAFW)

Nodal Ministry for Management/ Mitigation of Different Disasters

7	**Cyclone/ Tornado**	Ministry of Earth Sciences (MOES)
8	**Drought**	Ministry of Agriculture and Farmers Welfare (MAFW)
9	**Earthquake**	Ministry of Earth Sciences (MOES)
10	**Flood**	Ministry of Jal Shakti (MOJS)
11	**Flood-Urban**	Ministry of Housing and Urban Affairs (MHUA)
12	**Forest Fire**	Ministry of Environment, Forests, and Climate Change (MEFCC)
13	**Frost**	Ministry of Agriculture and Farmers Welfare (MAFW)
14	**Hailstorm**	Ministry of Agriculture and Farmers Welfare (MAFW)
15	**Industrial and Chemical**	Ministry of Environment, Forests, and Climate Change (MEFCC)
16	**Landslide**	Ministry of Mines (MOM)
17	**Nuclear and Radiological**	Department of Atomic Energy (DAE)
18	**Oil Spills**	Ministry of Defence (MOD) – Indian Coast Guard (ICG)
19	**Pest Attack**	Ministry of Agriculture and Farmers Welfare (MAFW)
20	**Tsunami**	Ministry of Earth Sciences (MOES)

2. State Level

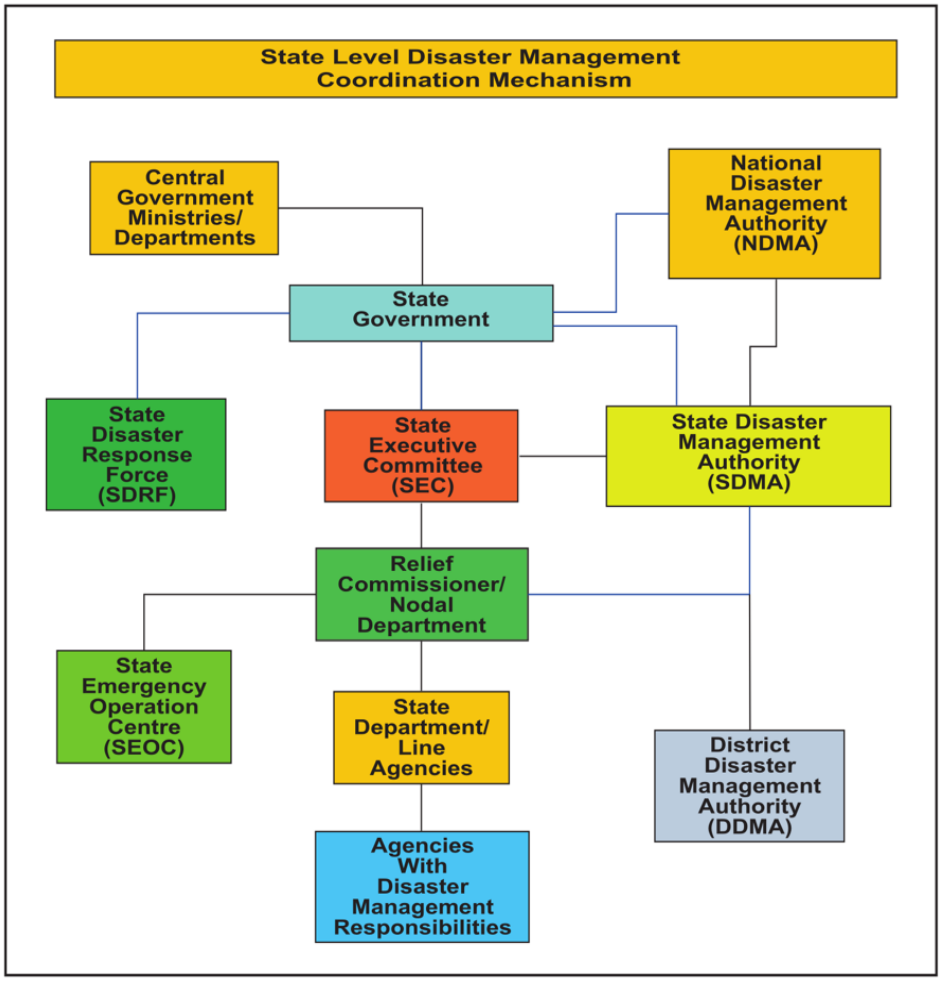

Figure-4: State-level disaster management - Basic institutional framework

As per the DM Act of 2005, each state in India/ Union Territory (UT) shall have its own institutional framework for disaster management. Each State/UT will have one nodal department for coordination of disaster management, referred hereafter as DM department (DMD), although the name and department is not the same in each State/UT. Among other things, the DM Act mandates that each State/UT shall take necessary steps for the preparation of State/UT DM plans, integration of measures for prevention of disasters or mitigation into State/UT development plans, allocation of funds, and establish EWS. Depending on specific situations and needs, the State/UT shall also assist the Central Government and central agencies in various aspects of DM. Each state shall prepare its own State Disaster Management Plan.

The DM Act mandates the setting up of a State Disaster Management Authority (SDMA) and a similar system in each Union Territory. At the district level, the District Disaster Management Authority (DDMA), the District Collector or District Magistrate or the Deputy Commissioner, as applicable, will be responsible for overall coordination of the disaster management efforts and planning. Figure -4 provides a schematic view of the typical state-level institutional framework. The figure represents merely the institutional pathways for coordination, decision -making and communication for disaster management and does not imply any chain of command.

F. Disaster Risk Finance in India

Over the years, the disaster risk has increased both in terms of incidence and in terms of economic impact. The financial and economic consequences of disasters can be mitigated through financial management tools and available physical risk reduction measures (OECD, 2012). In India, since long the Finance Commissions have been addressing this important aspect of financing for disasters.

The financing of disaster relief has been an important aspect of federal fiscal relations. There are significant variations in the disaster profiles of different states and wide regional disparities in terms of levels of economic development. This implies that the coping capacity of a majority of the states to deal with disasters on their own is inadequate. This is compounded by the fact that the poorer states are often the most disaster prone. The financing of disaster relief has, as a result, come to be firmly accepted as a joint endeavour of the Central and State Governments.

The recent Fifteenth (XV) Finance Commission has acknowledged the expanding field of disaster management. It has taken a very holistic and comprehensive approach in creating a financial structure that will take note of various layers, phases, aspects and dimensions of Disaster Management in India. The commission has submitted two reports for Disaster Risk Management, one for the year 2020-21 and final report for the period 2021-22 to 2025-26.

The successive Finance commissions up to XIV FC followed an expenditure based approach determining allocation of funds for Disaster Management to State Governments. The XV FC adopted a new method which is the combination of a) Capacity (reflected through past experiences); b) Risk Exposure (area and population) and c) Hazard & Vulnerability (disaster risk index).

There are two funds, namely National Disaster Risk Management Fund (NDRMF) and State Disaster Risk Management Fund (SDRMF) at the National Level and State Level respectively. The NDRMF further consists of National Disaster Response Fund (NDRF) and National Disaster Mitigation Fund (NDMF) and similarly the SDRMF consists of State Disaster Response Fund (SDRF) and State Disaster Mitigation Fund (SDMF) respectively. From the total earmarked grants for Disaster management for both National & State Corpus 20% is earmarked for Mitigation and remaining 80% for response fund. The response fund has been further apportioned into three windows:

a) Response & Relief (40%)

- 40% of NDRMF/SDRMF is allocated for response & relief from disasters

b) Recovery & Reconstruction (30%)

- To focus on recovery after the disaster
- To re-build assets and livelihoods

c) Preparedness & Capacity building (10%)

- Needed for States to be essentially prepared for Disasters to respond effectively
- Allocation to support SDMAs, SIDM, training & capacity building activities and emergency response facilities

The budget distribution table for the National Disaster Risk Management Fund (NDRMF) and State Disaster Risk Management Fund (SDRMF)

NATIONAL DISASTER RISK MANAGEMENT FUND (NDRMF)

(IN CRORES) 100%

NDRMF	2021-22	2022-23	2023-24	2024-25	2025-26	Total
Allocation	12390	13010	13660	14343	15060	**68463**

- ***Funding Windows of NDRF and NDMF are not Interchangeable***
- ***Flexibility for re-allocation within three sub windows of NDRF up to 10% of the earmarked allocation has been recommended***

DISTRIBUTION OF TOTAL NATIONAL ALLOCATION

(IN CRORES)

NDMF (20%)			13693
Catalytic Assistance (12 most drought prone States)		1200	
Reducing risk of Urban Flooding (7 most populous cities)		2500	
Managing Seismic & landslide risk (10 hill States)		750	
Mitigation measures to prevent erosion		1500	
NDRF (80%)			54770
Response & Relief (40%)		**27385**	
Recovery & Reconstruction (30%)		**20539**	
Preparedness & capacity building (10%)		**6846**	
Resettlement of displaced people affected by erosion	1000		
Expansion & modernization of fire services	5000		
TOTAL (NDMF + NDRF)			68463

STATE DISASTER RISK MANAGEMENT FUND (SDRMF)

(IN CRORES) 100%

SDRMF	2021-22	2022-23	2023-24	2024-25	2025-26	Total
Union Share	22184	23294	24466	25688	26969	122601
States' share	6799	7137	7491	7864	8261	37552
TOTAL	**28983**	**30431**	**31957**	**33552**	**35230**	**160153**

FUNDS (PERCENTAGE ALLOCATION)

(IN CRORES)

SDMF (20%)		32031
SDRF (80%)		128122
Response & Relief (40%)	**64061**	
Recovery & Reconstruction (30%)	**48046**	
Preparedness & capacity building (10%)	**16015**	
Total		160153

- ***Funding Windows of SDRF and SDMF are not Interchangeable***
- ***Flexibility for re-allocation within three sub windows of SDRF up to 10% of the earmarked allocation has been recommended***

G. National Initiatives on Disaster Management in India

1. The Disaster Management Act 2004

On 23 December 2005, the Government of India took a defining step by enacting the Disaster Management Act, 2005, which envisaged the creation of the National Disaster Management Authority (NDMA), headed by the Prime Minister, State Disaster Management Authorities (SDMAs) headed by the Chief Ministers, and District Disaster Management Authorities (DDMAs) headed by the District Collector or District Magistrate or Deputy Commissioner as the case may be, to spearhead and adopt a holistic and integrated approach to DM. The Act lays down institutional, legal, financial and coordination mechanisms at the National, State, District and Local levels. These institutions are not parallel structures and will work in close harmony. There has been a paradigm shift, from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness-driven approach for conserving developmental gains and to minimise loss of life, livelihood and property.

2. National Disaster Response Force (NDRF)

The Disaster Management Act has statutory provisions for the constitution of National Disaster Response Force (NDRF) for the purpose of specialised response to natural and man-made disasters. Accordingly, in 2006 NDRF was constituted with 8 Battalions. At present, NDRF has a strength of 16 Battalions with each Battalion consisting of 1149 personnel.

This Force functions under the Ministry of Home Affairs which has been vested with its control, direction and general superintendence. This is a multi-disciplinary, multi-skilled, high-tech force for all types of disasters capable of insertion by air, sea and land. All the 16 battalions are equipped and trained for all natural disasters including combating nuclear, biological and chemical disasters.

Each battalion has 18 self-contained specialist search and rescue teams of 45 personnel each including engineers, technicians, electricians, dog squads and medical/paramedics. These NDRF battalions are located at 16 different locations in the country based on the vulnerability profile and further the teams are placed at another 57 locations called Regional Response Centres (RRCs) and Temporary Platoon Locations (TPLs) to cut down the response time for their deployment during a disaster. During the preparedness period/in a threatening disaster situation, proactive deployment of this force is carried out in consultation with State authorities.

NDRF has proved its importance by striving to achieve the vision of a safer and disaster-resilient India with its motto of ‘Saving lives and beyond’ by conducting highly skilled rescue and relief operations, regular and intensive training and re-training, familiarisation exercises within the area of responsibility of respective NDRF Battalions, carrying out mock drills and joint exercises with the various stakeholders.

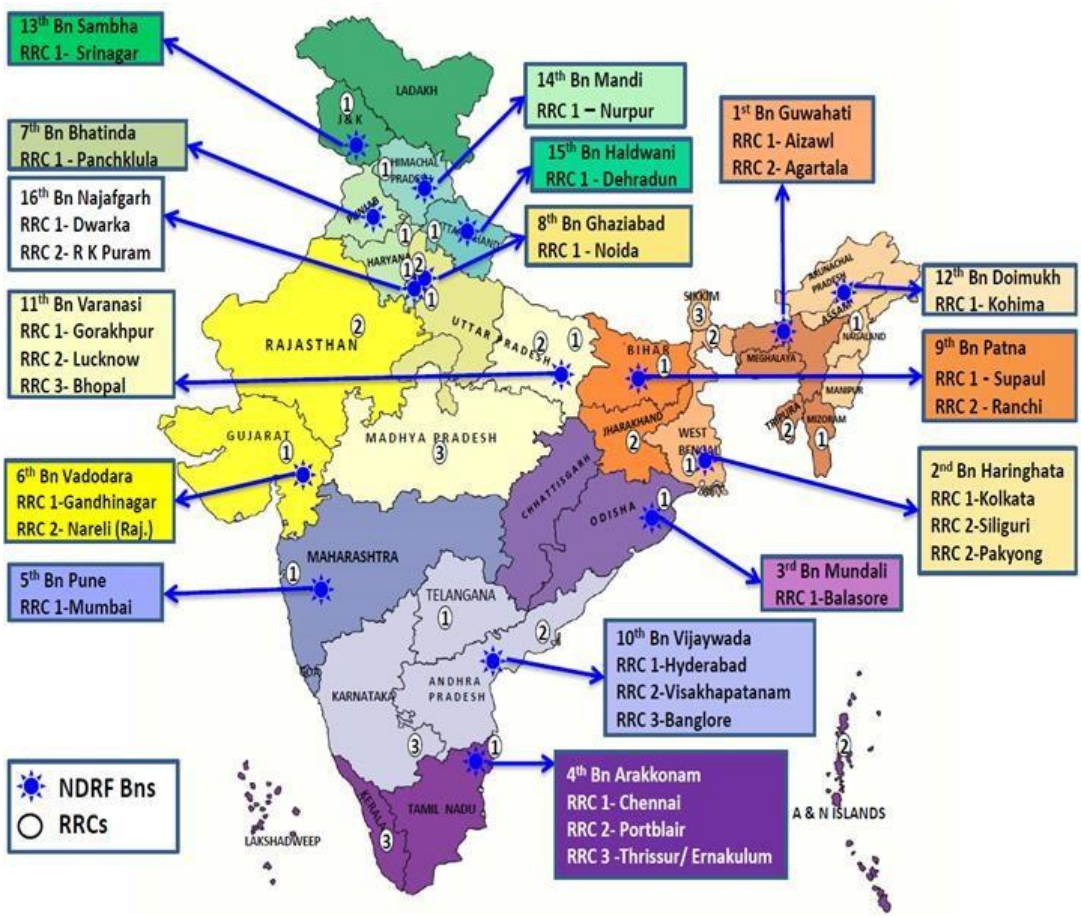

Figure-5: NDRF locations in India

NDRF is uniquely the world's largest stand-alone, dedicated disaster response force trained and equipped with international standards. The NDRF teams have the experience of carrying out response and relief operations in India and also at international levels like in the case of relief operations in Japan (2011) and Nepal (2015).

3. **National Policy on Disaster Management 2009**

The National Policy has been prepared after due deliberations and keeping in view the National Vision which is 'to build a safe and disaster-resilient India by developing a holistic, proactive, multi- disaster and technology-driven strategy for Disaster Management. This is achieved through a culture of prevention, mitigation and preparedness to generate a prompt and efficient response at the time of disasters. The entire process centre-stages the community and provides momentum and sustenance through the collective efforts of all government agencies and Non-Governmental Organisations'.

In order to translate this Vision into policy and plans, the NDMA has adopted a mission-mode approach involving a number of initiatives with the help of various institutions operating at national, state and local levels. The central ministries, states and other stakeholders have been involved in the participatory and consultative process of evolving policies and guidelines.

This Policy framework is also in conformity with the International Strategy for Disaster Reduction, the Rio Declaration, the Millennium Development Goals and the Hyogo Framework 2005-2015.

4. National Disaster Management Plan 2019

The hazard and vulnerability profile of India is now well known. India's proneness to multiple disasters caused by natural and human induced factors aggravated by climate change impacts pose many threats and challenges for communities and agencies involved in management of disasters. With the enactment of Disaster Management Act 2005 and adoption of National Policy on Disaster Management 2009, Government of India has established improved institutional arrangements and DRR mechanisms to deal with any threatening disaster situation or disaster.

The National Disaster Management Plan (NDMP) provides a framework and direction to the government agencies for all phases of the disaster management cycle. The NDMP is a "dynamic document" in the sense that it will be periodically improved keeping up with the emerging global best practices and knowledge base in disaster management. It is in accordance with the provisions of the DM Act 2005, the guidance given in the National Policy on Disaster Management (NPDM) 2009, and the established national practices.

The NDMP recognizes the need to minimise, if not eliminate, any ambiguity in the responsibility framework. It, therefore, specifies who is responsible for what at different stages of managing disasters. It is meant to be implemented in a flexible and scalable manner in all phases of disaster management:

a. Mitigation (prevention and risk reduction),
b. Preparedness,
c. Response and
d. Recovery (immediate restoration and build -back better)

5. Prime Minister's Ten Point Agenda on Disaster Risk Reduction

a. All development sectors must imbibe the principles of disaster risk management.
b. Risk coverage must include all, starting from Poor households to Small & Medium Enterprises to Multinational corporations to Nation states.
c. Women's leadership and greater involvement should be central to disaster risk management.
d. Invest in risk mapping globally to improve global understanding of Nature and disaster risks.
e. Leverage technology to enhance the efficiency of disaster risk management efforts.
f. Develop a network of universities to work on disaster-related issues.
g. Utilise the opportunities provided by social media and mobile technologies for disaster risk reduction.
h. Build on local capacity and initiative to enhance disaster risk reduction.
i. Make use of every opportunity to learn from disasters and, to achieve that, there must be studies on the lessons after every disaster.
j. Bring about greater cohesion in international response to disasters.

6. National Disaster Management Guidelines

The preparation of national guidelines for various disasters and cross-cutting issues constitutes an important component of the mandate entrusted to the National Disaster Management Authority under the Disaster Management Act, 2005. On the basis of these guidelines, plans are prepared by various Ministries at the Centre and the States.

The intent of these guidelines is to develop a holistic, coordinated, proactive and technology driven strategy for management of the specific disasters through a culture of prevention, mitigation and preparedness to generate a prompt and effective response in the event of an emergency.

i. National Guidelines for Preparation of Action plan – Prevention and Management of Cold Wave and Frost 2021
ii. Guideline for Earthquake Safety of Building from National Building Code of India 2016
iii. Cool Roof: House Owners' Guide to alternate roof cooling solutions
iv. Guidelines for Utilisation of Resources under India Disaster Resource Network (IDRN)
v. Guidelines on Management of Glacial Lake Outburst Floods (GLOFs)
vi. Compendium of Task Force Report on NDMA Guidelines on Management of Glacial Lake Outburst Floods (GLOFs)
vii. Summary for Policy Makers on NDMA Guidelines on Management of GLOFs
viii. Guidelines for Preparation of Action Plan - Prevention and Management of Heat Wave
ix. Landslide Risk Management Strategy
x. Guidelines on Disability Inclusive Disaster Risk Reduction
xi. Guidelines on Temporary Shelters for Disaster-Affected Families
xii. Guidelines on Prevention & Management of Thunderstorm & Lightning/ Squall/ Dust/ Hailstorm & Strong Winds
xiii. Guidelines on Boat Safety
xiv. Guidelines on Cultural Heritage Sites and Precincts
xv. Guidelines on Museums
xvi. Guidelines on Minimum Standards of Relief
xvii. Guidelines on Hospital Safety
xviii. Guidelines on School Safety Policy
xix. Guidelines on Seismic Retrofitting of Deficient Buildings and Structures.
xx. Guidelines on Scaling, Type of Equipment and Training of Fire Services
xxi. Guidelines on National Disaster Management Information and Communication System
xxii. Guidelines on Management of Drought
xxiii. Guidelines on Management of Urban Flooding
xxiv. Guidelines on Management of Dead in the Aftermath of Disaster
xxv. Guidelines on Management of Tsunamis
xxvi. Guidelines on Incident Response System
xxvii. Guidelines on Psycho-Social Support and Mental Health Services in Disasters
xxviii. Guidelines on Management of Landslides and Snow Avalanches
xxix. Guidelines on Management of Nuclear and Radiological Emergencies
xxx. Guidelines on Management of Biological Disasters
xxxi. Guidelines on Management of Cyclones
xxxii. Guidelines on Management of Floods
xxxiii. Guidelines on Medical Preparedness and Mass Casualty Management
xxxiv. Guidelines on Preparation of State Disaster Management Plans
xxxv. Guidelines on Chemical Disasters
xxxvi. Guidelines on Management of Earthquakes

7. **National Disaster Response Reserve (NDRR)**

A revolving fund of Rs.250 crores was recommended by the 13th Finance Commission to meet the immediate need for relief equipment and material after a disaster by the creation of a National Disaster Response Reserve (NDRR).

- The National Disaster Response Reserve (NDRR) was created to mitigate the sufferings of the victims of disasters that are beyond the coping capacity of the States.
- The State / UT are responsible for distributing relief materials to replenish the inventory in NDRR so that tents, food, medicines, blankets, temporary shelters, and lighting equipment become available for use.
- In plain areas, NDRR is focused on stocks of essential relief equipment to meet the needs of at least 2,50,000 people, while in the hilly areas, stores are intended to meet the needs of at least 1,50,000 people.

8. **Aapada Mitra scheme**

The Government of India has been implementing a scheme namely Aapada Mitra for Training of Community Volunteers in Disaster Response since May 2016 with a focus on training of 6000 community volunteers (200 volunteers per district) in disaster response in selected 30 most flood prone districts of 25 States of India.

The scheme aims to provide the community volunteers with the skills that they would need to respond to their community's immediate needs in the aftermath of a disaster thereby enabling them to undertake basic relief and rescue tasks during emergency situations such as floods, flash- floods and urban flooding.

The objectives of the scheme are:

- Development and Standardization of training modules at National Level;
- Development of Information Knowledge Management System at National level linked to States/UTs;
- Training institutions to be empanelled by respective States/UTs at the State/UT level;
- To train 6000 community volunteers in life saving skills of disaster response (flood relief and rescue), coordination, assistance, and provide personal protective equipment and emergency responder kits;
- To create a Community Emergency Stockpile/Reserve at the district/block level containing essential light search and rescue equipment, medical first aid kits, etc;To disseminate training and education tools developed under the project to more flood prone districts in subsequent phases of the scheme.

9. **India Disaster Resource Network (IDRN)**

India Disaster Resource Network (IDRN) is a nation-wide electronic inventory of resources that enlists equipment and human resources, collated from districts, states and national level line departments and agencies. It is a web based platform, for managing the inventory of equipment, skilled human resources and critical supplies for emergency response. Primary focus of IDRN portal is to enable the decision makers to find answers on availability

of equipment and human resources required to combat any emergency situation. This database will also enable them to assess the level of preparedness for specific disasters.

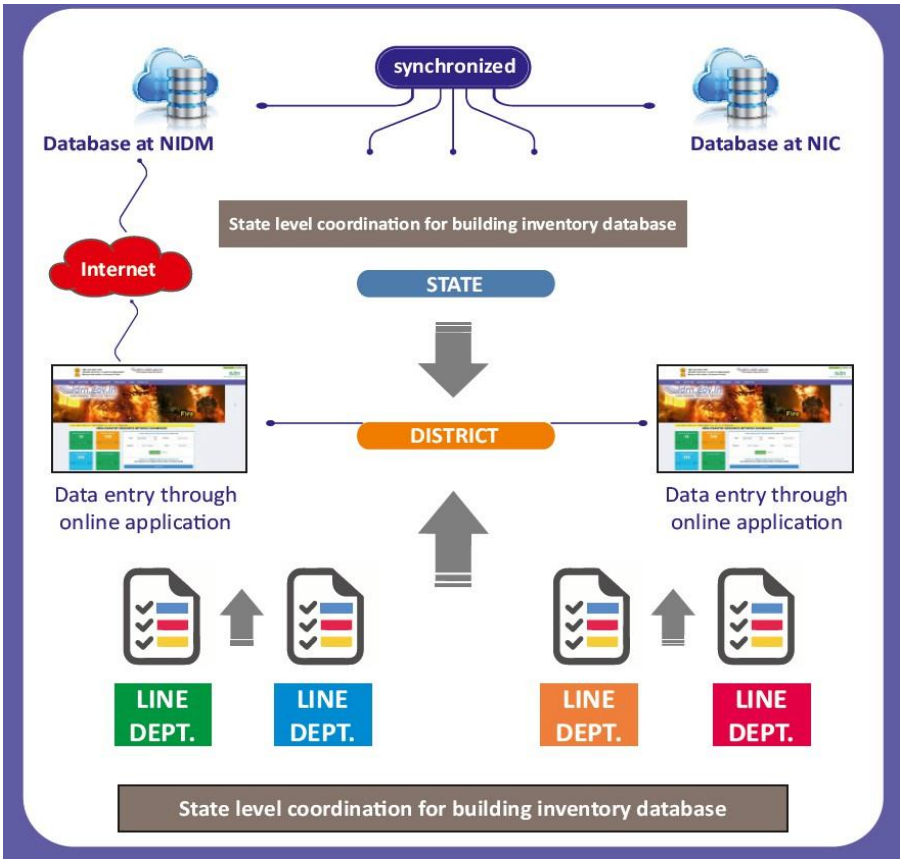

Figure-6: IDRN Diagram

The online inventory of resources is hosted in the National Informatics Centre (NIC), New Delhi. Only the authorised Government officers have the access to uploaded data in the portal and the district authorities are the officials for facilitating data collection and updation. Data is monitored and maintained at the central level by National Institute of Disaster Management (NIDM). Besides, NIDM is responsible for the overall administration of the portal. District Collectors/Magistrate are the authorised officials to get the latest information about disaster management resources available with various line departments/agencies and uploaded in the portal, using services of District Informatics Officers.

10. **Subhash Chandra Bose Aapada Prabandhan Puraskar**

In order to encourage innovation and recognise the exceptional contributions of organisations and individuals to disaster risk management in the country, the Government of India has instituted an annual national award for excellence in disaster management in the name of our great freedom fighter Netaji Subhash Chandra Bose. The first award was announced on his birth anniversary on 23 January 2019 and has been presented every year since then.

H. Post 2015- Global Frameworks for DRR

The Post-2015 goals and agenda are set forth in the three landmark global agreements reached in 2015 – the Sendai Framework for Disaster Risk Reduction (Sendai, Japan, March 2015), Sustainable Development Goals (UN General Assembly, New York, September 2015) and Climate Change Agreement (Conference Of Parties, COP21, Paris, December 2015). The three documents set the stage for future global actions on DRR, sustainable development and climate change. These three agreements have created a rare but significant opportunity to build coherence across different areas having several shared or overlapping concerns. Taken together, these frameworks represent a nearly complete agenda for building resilience, as that requires action spanning development, humanitarian, climate change impacts and disaster risk reduction. India is committed to these global frameworks and the government of India has taken various measures for realisation of the goals through involvement of government, private sector and the non-government organisations. The agreements represent a major turning point in the global efforts to tackle existing and future challenges in all countries. Specific emphasis is apparent to support resilience-building measures, and a shift away from managing crises to proactively reducing their risks. The agreements have varying degrees of emphasis on sustainable development, DRR, resilience and climate change. An important element in the Sendai Framework is to mutually reinforce with the other post-2015 global agendas by deliberately pursuing coherence across and integration of DRR, sustainable development, responses to climate change and resilience. In keeping with the global trends and priorities, the NDMP has also been restructured to ensure coherence and mutual reinforcement of the national initiatives in the domains of DRR, sustainable development and the responses to meet challenges of global climate change.

1. Sendai Framework for DRR

The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the outcome of stakeholder consultations initiated in March 2012 and intergovernmental negotiations from July 2014 to March 2015, supported by the United Nations Office for Disaster Risk Reduction at the request of the UN General Assembly. The foreword to the Sendai Framework describes it as “the successor instrument” to the Hyogo Framework for Acon (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. The Sendai Framework for DRR (SFDRR or Sendai Framework), the first international agreement adopted within the context of the post-2015 development agenda, marks a definitive shift globally towards comprehensive disaster risk management aimed at disaster risk reduction and increasing disaster resilience going far beyond disaster management. This approach calls for setting the overall goal as that of preventing new and reducing existing disaster risk through the implementation of integrated measures. The goal now is on DRR as the expected outcome, seng goals on preventing the creation of new risks, reducing the existing ones, and strengthening overall disaster resilience. In addition, the scope of DRR has been broadened significantly to focus on both natural and

human induced hazards including various related environmental, technological and biological hazards and risks. The Sendai Framework acknowledges the interlinkages between climate change and disaster risks. Disasters that tend to be exacerbated by climate change are increasing in frequency and intensity.

The SFDRR is a non-binding agreement, which the signatory nations, including India, will attempt to comply with on a voluntary basis. India will make all efforts to contribute to the realisation of the global targets by following the recommendations in the Sendai Framework and by adopting globally accepted best practices. Building on the Hyogo Framework for Action, the outcome that Sendai Framework aims to achieve globally over a span of 15 years by 2030 is the "substantial reduction of disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries." To attain the expected outcome, Sendai Framework seeks to pursue the following goal: "Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience."

In the domain of disaster management, the Sendai Framework provides the way forward for the period ending in 2030. There are some major departures in the Sendai Framework:

- For the first me the goals are defined in terms of outcome -based targets instead of focusing on sets of activities and actions.
- It places governments at the centre of disaster risk reduction with the framework emphasising the need to strengthen the disaster risk governance.
- There is a significant shift from earlier emphasis on disaster management to addressing disaster risk management itself by focusing on the underlying drivers of risk.
- It places almost equal importance on all kinds of disasters and not only on those arising from natural hazards.
- In addition to social vulnerability, it pays considerable attention to environmental aspects through a strong recognition that the implementation of integrated environmental and natural resource management approaches is needed for disaster reduction
- Disaster risk reduction, more than before, is seen as a policy concern that cuts across many sectors, including health and education.

As per the Sendai Framework, it is necessary to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing relevant information. The framework notes that, to cope with disasters, it is "urgent and critical to anticipate, plan for and reduce disaster risk". It requires the strengthening of disaster risk governance and coordination across various institutions and sectors. It requires

the full and meaningful participation of relevant stakeholders at different levels. It is necessary to invest in economic, social, health, cultural and educational resilience at all levels. It requires investments in research and the use of technology to enhance multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction.

a. Four Priorities

The four priorities for action under the Sendai Framework are:

i. Understanding disaster risk

ii. Strengthening disaster risk governance to manage disaster risk

iii. Investing in disaster risk reduction for resilience

iv. Enhancing disaster preparedness for effective response and to "Build Back Beer" in
recovery, rehabilitation and reconstruction

b. Seven Targets

India is a signatory to the Sendai Framework for a 15-year, voluntary, non-binding agreement which recognizes that the State has the primary role to reduce disaster risk, but that responsibility should be shared with other stakeholders including local government, the private sector and other stakeholders. India will make its contribution in achieving the seven global targets set by the Sendai Framework (Fig-7)

Figure-7: Sendai Framework for Disaster Risk Reduction - 7 Global Targets

a. Substantially reduce global disaster mortality by 2030, aiming to lower the average per 100,000 global mortality rates in the decade 2020–2030 compared to the period 2005– 2015;
b. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005– 2015;
c. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
d. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030;
e. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
f. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of the present Framework by 2030;
g. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

On 2 February 2017, the United Nations General Assembly endorsed the Report of the Open-ended Intergovernmental Expert Working Group (OIEWG) on Indicators and Terminology Related to Disaster Risk Reduction and the recommendations for indicators and terminology relating to disaster risk reduction (UNISDR 2016). The report of OIEWG is meant to help countries operationalise the 38 global indicators for measuring the progress towards realising global targets for DRR along with targets of other major Post-2015 global frameworks. The list as applicable to India will be used to monitor the progress of Ministries / Departments and States/ UTs towards achievement of targets set under the framework, by way of periodic reporting. As part of this effort, all ministries, departments, states and UTs will compile data in accordance with the indicators for the baseline period of 2005 to 2015 and on an ongoing basis from 2015 onwards.

2. **Sustainable Development Goals (SDG) and Disaster Resilience**

The Sustainable Development Goals (SDGs), adopted by the UN General Assembly on 25 September 2015, consisting of 17 Global Goals (Fig-8) and 169 targets, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The 17 Goals build on the successes of the Millennium Development Goals (MDGs), while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.

Sustainable development (SD) and disaster risk reduction (DRR) are closely interlinked. A single major disaster or “shock” incident (i.e. a rapid onset disaster like an earthquake, storm, tsunami or landslide) can undo hard-won development progress and set back development by years. A “stress” incident (i.e. a slow onset disaster like

drought, sea level rise, and salinity intrusion into groundwater stocks) can also cause long-term socio-economic harm. Climate change aggravates impacts from both natural hazards and human-induced vulnerabilities by acting as a threat multiplier. Driven by climate change, there is an increase in the frequency and severity of extreme weather events (including storms, droughts, heat waves and cold “snaps”). Such events multiply the risks that people living in areas prone to natural hazards already face.

Figure-8: Seventeen Sustainable Development Goals

The possibilities of attaining SDGs are jeopardised because disasters undermine economic growth and social progress. No country or sector is immune to the impacts of natural hazards, many of which – the hydro-meteorological – are increasing in frequency and intensity due to the impacts of climate change. While necessary and crucial, preparing for disasters is not enough, to realise the transformative potential of the agenda for SDGs, all stakeholders recognize that DRR needs to be its integral core. Progress in implementing the Sendai Framework contributes to the progress of attaining SDGs. In turn, the progress on the SDGs helps to substantially build resilience to disasters. There are several targets across the 17 SDGs that are related to DRR. Conversely, all seven global DRR targets of the Sendai Framework are critical for the achievement of the SDGs.

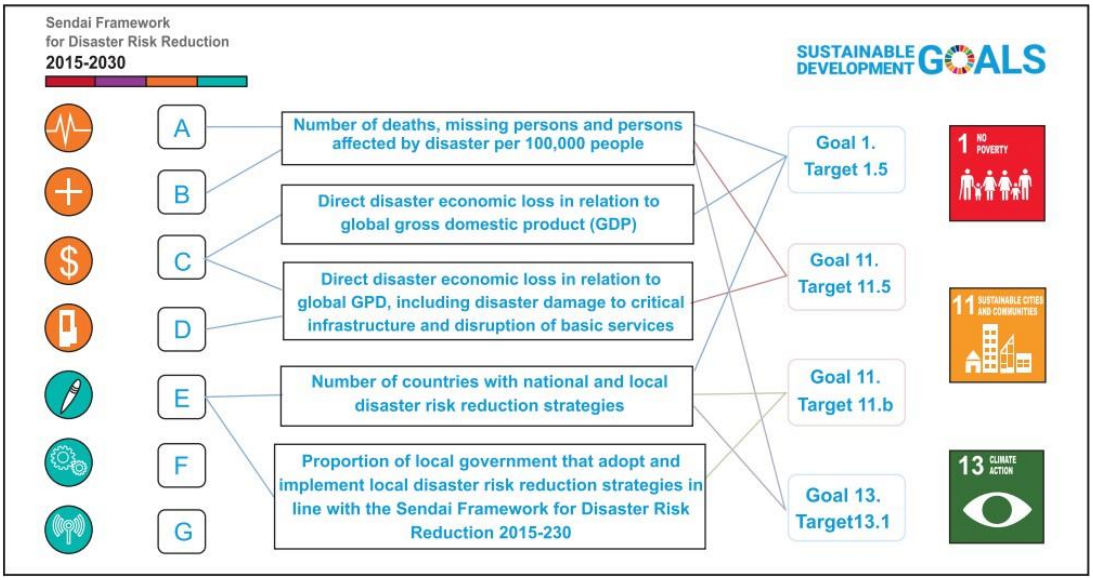

Figure-9: Coherence and mutual reinforcement of SDGs and Sendai Framework

Resilience is acknowledged both explicitly and implicitly in the SDG targets. The vision set out in the SDGs – for people, planet, prosperity and peace – will inevitably fail if shocks and stresses are not addressed. The pledge that 'no one will be left behind' requires a specific focus on the poorest and most vulnerable people, which is a key challenge: up to 325 million extremely poor people are likely to be living in the 49 most hazard prone countries by 2030. A focus on strengthening resilience can protect development gains and ensure people have the resources and capacities to better reduce, prevent, anticipate, absorb and adapt to a range of shocks, stresses, risks and uncertainties. Fig-9 depicts how the coherence and mutual reinforcement of the SDGs and Sendai Framework are reflected in outcomes and targets.

3. COP21 Paris Agreement on Climate Change Action and Disaster Risk Reduction

The Paris Agreement was adopted on 12 December 2015 at the Twenty-first session of the Conference of the Pares (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) held in Paris from 30 November to 13 December 2015. The agreement builds upon the UNFCCC and brings together all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects, with enhanced support to assist developing countries to do so (Fig-10). The agreement aims at "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change". Article-7 dwells on establishing "the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change"

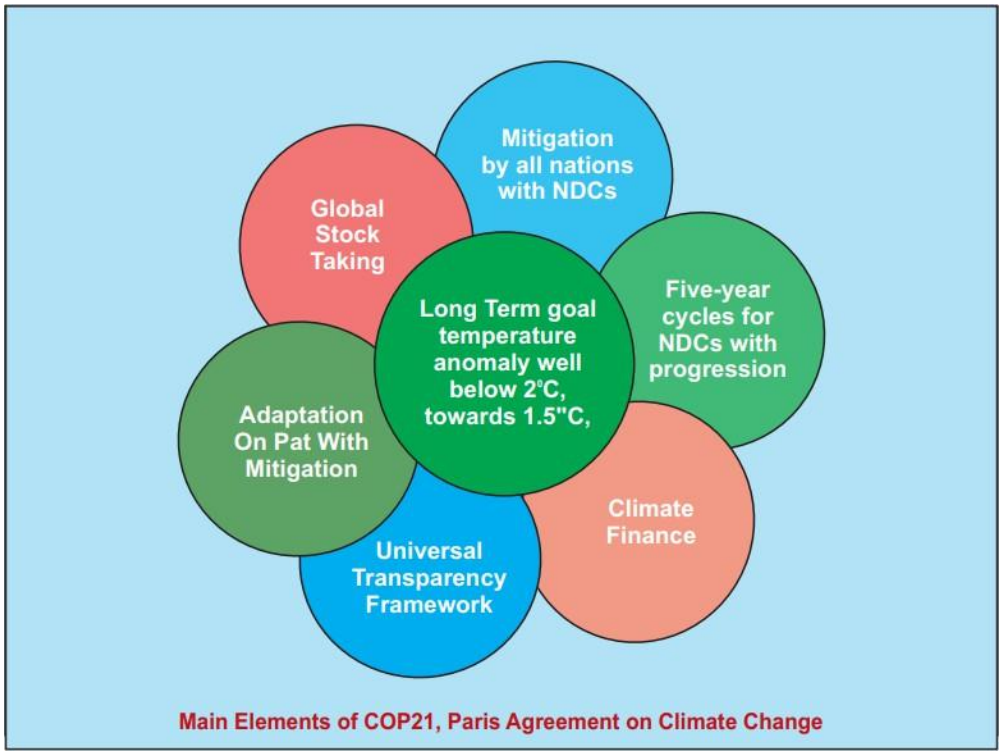

Figure-10: Main elements of the COP21, Paris Agreement on Climate Change

The major goals adopted in the agreement are:

i. A consensus on adopting the long-term goal of keeping the increase in global average temperature to well below 2°C above pre-industrial levels
ii. Aim to limit the increase to 1.5°C, since this would significantly reduce risks and the impacts of climate change
iii. Accepting the need for global emissions to peak as soon as possible, recognising that this will take longer for developing countries and
iv. To undertake rapid reductions of emissions in accordance with the best available science

There is significant convergence between the problems that disaster risk reduction and climate change adaptation seek to address (Fig-11). The regions already exposed to climate-related hazards and effects will be at greater risk due to a projected increase in the frequency and/or intensity of those hazards and effects because of global climate change.

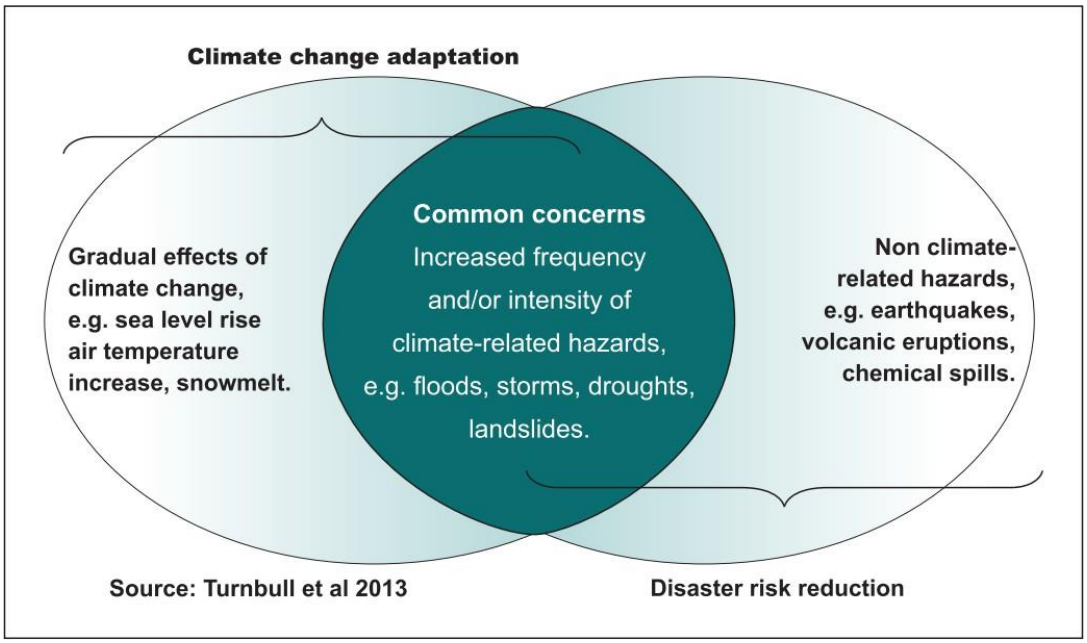

Figure-11: Common concerns of climate change adaptation

The agreement aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives. The agreement also provides for enhanced transparency of action and support through a more robust transparency framework. It requires all signatories to make the best efforts through "Nationally Determined Contributions" (NDC) and to strengthen these efforts in the years ahead.

The NDC includes requirements that all Pares report regularly on their emissions and on their implementation efforts. In 2018, Parties will take stock of the collective efforts in relation to progress towards the goal set in the Paris Agreement and to inform the preparation of NDCs. There will also be a global stock-taking every five years to assess the collective progress towards achieving the purpose of the Agreement and to inform further individual actions by Parties. The agreement entered into force on 4 November 2016, thirty days after the date on which at least 55 Parties to the Convention accounting in total for at least an estimated 55% of the total global greenhouse gas emissions have deposited their instruments of ratification, acceptance, approval or accession with the depositary. India has ratified the agreement and submitted her NDC along with the plan for mitigation and adaptation strategies and actions. India is committed to engaging actively in multilateral negotiations under the UNFCCC in a positive, creative and forward-looking manner. India's objective is to establish an effective, cooperative and equitable global architecture under the UNFCCC based on climate justice and the principles of equity and common but differentiated responsibilities and respective capabilities.

4. **Coherence and Mutual Reinforcement—Thematic Area for DRR**

The presence of risk multipliers is a threat to the success of all development frameworks and coping with risks is a central to sustainable development. Given the changes in human demographics and trends in development, impact of climate change (which disproportionately affects the poorest and most vulnerable people), and increasing exposure to disaster risks, there has never been a greater need to enhance coherence and coordination among all the major global initiatives to reduce risks, vulnerability to hazards and enhance resilience. This coherence will serve to strengthen existing frameworks to cope with risks and enhance the resilience for multiple hazards. It will promote governance systems to manage disaster risks aggravated by climate change impacts and make development resilient to various disaster risks.

Effective reduction of losses and risks from natural hazards and climate extremes requires integrated actions at different levels of governance. One of the greatest challenges is creating institutional convergence that integrates global goals emanating from these agreements. Disaster risk reduction (DRR) and Climate Change Adaptation (CCA) are part of key agendas being considered in all these recent global agreements. All three agreements share a common aim of making development sustainable. Strong commitment to ambitious goals and accelerated implementation of these international agreements must be a global priority. Given the complementaries between the post - 2015 agendas, leveraging the total impact of these instruments creates shared value. Efforts must be deployed to ensure that each of them do not build in “policy risks' or, contradictory policies, that generate more - rather than less - risk in development. Taken together, the different priorities, targets and actions in the three frameworks constitute a more comprehensive resilience agenda than when implemented independently without mutual reinforcement because building resilience requires action that spans the multiple domains of development, humanitarian initiatives, responding to climate change and disaster risk reduction.

On 2 February 2017, the UN General Assembly adopted resolution A/71/644, which states the necessary indicators to measure global progress in reducing loss attributed to disasters. Through collection of the information of these indicators, UN Member States can measure their progress in disaster risk reduction efforts by 2030 against the seven global targets defined in the Sendai Framework, including: mortality, persons affected, economic loss, and damage to critical infrastructure and disruption of basic services. Synergies with the monitoring of these international frameworks are already recognised by the international community. The UN Statistical Commission has adopted indicators developed by the Inter Agency and Expert Group on the Sustainable Development Goals, and this process is closely coordinated with the Sendai

Framework. A global indicator framework has been adopted by the UN General Assembly on July 6, 2017.

The NDMP has tried to envisage coherence across the national efforts for DRR, sustainable development, and the actions in response to climate change (mitigation and adaptation). The NDMP identifies mutually reinforcing measures in these three domains. The mainstreaming of DRR can be synchronised with the initiatives for sustainable development and the steps taken to address climate change impacts as an inherent part of the development agenda. Many of the additional challenges emerging from climate change impacts that act as hazard risk multipliers and must be integrated into the implementation of the NDMP.

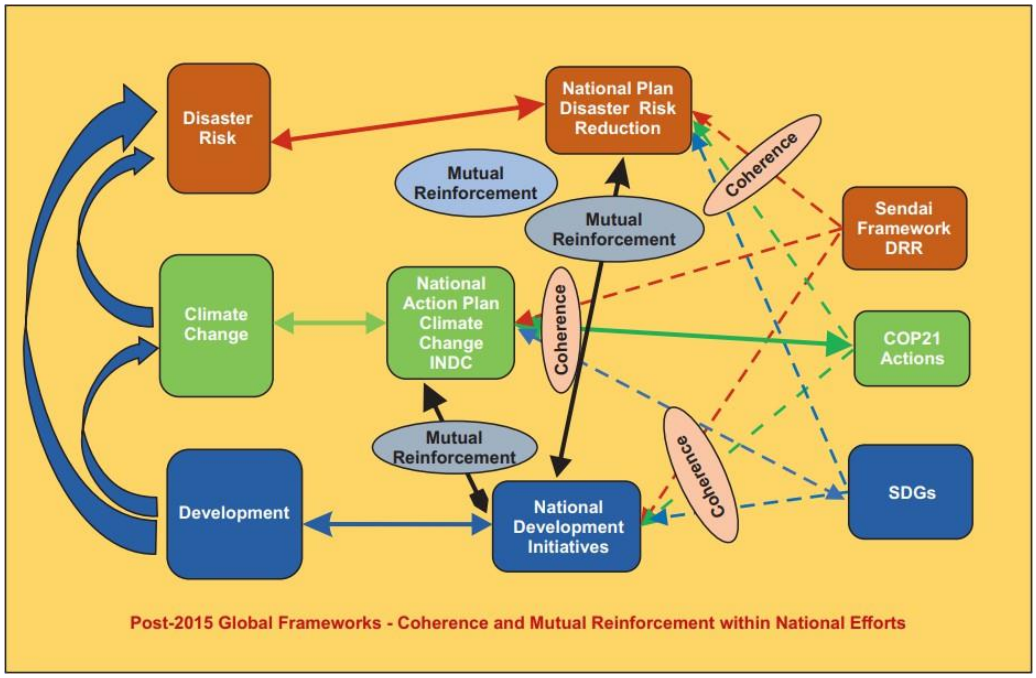

Figure-12: Post-2015 Global Frameworks—Coherence and Mutual Reinforcement within National Efforts

Ideas on ensuring coherence and mutual reinforcement across the global frameworks on development, disasters and responding to climate change covering almost every aspect of society and all sectors of economy are at an early and incipient phase. Enhancing resilience is the overarching theme as far as disaster risk reduction is concerned. All these discussions make it quite clear that these tasks cannot be separated from the mainstreaming of risk reduction although it is an idea that predates the concepts of coherence and mutual reinforcement across the global frameworks. The ideas of coherence and reinforcement across frameworks expand the scope of mainstreaming beyond how it was envisaged earlier (Fig-12). The ways in which coherence and mutual reinforcement are envisaged for SDGs and Sendai Framework is depicted in Fig-13. Similarly, that for SDGs and COP21 Paris Agreement on climate change actions is depicted in Fig-14. The measures envisaged for ensuring coherence and reinforcement will be discussed in the chapter on mainstreaming.

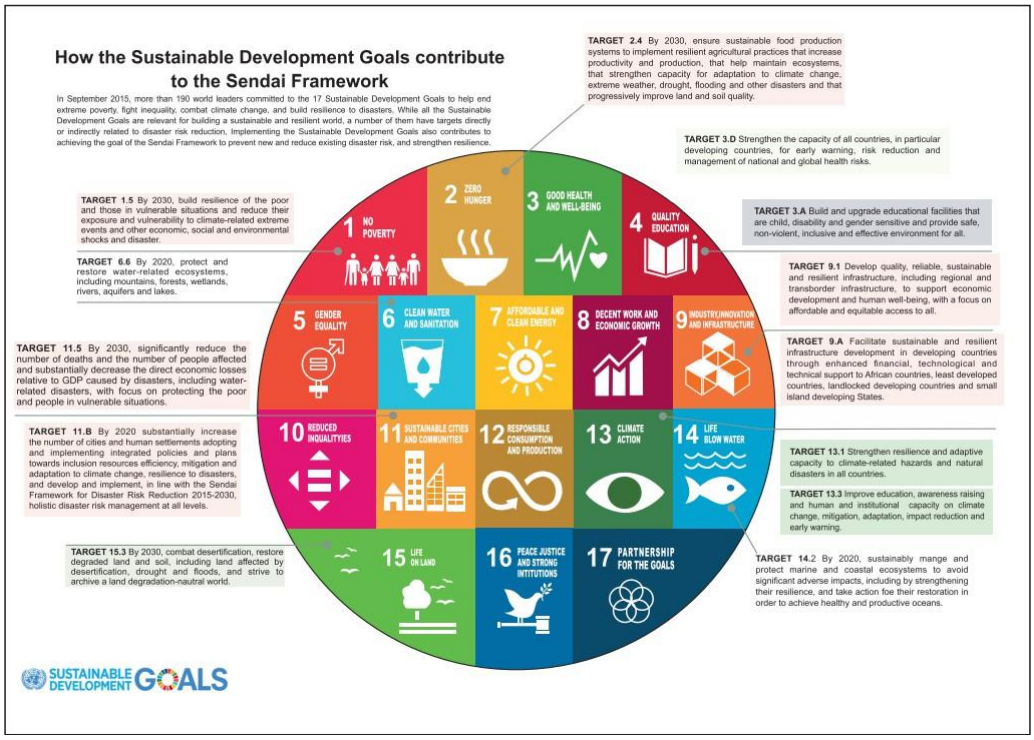

Figure-13: Envisaging coherence and Mutual Reinforcement of SDGs and Sendai Framework

Figure-14: Envisaging coherence and mutual reinforcement of SDGs and COP21 for climate change actions

5. **India's national initiatives relevant for DRR across the three Global Frameworks**

SN	Sendai – Global Targets	Sustainable Development Goals	COP21 – Paris Agreement on Climate Change	National Initiatives Relevant to DRR
1	Substantially reduce global disaster mortality by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 2, 11, 13	• Changes in the pattern of extreme events require enhanced disaster resilience and adaptation • Addressing GACC risks is crucial for eliminating poverty and reducing economic losses from disasters	Multiple schemes and initiatives for DRR, economic development, GACC mitigation and adaptation.
2	Substantially reduce the number of disaster-affected people by 2030 (2020-2030 compared to 2005-2015)	SDG 1, 11, 13	Stresses the need for accelerated action to build resilience through risk-sensitive planning and implementation of DRR	• Allocation of resources and funds for disaster prevention and to develop capacities for DRR • Strengthening of the DRR at all levels • Promoting disaster resilient development • Mainstreaming DRR and adaptation to GACC in development

3	Substantially reduce direct disaster economic loss	SDG 1, 11	The Paris Agreement aims to hold global average temperature increase to well below 2°C above pre- industrial levels and to pursue efforts to limit it to 1.5°C, recognizing that this would significantly reduce the risks and impacts	National commitment to DRR evident from the PM Ten Point Agenda for DRR National commitments for mitigation of and adaptation to GACC as per Intended Nationally Determined Contributions (INDC)
			of climate change	
4	Substantially reduce damage to critical infrastructur e and disruption of basic services (health, education, etc.)	SDG 1, 4, 9, 11	Global adaptation goals for enhancing adaptive capacity, strengthening resilience and reducing vulnerability to ensure adequate adaptation response in the context of the global temperature goal	Enhance the resilience of national health systems by integrating DRR into primary, secondary and tertiary health care, and by promoting and enhancing training capacities in the field of disaster medicine. The substantial reduction of disaster damage to critical infrastructure and disruption of basic services is essential to ensure healthy lives and promote well- being.
5	Substantiall y increase disaster risk reduction strategies	SDG 1, 3, 6, 11, 13	Addressing GACC risks that are crucial for reducing economic losses from disasters along with a well-integrated approach to adaptation, sustainable development, environmental management and disaster risk reduction	● NAPCC for mitigation of and adaptation to GACC ● National Mission on Sustainable Agriculture (NMSA) ● National Initiative on Climate Resilient Agriculture (NICRA)

6	Substantially increase international cooperation to complement national actions	Close international cooperation to achieve SDGs	Firm commitments by countries to the global response to GACC based on INDCs and international cooperation for achieving the COP21 goals	India is a pro-active member in the implementation of the Post-2015 and other global frameworks
7	Substantially increase the availability of and access to	SDG 3, 13	Emphasis on improving early warning systems, risk assessment and	National investments to improve the early warning and information systems in
	multi-hazard early warning systems and disaster risk information and assessments		management	different sectors and for multi-hazards

Note: All the central ministries have specific responsibilities in accordance with achieving the national targets relevant to the global frameworks.

I. Strengthening Disaster Risk Governance

Strengthening disaster risk governance is considered a cornerstone of the efforts to understand, reduce and manage risks in global practices (UNDP 2015). Governance encompasses the exercise of political, economic and administrative authority in the management of a country's affairs at various levels. It comprises mechanisms, processes and institutions through which groups articulate their interest, exercise their legal rights, meet their obligations and mediate their differences. Governance transcends government. It goes beyond governmental systems and powers by encouraging pro -active citizen engagement. Risk governance encompasses the full range of risks recognized by human societies, including health and medical, safety and security, and environmental risks, such as hazards and disasters.

The concept of governance has its origins partly in the recognition that many functions carried out by public entities are now provided by several governmental as well as private- sector or civil society entities. Such systems rely on the development and diffusion of various types of norms such as state regulation, self-regulation and market mechanisms. It may also rely on other processes such as negotiation, participation, and engagement, which facilitate collective decision making and action. Disaster governance is nested within and influenced by overarching societal governance systems and various aspects such as state- civil society relationships, economic organisation, and societal transitions have implications for disaster governance. Governance arrangements and stakeholder participation could vary across different disaster phases, adding to the complexity of governance challenges. Risk-spreading mechanisms, including insurance and reinsurance, are integral parts of disaster governance.

UNDP describes disaster risk governance as:
"The way in which public authorities, civil servants, media, private sector, and civil society at community, national and regional levels cooperate in order to manage and reduce disaster and climate related risks. This means ensuring that sufficient levels of capacity and resources are made available to prevent, prepare for, manage and recover from disasters. It also entails mechanisms, institutions and processes for citizens to articulate their interests, exercise their legal rights and obligations, and mediate their differences." (UNDP 2013)

UNISDR defines it as:
"The system of institutions, mechanisms, policy and legal frameworks and other arrangements to guide, coordinate and oversee disaster risk reduction and related areas of policy." (UNISDR 2016)

The concept has evolved considerably, and the current thinking acknowledges that one cannot separate governance of disaster risk from the governance of other types of risks,

including those associated with global climate change, environmental degradation, financial crises, and conflict situations (UNDP 2015). From the mid-2000's onwards, governance was commonly accepted as the crux of DRR, with comprehensive efforts underway to increase the DRR capacity of national and local institutions; to strengthen policy, legal and planning frameworks; to develop human and financial capacities; and to promote multi-stakeholder and multi-disciplinary approaches. Effectiveness of disaster governance can be judged from stakeholder participation, collaboration, accountability and transparency. There is now greater emphasis on accountability, transparency, responsiveness to the needs of those most at risk, and ensuring the rule of law/compliance with adequate legal provisions. These are of crucial importance in fostering development and promotion risk reduction.

The capacity of relevant individual actors and organisations comes into play when DRR policies – at various levels from the top to boom – are implemented. Participation, rule of law, transparency, responsiveness, consensus orientation, equity, effectiveness, efficiency, accountability and strategic vision are key factors when implementing a governance structure aimed at sustainable development and disaster risk reduction (UNDP 2004).

1. Sendai Framework and Strengthening Disaster Risk Governance

The Sendai Framework emphasises the importance of governance at different levels for an effective and efficient management of disaster risk. Effective risk governance requires clear vision, plans, competence, guidance, and coordination within and across sectors, as well as participation of relevant stakeholders, as discussed earlier. Strengthening disaster risk governance is necessary to foster collaboration and partnerships for the implementation of disaster risk reduction and sustainable development. The Sendai Framework lays emphasis on the following to strengthen disaster risk governance:

a. Mainstream and integrate disaster risk reduction within and across all sectors and promote the coherence and development of relevant laws, regulations, and public policies. It must guide both the public and private sectors through the legal framework that clearly spells out the roles and responsibilities. It must address disaster risk in publicly owned, managed, or regulated services and infrastructures. It must encourage actions by persons, households, communities, and businesses. It has to enhance relevant mechanisms and initiatives for disaster risk transparency. It must put in place coordination and organisational structures.

b. Adopt and implement disaster risk reduction strategies and plans, across different levels (local to national) and timescales, aimed at preventing the creation of risk, the reduction of existing risk and the strengthening resilience – economic, social, health and environmental.

c. Carry out assessment of the technical, financial and administrative disaster risk management capacity to deal with the identified risks at different levels

d. Promote necessary mechanisms and incentives to ensure high levels of compliance with the safety-enhancing provisions of sectoral laws and regulations, including those addressing land use, urban planning, building codes65, environment, resource management, health and safety standards, and update them, where needed, for better disaster risk management

e. Develop and strengthen mechanisms to periodically review and assess the progress on various DM plans as well as encourage institutional debates, including by parliamentarians and relevant officials, on DRR plans

f. Assign clear roles and tasks to community representatives within disaster risk management institutions and processes and decision-making through relevant legal frameworks, and undertake comprehensive public and community consultations during the development of such laws and regulations to support their implementation

g. Establish and strengthen government coordination forums composed of relevant stakeholders at the national and local levels, such as national and local platforms for disaster risk reduction.

h. Empower local authorities, as appropriate, through regulatory and financial mechanisms to work and coordinate with civil society, communities and indigenous peoples and migrants in disaster risk management at the local level.

i. Work with parliamentarians for disaster risk reduction by developing or amending relevant legislation and setting budget allocations.

j. Promote the development of quality standards, such as certifications and awards for disaster risk management, with the participation of the private sector, civil society, professional associations, scientific organisations and the United Nations.

k. Formulate relevant public policies and laws aimed at addressing issues of prevention or relocation, where possible, of human settlements in disaster risk-prone zones.

2. Responsibility Framework for Strengthening Disaster Risk Governance

Based on these considerations, and the increased emphasis globally on strengthening disaster risk governance to reduce disaster risk and to build resilience, the major tasks, agencies of the central and state government are presented in a responsibility framework. India currently has in place many institutions dedicated to disaster reduction, response, and for disaster risk governance at the centre and within the states at various levels from local to the state. However, there is wide variation in the functioning, structure, and capabilities. To strengthen disaster governance, a DM Cell will be established in each Central Ministry and a nodal officer, not below the rank of Joint Secretary will be appointed.

The National Disaster Management Plan seeks to strengthen the entire system of disaster risk governance in the country using the framework presented here. It envisages the implementation of various measures across the country over the short, medium, and long-

term, ending by 2022, 2027, 2030 respectively. Many of these are highly ambitious given the extremely uneven level of institutional arrangements across various states and districts in the country. Based on the current status of implementation of the DM Plans, each central Ministry, Department, and the State Government will restructure the respective DM Plans into these me frames for implementation while preparing plans or revising existing ones.

The responsibility framework has six thematic areas in which central and state governments must take actions to strengthen disaster risk governance:

a. Mainstream and integrate DRR and Institutional Strengthening
b. Capacity Development, Empower Local Authorities and Strengthen Coordination Mechanism
c. Promote Participatory Approaches, Partnerships and Networks
d. Work with Elected Representatives
e. Grievance Redress Mechanism
f. Promote Quality Standards, Certifications, and Awards

J. International Cooperation

1. Participation in International Efforts

India plays an active role in global initiatives on disaster management. India is a signatory to the Sendai Framework for Disaster Risk Reduction and is committed to achieve the priories and the objectives through systemic and institutional efforts. With mul- dimensional initiatives and expertise, India remains committed to playing a leading role in strengthening regional and international cooperation efforts in mitigating and reducing the effects from disasters.

India is one of the participating countries and works closely with the UNISDR. The United Nation Disaster Management Team in India comprises of UN agencies such as Food and Agriculture Organization, International Labour Organization, United Nations Development Programme, United Nations Educational, Scientific and Cultural Organization, United Nations Population Fund, United Nations High Commission for Refugees, United Nations Children's Fund, World Food Programme, and World Health Organization. India is participating in the Global Facility for Disaster Risk Reduction programme. India is one of the founding members of the Asian Disaster Reduction Centre. India has agreements with several countries for cooperation in the field of disaster management. India has been working closely with many countries for the exchange of ideas and expertise in disaster management.

2. Accepting Foreign Assistance

As a matter of policy, the Government of India does not issue any appeal for foreign assistance in the wake of a disaster. However, if the national government of another country voluntarily offers assistance as a goodwill gesture in solidarity with the disaster victims, the decision on acceptance of all such offers vests solely with the Central Government. The primary responsibility for reviewing such foreign offers of assistance rests with the Ministry of External Affairs which will consult and coordinate with the Ministry of Home Affairs.

All offers of assistance from foreign governments will be routed through the Ministry of External Affairs. Offers of assistance in-kind, including technical assistance, emergency rescue teams, reconstruction assistance, etc. will be evaluated on a case-by-case basis, in consultation with the Ministry of Home Affairs, which will assess the requirements based on inputs from the concerned State governments.

In the case of contributions from NRIs, PIOs and foreign non -governmental bodies such as Foundations, etc. such donations may be accepted through the Prime Minister's and Chief Minister's relief funds. All other donations from foreign non-governmental entities to Indian non-governmental entities must be compliant with extant regulations, including the Foreign Contribution (Regulation) Act 2010.

3. Accepting Multilateral Assistance

In the case of an offer of assistance from UN Agencies, the Government of India will evaluate and consider all such offers on its merits. If accepted, GOI will issue directions to the respective Ministry or State Government to coordinate with the concerned UN agency. India will permit UN agencies and international NGOs already operating in the country at the time of the disaster event to continue rendering their humanitarian assistance to people in the affected area in coordination with the relevant Central Ministries/Departments and the State Government in accordance with applicable norms and protocols.

4. Fostering Partnerships

India is keen to share expertise and work with other countries in the areas of disaster management. India can play a major role for capacity building in the Asia Pacific region and is looking forward to building sustained regional and international partnerships under the Sendai Framework. India is committed to work with countries in the region and beyond in building resilient nations and communities, against disasters. India is looking forward to engaging with the international community in providing humanitarian assistance to other countries in need.

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