

BHUTAN

DISASTER MANAGEMENT PRIMER

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CFE-DM

CENTER FOR EXCELLENCE
IN DISASTER MANAGEMENT & HUMANITARIAN ASSISTANCE

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COUNTRY OVERVIEW

Introduction

This Bhutan Disaster Management Primer publication from the Center for Excellence in Disaster Management and Humanitarian Assistance (CFE-DM) offers background information on the country's disaster management capability, along with information on natural hazards, infrastructure, laws, plans and policies, historical disasters, and other areas pertaining to disaster management, risk reduction and disaster response. This information resource is designed to provide a ready reference for personnel planning for a disaster response operation or exercise in Bhutan alongside the country's own responders.

The Kingdom of Bhutan is a small landlocked country located in the Himalayan region between China to the North and India to its South. It borders China's Tibet Autonomous Region in the North, and the Indian states of Sikkim, Assam, and Arunachal Pradesh at its southeastern, south and western borders.[1] Storms from the Himalayas are the source of the country's Bhutanese name, which translates as "Land of the Thunder Dragon."[2]

Gross National Happiness (GNH) is "Bhutan's guiding philosophy for balanced, sustainable and inclusive socio-economic development."[3] GNH is the guiding principle for economic, social, security, and governance development; it promotes holistic, sustainable transformation to enhance opportunities for Bhutan's people. According to the Royal Government of Bhutan (RGoB), the long-term goal is to become a high-income GNH economy by 2034. "The focus is on transforming the Bhutanese economy by emphasizing the interconnected pillars of people, progress and prosperity, or the '3Ps.'"[4] Due to recent development progress, Bhutan has also transitioned out of being categorized as being in the least developed country (LDC) category in December 2023.[5]

Bhutan is exposed to multiple hazards and has experienced significant natural disasters, including more frequent and extreme weather events. The RGoB has limited resources for building capacity and reducing vulnerability to major natural disasters, however it has fared well with response to small-scale disasters. According to a 2024 Bhutan Crisis Preparedness Gap Analysis report, with highly scattered population in remote areas and relatively dense population in urban centers, Bhutan has coped relatively well with frequent and less severe disasters, however, the country is not prepared for more severe disasters such as earthquakes and glacial lake outburst floods (GLOFs).[6]

Vulnerability Factors

Bhutan's exposure to natural hazards increases the country's disaster risk. Bhutan's preparedness is limited by a lack of critical infrastructure and capacity among disaster management (DM) institutions and natural hazard risk information.[7] Bhutan's 13th Five Year Plan (2024 – 2029) notes that the country's "ability to understand disaster risks, implement early warning systems, and integrate disaster risk reduction (DRR) in infrastructure planning and development is hindered by a lack of a national-level, multi-hazard risk assessment."[8] Bhutan also faces fiscal constraints and a lack of adequate infrastructure and systems for preparedness and response. For instance, inadequately equipped early warning systems (EWSs) affect the timely dissemination of hazard warnings and there is currently limited capacity of the nation's Emergency Operation Centers (EOCs).[9]

Bhutan's economy and livelihoods revolve around sectors such as agriculture and hydropower which are vulnerable to weather events and other natural hazards. Bhutan's economy is dependent on hydropower including the sale of electricity to India. While the country's water resources allowed for hydropower development, the sector is vulnerable to variations in rainfall, melting glaciers, and other weather events.[10] Half of the country's workforce is

in agriculture and more than 70% of the country's populations live along river valleys. Floods affect not only the lives and livelihood of local populations but also the national economy due to damage to hydropower facilities, agriculture, and transport.[11] Physical vulnerability is also increased as vulnerable populations may expand their livelihoods such as farming to higher risk areas.[12]

Many still rely on subsistence agriculture and rice imports from India. If transportation networks are hindered due to disasters, access to markets and imports may be lost or decrease, impacting food security.[13] Agriculture is highly vulnerable due to its dependence on monsoon rains and short growing periods. Additionally, around 30% of production takes place on slopes that are vulnerable to landslides.[14]

About 64,000 Bhutanese (around 9 percent of the population) have moved overseas since 2015, leading to a "brain drain." This includes the resignation of mid-level professionals across public and private sectors, "amplifying the existing shortage of technical capacity for crisis preparedness and response."[15]

Increasing rates of urbanization and growing populations contribute to exposure to urban risks such as fires, earthquakes and flooding. Urban populations are vulnerable due to unplanned development and housing which are unlikely to withstand a severe event. There is potential for mass building collapses given that many of the existing structures were built before earthquake regulations were implemented in 1997. Around 66 percent of the buildings are built using traditional construction methods.[16]

Regional responders may face access challenges if called upon to support response efforts should a major disaster occur requiring international assistance. Bhutan's international airport, Paro International Airport (PIA), is considered one of the most dangerous airports in the world, due to challenging terrain and capacity. Transport networks are crucial for a landlocked country and roads and bridges remain vulnerable to hazards, blockages of which could impede response.[17]

Disaster Impact on Communities

Natural hazards and disasters have the potential to cause widespread damage and disruption which may lead to significant losses to key industries such as agriculture, hydropower, transport and services. Impacts on the population and economic losses have been significant. In 2009 cyclone Aila triggered flooding across 17 dzongkhags, resulting in estimated damages of US$17 million. Later that year in September, a M6.1 earthquake struck eastern Bhutan, leaving 12 dead and causing severe damages to housing, infrastructure, 91 schools, 25 health centers, 50 government offices and 281 monasteries. Total losses were US$52 million, and reconstruction costs were projected to exceed US$41 million. Livelihood support was also required for affected people whose income was impacted. In 2011, another severe earthquake hit the country, affecting 7 percent of the population in all of the Dzongkhags, and causing damages of US$24.26 million. Important religious and cultural buildings suffered damages of nearly US$ 7 million, and estimates of their reconstruction costs were almost as high.[18]

Disasters also pose a threat to the development of the economy. In 2016, 27 percent of the government's revenue and 14 percent of the GDP were from hydropower facilities and electricity exports to India. Bhutan is among countries which have the greatest national-level economic consequences following glacier floods.[19]



June 2021 heavy monsoon rain cause flash floods and landslides blocking the Tingtibi-Panbang Highway in multiple locations. Photo Credit: Bhutan Times. Source: https://facebook.com/bhutantimes1

Fast Facts

Geography

Location: Bhutan is a landlocked country located in South Asia, between India and China
Area: 38,394 kilometers (km)
Terrain: Mostly mountainous with valleys and savanna. The highest point is 7,570 m (Gangkar Puensum and the lowest point is 97 m Drangeme Chhu)

Climate

Tropical in the southern plains, cold winters and hot summers in central valleys, severe winters and cool summers in the Himalayas

Population

Total Population: 884,546 (2024 est.)
Urban population: 44.4% (2023)
Thimpu (capital) (2018): 203,000[20]

Administration

Administrative Divisions: 20 dzongkhags (districts): Bumthang, Chhukha, Dagana, Gasa, Haa, Lhuentse, Mongar, Paro, Pemagatshel, Punakha, Samdrup Jongkhar, Samtse, Sarpang, Thimphu, Trashigang, Trashi Yangtse, Trongsa, Tsirang, Wangdue Phodrang, Zhemgang.[21] These are further divided into gewogs (a group of villages), and dungkhags (subdistrict) levels. There are also 4 thromdes (municipalities)[22]

Infrastructure

Transport

Bhutan's roads, the primary mode of inland transport, are highly vulnerable to landslides and floods, leaving many parts of the country disconnected during the monsoon. Many remote communities are challenged due to damaged roads disrupting transportation and limiting their access to health care, education, and economic opportunities.[23] The 170-km Phuentsholing to Thimphu Highway is considered a lifeline for trade, with more than 80 percent of Bhutan's trade with India and facilitated by the highway.[24] The DoST under the MoIT is conducting a landslide risk assessment along national highways and planning to develop a road management system.[25] As mentioned above, Bhutan's international airport, Paro International Airport (PIA) is one of the world's most challenging airports to negotiate. It is located in a deep valley at an elevation of 2,243 m high, surrounded by mountain peaks as high as 5,500 meters. It is located 6 km from paro town and 55 km from Thimpu. The airport has limited space for parking on the apron and can only accommodate five Airbus 320s.[26]

Airports

Airports: 4 (2025); international airport is Paro International Airport (PIA)
Runway dimensions: Length: (2,165m) x Width (30m)
Surface: Asphalt
Elevation: 2,243.7 m (7,360 feet)
IATA/ICAO Code: PBH/VQPR[27]
Heliports: 8 (2025)
National air transport system
Number of registered air carriers: 2 (2020); Inventory of registered aircraft operated by air carriers: 6

Heliports

8 (2025)

Roads

Roadways, total: 12,205 km (2017)
Urban: 437 km[28]

Border Disputes

There is an unresolved border dispute between China and Bhutan and the two countries have held border talks for decades. China has constructed settlements in the border regions in northeast Bhutan and the west of the country near a disputed border area between India and China. India and China have skirmished over their disputed 2,100-mile border, which straddles Bhutan. India is Bhutan's largest trading and development partner, but Bhutan has no

formal diplomatic ties with China. Bhutan has denied that Chinese construction has taken place on its side of the border.[29]

Bhutan – India Relations

Bhutan maintains friendly relations and close ties with India. Formal diplomatic relations between India and Bhutan were established in 1968. The Treaty of Friendship and Cooperation was signed in 1949 between the two countries and renewed in February 2007. Cultural and Buddhist links also bring the two countries closer together, while the countries also maintain close economic ties. The India-Bhutan Agreement on Trade, Commerce and Transit which establishes free trade between the two countries, was first signed in 1972 and revised in 2016. India is Bhutan's top trade partner and also a main development partner. Hydropower is a major industry for Bhutan developed in cooperation with India. Cooperation between the two in the sector is covered under the 2006 bilateral agreement for cooperation and its Protocol signed in 2009. Four hydroelectric projects are operational in Bhutan and supplying electricity to India, while two other projects are under development, according to India's Ministry of External Affairs. India's imports of electricity amount to a significant portion of the total revenues of the RGoB. Around 50,000 Indian citizens also work in Bhutan mainly in the construction, education and infrastructure sectors.[30]

Bhutan relies on India for military training, the country's air defense and its arms supply. The Indian Military Training Team (IMTRAT) is a training mission of the Indian Army in Bhutan. It was established in 1961 – 1962 and trains personnel of the Royal Bhutan Army (RBA) and the Royal Bodyguard of Bhutan (RBG).[31]



Map of Bhutan
Source: https://www.cia.gov/the-world-factbook/countries/bhutan/map/

DISASTER OVERVIEW

Natural disasters have affected a significant portion of Bhutan's population and have led to economic losses. Between 1992 and 2021, natural disasters affected around 87,900 people and led to approximately 320 deaths in the country.[32] Economically, the country's estimated average annual loss (AAL) from disasters (including biological) is US$169.3 million (approximately 6.9 percent of GDP). Hazards such as earthquakes cause significant economic damage. For instance, the earthquake in 2009 caused damages that amounted to 4.3 percent of GDP, while the 2011 earthquake caused damages amounting to 1.4 percent of GDP.[33]

Despite advances in disaster management and EWS, Bhutan remain at risk and vulnerable to natural hazards. The RGoB acknowledges in its 13th Five Year Plan (2024 – 2029), or 13th FYP, some gaps in EWS, risk assessment and disaster risk reduction (DRR), noting in the plan that the country's "ability to understand risk, implement early warning systems, and integrate DRR into infrastructure planning and development is hindered by a lack of a national-level, multi-hazard risk assessment."[34] In addition to gaps in risk awareness, gaps in preparedness and response increase the consequences of natural hazards and disasters in Bhutan. According to the World Food Program (WFP), the country "remains highly vulnerable to disaster events but lacks the necessary data information systems, response plans and coordination systems to prepare for emergencies adequately."[35]

Natural Hazards

Bhutan is exposed to a range of hazards, including floods, landslides, windstorms, cyclones, earthquakes, glacial lake outburst flood (GLOF), forest fires, droughts, and extreme weather events. GLOFs, flash flood, riverine flood, windstorm and landslides are the most common events reported across the country.[36] Damaging earthquakes are less frequent but continue to pose a risk.

Out of the more common events, flooding occurs most frequently and contributes to the largest percentage of mortality in Bhutan. Agricultural land and most of the country's infrastructure are built along drainage basins that are prone to flooding, particularly riverine flooding, caused by heavy monsoon rains and glacial melt. Risk is concentrated in the center and northwestern regions and Samtse.[37]

Floods

Flooding events are common in Bhutan, contributing to high risks to life, livelihoods, housing, infrastructure, and agriculture. Flood disasters have impacted the country in the past, usually due to heavy rainfall, but sometimes in association with cyclones. Events are mainly monsoon-related flooding, and although less frequent,



A view of a village with rice fields and a river. Photo credit: Phuntsho Wangdi. Source: https://www.pexels.com/photo/a-view-of-a-village-with-rice-fields-and-a-river-17711917/

deadly Glacial Lake Outburst Floods (GLOFs) remain a top concern.

Most of the country's agricultural land and infrastructure are located along drainage basins that are highly vulnerable to monsoon rains and GLOFs. According to the World Bank Group and the Asian Development Bank, the impact of flooding on human health and livelihoods could amount to 4% of Bhutan's GDP by the 2030s and is expected to increase.[38] In 2010 flash floods and landslides affected nearly 4,800 households, and in 2012, flooding in Gasa caused damages of over US$5 million to infrastructure and housing.[39] The increasing number of dams, hydropower facilities, and transport infrastructure located along the main river basins also increase the exposure to flooding.[40]

The monsoon season takes place between June and September and brings in 70% of the annual precipitation, which poses a significant risk of flooding.[41] Most flash floods occur during the monsoon season. In a single monsoon season, hundreds of instances of transport disruption can be recorded as flooding and landslides damage or cut off key routes.[4243] From 2017-2021, there were 30 flood events.[44]

Narrow river gorges are also prone to flooding which may be enhanced by landslides resulting in the formation of artificial lakes. For example, one formed following a landslide on the Tsaticchu, a tributary of the Kurichu River in 2003, posing a threat to the Kurichu hydropower plant as the lake increased in volume to 33 million cubic meters.[45]

Glacial Lake Outburst Floods (GLOFs) are a sudden release of large amounts of water due to a collapse of lakes fed by glacier melt that can cause flash floods and devastation downstream. Since the 1950s, Bhutan has had at least 18 GLOF events that caused varying degrees of damage and loss of lives.[46] The risk of this natural hazard is high in northern Bhutan which has 677 glaciers, the majority of which are mountain glaciers that feed into 2,674 glacial lakes. Of these lakes, 25 pose a risk of bursting. Within the four river basins of Bhutan, there are 567 identified glacial lakes. Glacial lakes in Bhutan account for 19.03% of the total numbers of water bodies and 0.14% of total land area.[47]

The Thortomi lake is considered the most dangerous lake when it comes to a potential GLOF as the Thorthomi-Rapstreng moraine dam has reportedly been deteriorating over the years. In a worst-case scenario, the collapse of the dam could result in the combined outflow of both the Thorthomi and Rapstreng lakes, potentially releasing 53 million cubic meters of water, according to a National Centre for Hydrology and Meteorology (NCHM) study. Following recommendations from NCHM, there have been efforts to relocate residents who live near Thorthomi Lake.[4849]The lake has seen a recent minor breach. In June 2019, the melting of the Thorthormi glacier resulted in a surge and breached the lower



The twin lakes of Tshophu are two of the many lakes in Bhutan formed by melting glaciers that may be at risk of a GLOF. The lakes are located in Jigme Dorji National Park, at an altitude of 4,430 m (14,534 ft). Source: World Factbook. Bhutan. https://www.cia.gov/the-world-factbook/countries/bhutan/images/

subsidiary lake which drained completely. Residents in Lunana were evacuated and no deaths or injuries reported. However, two bridges were washed away in Thanza and Tenchey.[50] The lake has also been drained to reduce the risk. This was done between 2009-2012 when water levels were lowered during Operation Thortomi.[51]

Earthquakes

Bhutan lies in one of the most seismically active zones in the world, between the Indian and the Eurasian tectonic plates, and therefore the risks of earthquakes are high. A 2020 seismic hazard and risk assessment from the Department of Geology and Mines (DGM) found the Main Himalayan Thrust (MHT) to be the primary source of hazard, which is highest in the southern part of Bhutan where the MHT is shallow, and conditions lead to amplification of shaking. Studies indicate a magnitude (M) 8 or greater quake last occurred in this area in approximately 1100 AD.[52]

While earthquakes occur in Bhutan, the seismic risk comes from outside the country as well, with Bhutan being affected by earthquakes occurring in neighboring countries such as in Nepal and China. The strongest recent earthquake of the past 10 years near Bhutan occurred on Jan 7, 2025, with a magnitude of 7.1. It struck 256 km west-northwest of Thimphu, at a depth of 10 km in China[53]. The strongest earthquake to hit near Bhutan in the past 125 years was a M 8.0 earthquake in Nepal that struck on Jan 15, 1934, some 268 km west-northwest of Thimphu.[54]

Over roughly the past 10 years, a total of 393 earthquakes with a magnitude of four or above have struck within 300 km of Bhutan. This comes down to a yearly average of 39 earthquakes per year, or 3 per month. On average an earthquake will hit near Bhutan roughly every 9 days.[55]

Like other countries in the Indo-Pacific, Bhutan may be due for a "big one." A seven-year study that came out in October 2018, warned that Bhutan may be due for another M 8.0 earthquake.[56] The study was inspired by the 2009 M 6.1 earthquake. Based on that earthquake as well as the M 6.9 earthquake in 2011, an M 8.0 earthquake is likely to cause significant physical and greater economic damage. Bhutan formed its earthquake and geophysical division under the DGM after the 2009 earthquake.[57]

Additionally, a joint study by the Department of Disaster Management (DDM) (now known as the Department of Local Governance and Disaster Management, or DLGDM), World Food Program (WFP), and Newcastle and Durham University in 2020, found that the worst-case scenario of a magnitude-8.9 earthquake at night in Bhutan could cause 9,000 fatalities, 10,000 serious injuries and displace 40,000 people.[58]

Learning from the experiences of the 2009 and 2011 earthquakes, Bhutan has worked on improving safety standards for construction as well as developing EWS for earthquakes. One such project overseen by the Ministry of Works and Human Settlement (MoHWS) is the "Capacity Building in Disaster Resilient Construction." Current building codes in the country require buildings be designed to withstand ground shaking up to 0.36g.[59]

Landslides

Landslides also pose a high risk to Bhutan. They can be triggered by other hazards such as earthquakes, heavy rains, and flooding. There are frequent landslides during the rainy season, with movement triggered by heavy rains. Landslides tend to occur frequently given the country's mountainous topography, soil conditions and land-usage. They are often triggered in areas characterized by road-cutting during the rainy months and may also endanger hydropower production in river valleys which may become blocked. Land cultivation and hill cutting contributes to the increased risk of landslides as well as flash flooding.[60]

Organizations such as the United Nations Development Program (UNDP) have assisted in supporting projects that aim to mitigate landslide risk. UNDP Bhutan's National Adaptation Program of Action (NAPA) II project aims to stabilize the

land in Phuentsholing. The area includes key institutions and cultural sites and includes the important 170-km Phuentsholing – Thimpu highway.[61] Another such project intended to mitigate the effects of landslides found its pilot project in Reotala, where frequent landslides occur. A technology called InSAR (Interferometric Synthetic Aperture Radar), was used by a World Bank team to identify high-risk areas in 2023 as a result of a collaboration between the Bhutan Department of Roads and the Japan International Cooperation Agency (JICA).[62]

The country's efforts to develop a landslide inventory are ongoing, but landslide risk assessments are limited, and there is no EWS for landslides. The DGM conducts landslide hazard mapping while the DoST under the MoIT has embarked on landslide risk assessments along national highways.[63]



House in Khuruthang, Bhutan. Photo credit: Sanjeev Bhambri. Source: https://unsplash.com/photos/brown-house-on-green-grass-field-near-mountain-under-white-clouds-during-daytime-dyig59566O4

Forest Fires

Approximately 70% of Bhutan's land are covered by forests posing an increased risk of forest fires.[64] Most of the wildfires in Bhutan occur during the dry season between November and March-April and are frequent during the winter months, when dry spells cause high day temperatures and risks are exacerbated by strong winds and availability of dry brush and wood. Drought conditions in combination with increased lightning risks also raise the risk of forest fires.[6566] Forest fires are more common in Thimphu, Wangdue Phodrang, Punakha, Mongar, Lhuentse and Trashigang dzongkhags. One of the major causes of forest fires is electrical short circuits from powerlines and old transformers. Another major cause is the accidental spread following clearing of grass and forests.[67] Other causes of forest fires in Bhutan include agriculture debris burning and campfires.[68]

More than 7,000 hectares of forest were burnt every year during 1994–2020. Both flame length and rate of fire spread are expected to increase.[69] Between 2017 and 2018, Paro Gewog had the highest recorded fire incidents and lost more than 8,000 acres of forest.[70] Urban fires are also a concern. In October 2010, a fire occurred in the town of Chamkhar, Bumthang, where 59 shops were destroyed, and 267 people left homeless. Due to the heavy reliance on wood for houses, heating and fuel, fire risks are high.[71]

Windstorms

Bhutan is also vulnerable to seasonal windstorms. The country is prone to this hazard outside of the monsoon season, which arises during seasonal changes when the wind direction changes during the pre-monsoon (March to May), post-monsoon (October to November), and during December. Impacts include damages to agricultural crops, rooftops, structures, and fallen trees.[72] Windstorms have become more widespread and frequent in Bhutan. Windstorms in 2011, 2013 and 2014 affected most districts in the country. Traditional Bhutanese houses are vulnerable to windstorms due to the type of construction.[73]

Cyclones

Cyclones can affect Bhutan but are considered a relatively low risk hazard due to it being

a landlocked country and its geographic location. In May 2009, Cyclone Aila, the strongest cyclone to affect Bhutan in recent history, left 12 dead and affected approximately 65,000 people. In 2020 Cyclone Amphan displaced 84 people and triggered floods and landslides which damaged highways, roads, bridges, irrigation systems and hydropower facilities. Bhutan relies upon neighboring India for internet access, and severe internet connectivity issues occurred due to damaged links in India during the cyclone, which damaged power and internet cables in Kolkata.[74, 75]



Drought

December to February is currently the country's driest season, while rainfall has increased from June to September. A high degree of rainfall variability and distribution exists within the country, with precipitation being the highest near the northern and southern borders of the country. Two primary types of drought may affect Bhutan: meteorological (usually associated with a precipitation deficit) and hydrological (usually associated with a deficit in surface and subsurface water flow). While drought poses a risk, Bhutan is projected to experience an overall increase in rainfall.[76]



Extreme Weather Events

Bhutan has experienced more extreme and frequent weather events in recent years.[77] Projected increases in heavy precipitation increase the risk of flooding and erosion.[78] Urban areas in the south are vulnerable to extreme heat. Risks of local dry spells are expected to increase in large parts of the country, while extreme rainfall will increase flood and landslide risks.[79]

Bhutan's economy is highly dependent on sectors such as agriculture, forestry and hydropower which are vulnerable to weather events. Half of the country's workforce is in agriculture, which is highly vulnerable given its dependence on rain-fed dryland and wetland farming. For example, rainfall in October 2021 affected 17 dzongkhags and resulted in significant crop loss. Bhutan's economy is shaped by hydropower development and the sector is vulnerable to changes in rainfall, melting glaciers, and increasing occurrence of extreme weather events.[80]

Farming occurs on less than 3 percent of the country's land, putting the important agricultural sector under risk of disasters. Water security is another concern, potentially created by changing rainfall and future loss of glaciers which feed most of the rivers. Major loss of ice may result in decreased river volumes and shortages of water during summer, which would result in less output of hydropower.[81]

History of Natural Disasters

1994 October - GLOF

In October, the Lugge Tsho glacial lake in eastern Lunana suddenly released meltwater to downstream Punakha-Wangdue valley, claiming 21 lives. It affected 91 households, damaged 12 houses and 1 temple, washed away 5 water mills and 4 bridges, destroyed 2 Chortens (Buddhist monument), 816 acres of dry land, and affected 965 acres with sand and silt. Livestock and stored grains and materials were also affected.[82] It was reportedly Bhutan's first major GLOF event.[83]

2000 August - Landslides

More than 180 people were killed following landslides triggered by heavy rains in early August. The floods displaced more than 1,000 people and destroyed key roads between Bhutan and India. The worst of the landslides occurred in Pashakha village in southern Bhutan, which was completely wiped out. The area is next to India's Jalpaiguri district in West Bengal State and Indian troops joined Royal Bhutan Police (RBP) in searching for the missing, while the Royal Bhutan Army (RBA) oversaw rescue work and was helped by India's border roads organization which helps maintain Bhutan's highways.[8485]

2009 May – Cyclone

In May, unprecedented rainfall and flooding caused

by Cyclone Aila affected 17 dzongkhags, resulting in 12 deaths and estimated economic losses of US$8.2 million.[86] Approximately 65,000 people were affected.[87]

2009 September - Earthquake

On September 21, a M 6.1 earthquake struck Mongar in eastern Bhutan. Twelve people died, 35 were injured, and up to 8,400 were displaced.[88] Nearly 5,000 houses, public buildings, cultural and religious monuments were damaged, amounting to US$52 million in damages.[89]

2010 October - Fire

In October, a fire occurred in the town of Chamkhar, Bumthang, where 59 shops were destroyed and 267 people became homeless.[90]

2011 April – Windstorm

In April, a windstorm affected 17 districts and damaged 2,424 rural homes, 77 lhakhangs (temples), 4 chortens (Buddhist monuments), 57 schools, 31 public buildings and 3 RBP buildings.[91]

2011 September – Earthquake

On 18 September, a M6.9 earthquake hit the Greater Sikkim Area and resulted in one death in Bhutan due to earthquake-associated landslides and 14 injuries. It impacted 6,977 rural homes, 36 schools, 22 hospitals, 286 heritage sites, monasteries, and 27 public buildings, causing over US$24.26 million in damages.[929394] The quake displaced 20,000 people, resulting in the most significant displacement in Bhutan following a disaster.[95]

2012 April – Wildfire

In April, a forest fire in Thimphu killed two police officers and injured 17 people.[96]

2013 December – Windstorm

In December and across 13 districts, a windstorm damaged 1,012 rural homes, 12 schools, 58 cultural sites, 3 government offices, and 8 health clinics.[97]

2014 February – Forest fire

In February Thimphu saw over 2,000 acres of forest burned with the fire lasting nearly three days. 700 fire fighters and volunteers responded[98]

2015 April – Windstorm

In April and across 8 districts, a windstorm damaged 972 structures, destroyed crops, and injured 3 people.[99]

2015 - GLOF

Lemthang Tsho lake burst following heavy rainfall, leading to the drainage of numerous other interconnected ponds and the outburst of the lake in 2015. Luckily, the impact was minimal and confined within a 30 km stretch of the river downstream.[100]

2016 July – Flash Floods and Landslides

In July-August 2016 monsoon triggered flash floods and landslides cut off many parts of south Bhutan - Samtse, Chhukha, Tsirang, and Sarpang divisions, and Phuentsholing, Lhamoiyzingkha, and Gelephu subdivisions. Four people were killed and 125 families affected.[101] Landslides damaged most of the major highways and roads and bridges were washed away. The Phuentsholing -Thimphu highway was hit in several locations, and the Kamji bridge partially collapsed.[102]

2016 - Forest Fires

In 2016, there were 72 forest fires that burned more than 21,000 acres.[103]

2019 March – Windstorm

In March and in the east of Bhutan across 4 dzongkhags, 125 houses suffered damages from a windstorm.[104]

2019 December - Windstorm

On 4 December, a strong windstorm affected parts of Thimphu and Gasa dzongkhag. The windstorm ripped off roofs of six houses and public structures in Naro and Lunana gewog.[105]

2020 May - Cyclone

Cyclone Amphan hit 16 May triggering flooding and landslides, damaging highways, roads, bridges, irrigation systems and hydropower facilities.[106]

2020 – COVID-19 pandemic

COVID-19 response: Bhutan confirmed its first case of COVID-19 on 6 March 2020. Following a nationwide lockdown, the RGoB enacted numerous preventive measures. The National COVID 19 Preparedness and Response Plan guided the response while the MoH activated its Health Emergency and Contingency Plan, and the Royal Centers for Disease Control (RCDC) utilized its sentinel surveillance network. When Bhutan began relaxing restrictions in April 2022, it had recorded 21 deaths and vaccinated more than 91% of its population with three doses.[107]

2021 June – Flooding and Landslides

On 16 June heavy monsoon rain caused flash floods and a landslide at a remote mountain camp in the outskirts of Laya Town in Gasa in northwestern Bhutan. At least 10 people died and five were injured.[108] A rescue team including military members assisted.[109]

2021 October – Heavy Rain

Rainfall in October 2021 affected 17 dzongkhags and resulted in significant crop loss.[110]

2023 July - Flooding

On 20 July heavy rainfall in Lhuntse District, in northeastern Bhutan, caused flash floods and landslides. Six people were killed, three were injured, and 17 were left missing. A small hydropower plant and paddy fields were damaged.[111]

2024 January – Forest Fire

On January 4, a fire broke out in Naro Gewog that burned 596 acres and destroyed eight houses. A second fire in Kawang Gewog burned 60 acres of the Nobrig Community Forest on January 8. RBA, RBP and Royal Bodyguard of Bhutan (RBG) helped respond to the blaze.[112]

2024 August – Flood

On August10, a flash flood caused by a thunderstorm hit the Dechencholing region in Thimphu[113] affecting 133 households and 62 foreign workers at nearby construction sites.[114]

2025 January - Earthquake

On January 7 a M 7.1 earthquake hit Tibet, China; neighboring countries including Bhutan were affected with tremors felt in Thimphu.[115] While no injuries were reported, two avalanches were triggered above the Belching Glacier in Lunana, located in northwestern Bhutan. The area contains several glacial lakes at risk of a GLOF, fortunately, the avalanches did not trigger any.[116]

Country Risk

Bhutan faces risks from natural disasters but relatively less than other countries. The INFORM Risk Index measures the risk of humanitarian crises and disasters in 191 countries. The INFORM model is based on the standard dimensions of risk: Hazards and Exposure, Vulnerability, and Lack of Coping Capacity. According to the INFORM Risk Index country profile 2025 second edition, Bhutan had an overall risk score of 2.9/10 and was ranked the 126th most at risk country out of 191 countries, putting it in INFORM's "low" risk class. Compared to other Indo-Pacific countries Bhutan is ranked as having similar risk to Mongolia (126) and Tuvalu (131).[117] In a separate report that also measures risk, the World Risk Report 2024 contains the World Risk Index which assesses the disaster risk for 193 countries. Bhutan was rated the 173rd country most at risk out of 193.[118]

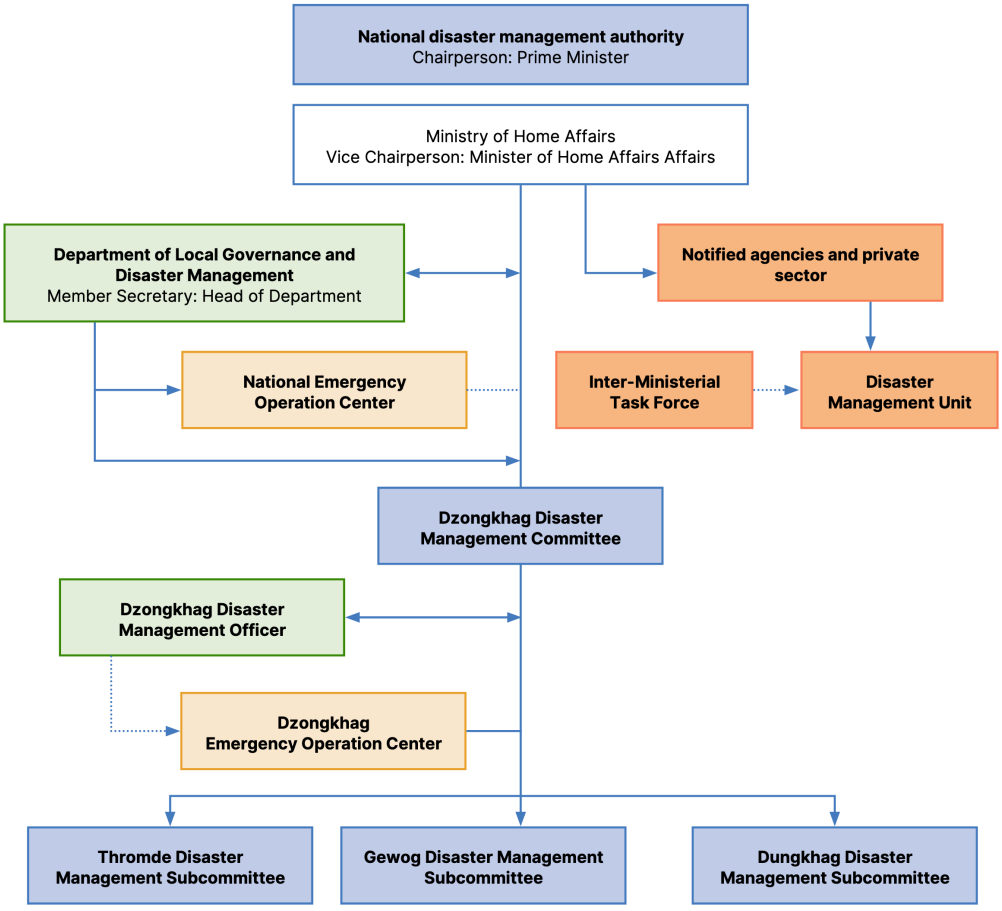
DISASTER MANAGEMENT STRUCTURE

Lead Government Agencies

The Disaster Management Act of 2013 (see below section on Laws, Policies and Plans for DM for more information) established the formation of Bhutan's Institutional structure for Disaster Risk Management (DRM).

The National Disaster Management Authority (NDMA) is chaired (ex-officio) by the Prime Minister with representation from key agencies. The Vice Chairperson is the Minister of Home Affairs. The NDMA is the top decision-making body and is mandated to approve national disaster management policies, frameworks, contingency plans, hazard and vulnerability maps, standards and guidelines, mobilization of funds, and mainstreaming DRR in development plans, policies, programs, and projects. The NDMA is responsible for establishing an Inter-Ministerial Task Force (IMTF) of technical experts from relevant agencies to provide technical assistance in reviewing national DM plans and establishing critical disaster management facilities, including the interim national emergency operations center (NEOC).[119] The IMTF is responsible for reviewing hazard zonation and vulnerability maps, DRR and DM activities, and national standards, guidelines and Standard Operating Procedures (SOPs) for DM.[120]

Department of Local Governance and Disaster Management (DLGDM) (formerly known as the Department of Disaster Management [DDM] and known as the Secretariat of National Disaster Management Authority) falls under the Ministry of Home Affairs (formerly Ministry of Home and



Source: World Bank. 2024. Washington, DC: World Bank. License: Creative Commons Attribution CC BY 3.0 IGO.

Cultural Affairs).[121] The DLGDM is the designated secretariat and executive arm of the NDMA and functions as the national coordinating agency for disaster management. It is also responsible for instituting a coordination platform for DRM initiatives and enhancing awareness and understanding about DM.[122]

All dzongkhags and thromdes are mandated to institute Dzongkhag/Thromde Disaster Management Committees DMCs and draft Disaster Management Contingency Plans (DMCPs). Dungkhags and gewogs may be asked to draft a DMCP if required by the dzongkhag. At the sector level, agencies including private entities are notified by the NDMA to institute disaster management units and prepare sectoral DMCPs.[123]

The Department of Geology and Mines (DGM) under the Ministry of Energy and Natural Resources (MoENR) is responsible for seismic monitoring of the country; there is no earthquake EWS in place. There are 14 earthquake source monitoring stations and 221 earthquake intensity meters across the country. All the information from these stations is received at the central monitoring system for seismic activities hosted at the DGM, which was established in 2016. The DGM and Department of Surface Transport (DoST) aims to enhance seismic and landslide hazard mapping.[124] The DGM is also mandated to conduct studies to prevent and mitigate natural disasters resulting from geological hazards.[125]

The National Centre for Hydrology and Meteorology (NCHM) is a scientific and technical autonomous agency mandated to provide early warning services related to flood and GLOF in addition to scientific and technical services in hydrology, water resources, meteorology, and climatology.[126] The NCHM monitors GLOFs at the national level.

Among other agencies, the Department of Engineering, Department of Human Settlement, Department of Roads, Department of Local Governance, Department of Agriculture, Department of Medical Services, Royal Bhutan Army (RBA) and Royal Bhutan Police (RBP) provide support to DRM activities in Bhutan.[127]

Disaster Response

National Disaster Response Coordination Committee (NDRCC) at the national level and Incident Management Teams (IMT) at the Dzongkhag, Dungkhag, and Gewog levels have been designated for emergency response.[128] The NDMA approved the Disaster Response and Coordination Process (DRCP), including the NDRCC, via a Government Order in 2017 to ensure effective disaster response. The DRCP defines structures, roles, responsibilities, and coordination of response across national and dzongkhag levels based on the Incident Command System (ICS), including the roles and responsibilities of the NDRCC. The NDRCC is led by government secretaries and the Chief of Police and supported by various government and non-government agencies.[129] The NDMA is responsible for making any decision regarding requests for international humanitarian assistance.[130]

The DM Act includes the provisions to declare Type I – III disasters in the country. On the written advice of the Prime Minister, a Type III (national level) emergency can be declared by the Druk Gyalpo (His Majesty). The Act also includes the provision to declare Type I (thromde and gewog level) and type II (dzongkhag level) disasters by the Chairperson of the Dzongkhag Disaster Management Committee (DDMC) upon approval by the NDMA. The NDRCC is activated during a Type III disaster, and the IMT is activated during a disaster at sub-national and local levels. However, according to a gap analysis by the World Bank, Type I–III disasters have never been declared "due to the lack of awareness, enforcement of the act, clear evaluation criteria for the degree of a disaster, and SOPs." Thus, the NDRCC has not yet been activated.[131]

Air access to Bhutan may pose challenges for international responders during a disaster response. Bhutan's international airport, Paro International Airport (PIA), is one of the most dangerous airports in

the world, because of the difficult terrain and capacity of the airport, making accessibility limited as there are only a few pilots certified to land at the airport under visual meteorological flying conditions. According to the Logistics cluster, foreign aircraft can only land at Paro with the help of a certified pilot. According to the gap analysis report, there are only around 16 certified pilots who can operate flights there. Flights are restricted to hours between sunrise and sunset only." At the three domestic airports, flight operations are commonly affected by severe weather conditions, posing additional challenges for access. As it faces operation and capacity limitations, to improve the emergency preparedness capacity of the PIA, a Get Airport Ready for Disaster (GARD) program was conducted by UNDP and WFP at PIA in December 2023. Additionally, Bhutan currently lacks established humanitarian staging areas nationwide.[132] The RGoB notes that there is urgent need to establish and store relief items at strategic locations across the country, in addition to improving other measures to strengthen emergency logistics.[133, 134]

The interim National Emergency Operation Center (NEOC) is at the DLGDM office in Thimphu. The government has plans for establishing a fully equipped NEOC. Almost all local governments do not have EOCs but have designated office space to be used as interim EOCs, except Punakha Dzongkhag and Phuentsholing Thromde which have EOCs. The Ministry of Education activates its Education Emergency Operation Centre (EEOC) in line with Education Disaster Response Coordination Mechanism (EDRCM), to respond to Education in Emergencies (EiE). The Health Emergency Operation Center (HEOC) was activated at the MoH at the onset of the COVID-19 pandemic. It is operated by the Emergency Medical Services Division.[135136]

The U.S. Forest Service (USFS) with USAID has worked with the DDM since 2011 to incorporate ICS into the response system, and to train members of the National Search and Rescue Team and local government. The ICS was implemented from August 2017.[137] There are five levels of ICS in Bhutan: National Level, District Level, Municipal Level, Sub-District Level, and Block Level.[138]

A National Logistics Preparedness Working Group was formed to establish a joint action plan, create and streamline logistics capacity to meet response needs.[139]

DM Partners

National

At least two volunteer societies participate in DM in Bhutan. The Bhutan Red Cross Society (BRCS), founded in 2017,[140] is focused on building a resilient and harmonious society, prevent human suffering during times of disasters, and improve livelihoods and wellbeing of vulnerable people. The BRCS works through a network of volunteers in communities across Bhutan and its network of international movements for humanitarian assistance mobilization in a crisis. The BRCS also works on community DRR activities.[141, 142]

De-suung, a royal initiative with over 31,620 trained personnel, is a national-level, member-based, voluntary organization with a mandate to, among others, provide appropriate skills and knowledge in the field of disaster management. During any national disaster events, the Office of the De-Suung Management carries out the overall coordination for the deployment of De-Suups (volunteers) in all the dzongkhags. Dzongkhag Coordinators consult and coordinate with the De-Suung Office to facilitate immediate deployment, search and rescue, reconstruction or rehabilitation operations.[143] De-suung supports the DLGDM and RBA in emergency operations.[144]

International Partners and Donors

Various international partners and donors including the United Nations, Red Cross and Red Crescent Societies, international and regional organizations and international NGOs are involved in helping to build preparedness and resilience, disaster and risk management in Bhutan. Multi-lateral donors, including the World Bank (WB), Asian Development

Bank (ADB) and the South Asian Association for Regional Cooperation (SAARC) have provided financial support to various projects and initiatives on DRR. Major bilateral donors include India, Japan, Denmark, and Austria.[145] The following is a sample of some of the major DM partnering efforts by international organizations and donors in Bhutan.

United Nations

- The UN Office for Disaster Risk Reduction (UNDRR) and the Coalition for Disaster Resilient Infrastructure (CDRI) assisted the DLGDM testing critical infrastructure during a workshop in March 2024, part of "Enhancing resilience of infrastructure through strengthened governance." The project aims to enhance the disaster resilience of infrastructure.[146]
- The World Food Program (WFP) assisted in drafting a roadmap for DRM focusing on disaster awareness, data preparedness, governance, coordination, resourcing, and sector preparedness.[147]
- The World Health Organization (WHO) was a major public health partner in combatting COVID 19 in Bhutan.[148]
- The World Meteorological Organization (WMO), in collaboration with NCHM is helping to develop capacity.[149]
- Community DRR activities are implemented by UNDP Bhutan in landslide and flash flood prone areas. The UNDP, in partnership with the Global Environment Facility (GEF) and Green Climate Fund (GCF), has been supporting development of EWS.[150] With USAID/OFDA support, UNDP facilitated training to incorporate disaster-resistant building and repairing techniques.[151]

Donors

- The Japanese International Cooperation Agency (JICA) is helping to build capacity in disaster resilient infrastructure, GLOF mitigation, meteorological observation, forecasting, and flood warning.[152]
- The European Union (EU) is supporting the National Training Centre for Search and Rescue to enhance the response capacity of Search and Rescue (SAR) teams and improve the country's overall preparedness.[153]
- The World Bank has been supporting the ongoing multi-hazard risk assessment to develop a risk-informed decision support system, known as the Bhutan DRM Portal,[154] and financing that helps address shocks related to natural disasters and/or health-related events.[155]
- The Government of India provided funding for the DGM to collaborate with the Regional Integrated Multi-Hazard Early Warning System (RIMES) and partner institutions (Kyoto University, NIED, PHIVOLCS, and the University of Montpellier) to install Earthquake Source Monitoring Stations and earthquake intensity meters, and to build capacity.[156]

Bhutan participates in International Centre for Integrated Mountain Development (ICIMOD) activities to learn from and share knowledge and best practices in DM with regional countries and to increase the region's capacity, knowledge sharing and cooperation to manage disasters.[157]

Bhutan is also one of the eight Member States of the SAARC, which is comprised of Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka.[158] One of the areas of cooperation within SAARC is on Environment, Natural Disasters and Biotechnology. SAARC member states have reiterated the need to strengthen regional cooperation on the environment and natural disasters. A SAARC Disaster Management Centre (SDMC) was established to provide policy advice and facilitate capacity building for DRR and DM.[159]

Armed Forces and Police Role in Disaster Response

There are an estimated 7-8,000 active military and security service personnel. The Royal Bhutan Army (RBA; includes Royal Bodyguard of Bhutan,

or RBG, and an air wing). The RBA is lightly armed; it has a small amount of heavy equipment, such as armored cars and helicopters, from India and Thailand. RBA is responsible for external threats but also has internal security functions such as conducting counterinsurgency operations, and guarding forests. Bhutan relies on India for military training, arms supplies, and the country's air defense.[160] The RBA has supported past emergency responses, especially in evacuating people from threatened or affected areas.[161]

The Royal Bhutan Police (RBP) falls under the Ministry of Home Affairs (MoHA). It drafted its DMCP in 2021 with the objectives of ensuring safety of life and property, providing rapid and life-saving response, and pre-positioning of stockpiles and communication needs for sustained relief operations. Within the RBP, the Tashigatshel Special Reserve Police Force (SRPF) drafted its DMCP to "reduce disaster and avoid potential losses from hazards; assure prompt and appropriate assistance to disaster victims; achieve rapid and effective recovery and to ensure all the mechanisms are in place for coordination."[162]

Some of the staff of the RBP and Desuung are trained in basic SAR. The DLGDM, RBP and RBA provide training for SAR operations for all dzonkhags. A national SAR Training Center is under construction.[163] However, currently, the government emergency services do not possess specialized equipment and staff necessary to respond to major disasters, especially in high altitudes and other situations where advanced SAR is required. RBP has some basic SAR equipment, but Desuung does not have any equipment and depends on the equipment owned by other agencies.[164]

Military deployments (peacekeeping): Bhutan began first participating in UN peacekeeping in 2014 by contributing to the UN Truce Supervision Organization (UNTSO) in the Middle East. Bhutan has provided personnel in support of the United Nations Multidimensional Integrated Stabilization Mission in the Central African Republic (MINUSCA). It deployed its first ever peacekeeping contingent, a Light Quick Reaction Force (LQRF) to MINUSCA in October 2022. It completed its mission and was replaced by the second Quick Reaction Force (QRF) comprised of 180 peacekeepers, deployed in November 2023.[165] Bhutan's first deployment to MINUSCA was in 2016 where two staff officers were deployed as the mission was being established.

Bhutan has also contributed peacekeepers to the missions in Abyei, the Central African Republic, the Democratic Republic of Congo, Mali, the Middle East, South Sudan and Western Sahara. Bhutan personnel also served in United Nations Mission in Liberia (UNMIL) and in United Nations – African Union Hybrid Operation in Darfur (UNAMID). Several hundred Bhutanese from the RBA and RBP have served as UN peacekeepers. [166, 167]

Laws, Policies and Plans on DM

Laws, policies and guidelines on DM in Bhutan is relatively new. The first framework for DM was the National Disaster Risk Management Framework (NDRMF) which was drafted and adopted in 2006. The NDRMF was the first guiding principle for the policy and planning for disasters in the country.[168] A turning point for the drafting of new laws to address disaster management came following the 2009 earthquake which started the process of the drafting of the first Disaster Management Act. The 2011 earthquake helped speed up the drafting and approval of the DM Act on 27 February 2013 when the first Disaster Management Act of Bhutan was enacted.[169]

The Disaster Management Act of 2013 and its Rules and Regulations (R&R) of 2014 is the overarching legal and regulatory foundation for disaster risk management. The Act emphasizes the role of the NDMA in approving hazard and vulnerability maps and guidelines and Standard Operating Procedures (SOPs) for DM and directing agencies to mainstream DRR. In addition, the MoHA has approved the DM R&R 2014 for the establishment of governance and institutional mechanism and the implementation of DRM in the country. The act mandates the establishment of Disaster Management

Committees (DMCs) at the dzongkhag level and DM Subcommittees at the thromde, gewog, and dungkhag levels.[170]

The DM Act is being updated per Bhutan's Voluntary National Report (2022). The DLGDM is planning to incorporate lessons learned from COVID-19 and past disasters by amending the DM Act 2013 and DM R&R, with assistance from the World Bank.[171]As per the DM Act 2013, the DDM formulated the following policies and plans in collaboration with relevant agencies:

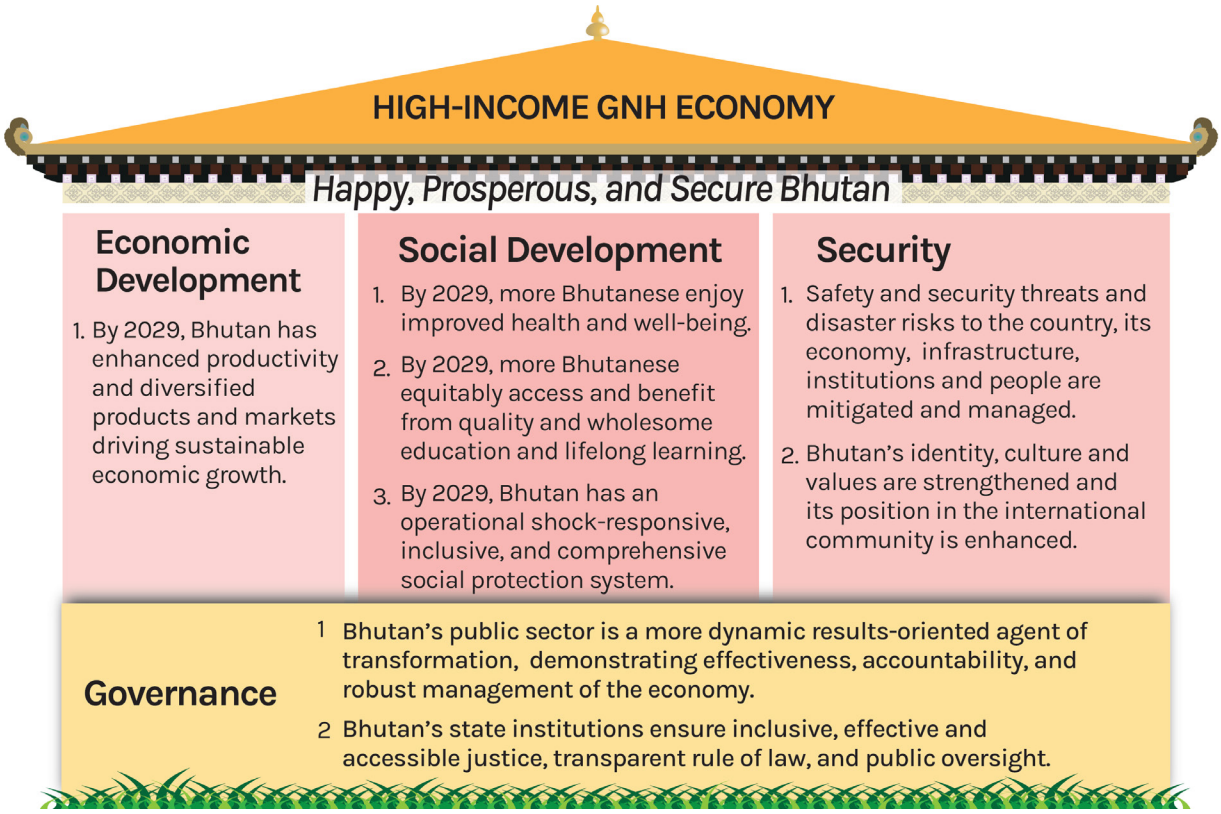
- Disaster Financing Guidelines 2017
- Disaster Response and Coordination Process at the National and Dzongkhag level
- Disaster Risk Management Strategy 2017
- Disaster Management Strategic Policy Framework (DMSPF) 2014
- Disaster Management Rules and Regulations
- Disaster Management Planning and Contingency Guidelines
- School Disaster Management Planning Guideline
- Guideline on Proper Construction Practices for Non-Engineering Buildings
- National Action Plans for School Earthquake Safety
- National Action Plans for Earthquake Safety of Health Facilities
- Post-Earthquake Safety Assessment Guidance Document
- National Recovery and Reconstruction Plan for 2009 & 2011 Earthquake
- Dzongkhag Disaster Management Plan
- Thromde Disaster Management Plan[172]

The Disaster Risk Management Strategy (2017) was prepared to guide the development of the Five-Year Plans (FYPs). The strategy identifies gaps and issues based on the priority actions in the Sendai Framework and provides guidance to agencies in DRM planning, coordination, and budgeting.[173]

The MoHA approved the National Disaster Management and Contingency Plan (NDMCP) in 2023. The DLGDM prepared the NDMCP with assistance from the World Bank. The plan takes a whole-of-government approach to multi-hazard preparedness and response and defines the roles and responsibilities of government agencies as well as a mechanism for coordinating interagency response. The plan lays out a series of priority actions with targets for the next five years and will be reviewed and updated regularly.[174]

The DM Act 2013 requires all notified sectors/ agencies to prepare, implement, review and update Disaster Management Contingency Plans (DMCPs). This includes the following that have formulated their own DMCPs: Ministry of Education, Ministry of Works and Human Settlement (MoWHS), Department of Tourism, Druk Air (Royal Bhutan Airlines), RBP, and Ministry of Health.[175] The DM Act also required the 20 Dzongkhags and four thromdes to carry out disaster risk assessments for drafting DMCPs; all have done so as of 2022.[176]

Bhutan's 13th Five Year Plan (2024 – 2029), or 13th FYP aims to transform the country into a high-income economy by 2034, while maintaining its Gross National Happiness philosophy. The plan includes enhancing infrastructure, fostering innovation and developing new industries.[177] The 13th FYP aims to "safeguard and strengthen Bhutan's sovereignty, territorial integrity, security, unity, well-being, resilience and economic prosperity." The RGoB says this objective will be pursued through two outcomes relating to national security, community vitality, cultural vibrancy and identity, disaster preparedness and resilience, and international engagement. The plan focuses on mitigating and managing safety and security threats and disaster risks to Bhutan. The Plan's "security" rubric recognizes that building the national DM capacity will rely on building critical infrastructure especially air, road, power, and communications. In addition, the FYP requires the development and implementation of disaster preparedness and response plans. Among the responsible parties for developing DM capacity are local governments, with local government key result area (LGKRA) #5 being "effective disaster risk



Source: Royal Government of Bhutan. Thirteenth Five Year Plan 2024-2029. https://www.pmo.gov.bt/wp-content/uploads/2019/09/13-FYP.pdf p 42

management and safety in local communities." The figure above illustrates the FYP outcomes.[178]

Risk assessment is a relatively new concept in Bhutan. While nationwide assessments are limited, sectoral and subnational assessments have been conducted. There are ongoing hazard mapping and risk assessments for floods, landslides, and earthquakes.[179] Risk assessments have been conducted by NCHM and DGM. The DGM assessments include seismic hazard map (2020), landslide inventory map (2022-2023) for 20 Dzongkhags, and for road infrastructure (2022). NCHM assessments include: a 2019 study on historical climate data and projections, a glacial lake inventory (2021), detailed assessment report on GLOF at Thorthormi Lake (2020), and a compendium of extreme heat and rainfall events (2017-2021). The Flood Engineering and Management Division (FEMD)/MoWHS delivered flood assessments for all 20 Dzongkhags in 2019.[180]

DM Communications

The Department of Information Technology and Telecom (DITT), Ministry of Information and Communications (MoIC) has developed an SOP for communication during disasters, established a disaster communications network through the South Asia Satellite (SAS) and installed 81 Very Small Aperture Terminal (VSAT) across the country and in the interim NEOC. A Disaster Communication and Helpline Unit (DCHU) under the RBP was established and the radio communication network provides dzongkhag level communication during emergencies across 18 dzongkhags.[181]

DLGDM, in coordination with technical agencies piloted the Bhutan DRM Portal (BDP), a nation-wide Multi-Hazard Risk Decision Support System with a focus on high-risk hazards (earthquakes, floods, and landslides), priority sectors, and the most vulnerable.[182] The DLGDM with support from the WB developed the Disaster Management Information

System (DMIS) in 2018. DMIS maintains pre-crisis data and provides a platform for reporting disaster incidents from local governments. It is comprised of 1) Pre-crisis data, 2) Disaster Assessment, 3) Report Generation, 4) Risk mapping, and 5) DRR Activities/ Project.[183]

The DLGDM has developed a 72-hour Rapid Assessment Approach (RAA), a prepopulated database, which includes a geo-spatial database of demographics, access to roads, health stations and schools, to estimate the likely impact of a disaster and enable a timely response through the Platform for Real-time Information System (PRISM) portal.[184]

Early Warning Systems (EWS)

In terms of EWS in Bhutan, significant progress has been made to improve the dissemination of information. However, there are limitations and the RGoB notes capacities for EWS is low. For example, there is no national risk communication system where people can look for alerts and warnings. Although some kinds of risk communications about earthquakes, GLOFs, and floods are conducted by the DLGDM and NCHM, there is no location-specific and targeted risk communication. There are EWS in the form of advisories for the public regarding extreme weather events, however, the warnings tend to be more scientific. Risk information is usually communicated through television.[185]

Technical agencies are charged with monitoring hazards and delivering early warnings to the public. The NCHM is tasked with monitoring hydro-met hazards for extreme weather and flood/GLOF early warning through the National Weather and Flood Warning Center (NWFWC). The NCHM produces weather forecasts for three days in advance. However, it does not operate a lightning detection network and there are no global atmospheric watch stations operating in Bhutan. Bhutan has a national hydro-met observational network with almost 250 stations across the country operated by NCHM. GLOF/flood warning systems are installed and operational in the major river basins of Punatsang chu, Mangde chu, and Chamkhar chu. Flood EWS projects in Thimphu chu, Pa chu (Paro) and Ammo chu are underway. [186]

There is no earthquake EWS in place, however, the DGM has installed 14 earthquake source monitoring stations and nearly 225 earthquake intensity meters to monitor seismic activity in 205 gewogs and 20 dzongkhags. All the information from these stations is received at the central monitoring system for seismic activities hosted at the DGM. The Center for Geo-information (CGI) of the National Land Commission also provides geo information through its Bhutan geo-portal. In absence of an earthquake EWS, other initiatives aim to strengthen understanding of earthquake risks. The DGM and Department of Surface Transport (DoST) aim to enhance seismic and landslide hazard mapping.[187, 188] Additionally, the DGM, in collaboration with the GovTech Agency, is working to upgrade earthquake monitoring systems. The new system will include a web-based platform for real-time earthquake information, and the public can contribute by reporting shaking.[189]

There is no forest fire monitoring and EWS in place due to limited technical capacity and financial constraints. However, the Forest and Nature Conservation R&R of 2023 mandates the Department of Forests and Park Services (DoFPS) under the MoENR to develop a forest fire surveillance system.[190]

The National Disease Surveillance and Epidemiology Unit of the RCDC under the MoH monitors and notifies the spread of diseases. The National Early Warning Alert and Response Surveillance System is a web-based system that incorporates real-time mobile SMS reporting.[191]

Bhutan International Disaster Response

Bhutan has responded to regional disasters. After Nepal was hit by a strong M 7.8 earthquake on April 25, 2015, Bhutan sent a medical relief team and volunteers to Nepal. The team was stationed in Trishuli, one of the areas' worst affected. The team provided medical aid from April 27 to May 17, 2015, treating over 2,000 patients and performing more than 200 surgeries. The team also visited remote areas and evacuated additional casualties and provided treatment in villages.[192]

U.S. - BHUTAN RELATIONSHIP

The United States does not have diplomatic relations with the RGoB, and there is no U.S. diplomatic presence there. Although there are no diplomatic relations, the two countries established consular relations on 23 July 1986; the Consulate General of the Kingdom of Bhutan was established in New York with an officer from the Permanent Mission of the Kingdom of Bhutan to the UN holding dual accreditation as the Consul General with consular jurisdiction in the U.S. Frequent informal contact is also maintained via the US embassy in New Delhi and Bhutan's Permanent Mission to the UN.[193, 194]

Various U.S. agencies have worked with Bhutan for disaster preparedness and response training, projects and other initiatives. In partnership with the USFS, DLGDM conducted various training courses which included: Basic and Intermediate ICS, Integrated Planning, and All Hazards Incident Management Team training. The USFS has also worked with Bhutan to help achieve the goal of maintaining 60% of total land under forest cover.[195]

USAID, in partnership with the Asian Disaster Preparedness Center and the National Society for Earthquake Technology, supported disaster preparedness through professional development activities for emergency responders[196] USAID provided funds to the UNDP in 2015 to support RGoB efforts to promote disaster-resilient construction practices.[197] In 2022, it awarded research grants worth US$500,000 to foster partnerships in scientific cooperation between Bhutan and the U.S.[198]



Dr. Maj. Choden of the Royal Army of Bhutan greets physician's assistant Maj. Anthony Rafosky from the U.S. Army's 97th CA Battalion during a Disaster Response and Preparedness SMEE in Bhutan. (U.S. Marine Corps Photo by Cpl. Derek Mol)
Source: https://www.socom.mil/pages/Establishing-Camaraderie-in-Bhutan.aspx

During the COVID-19 pandemic, USAID and the U.S. Centers for Disease Control and Prevention, provided equipment, vaccines, and masks; partnered with Bhutan to strengthen healthcare capacity, and train healthcare workers. The CDC also collaborated with the MoH to build capacity for influenza surveillance and vaccine introduction.[199]

Department of Defense (DOD) DMHA Engagements

The first ever formal military exchange between the U.S. and Kingdom of Bhutan occurred in Thimpu in November 2019. A team of disaster response specialists from Special Operations Command Pacific (SOCPAC) attended the Subject Matter Expert Exchange (SMEE) with personnel from the NDMA, including the Director General. The SMEE focused on disaster response and preparedness and provided insight into unique capabilities USINDOPACOM can provide during a disaster response. The exchange was developed with the DLGDM and featured participants from the RBA, RBP, MoFA, MoH, and other government agencies and first responders. The U.S. team consisted of the Theater Civil-Military Support Element (TCMSE), personnel from the Pacific Disaster Center, 97th Civil Affairs Battalion (Airborne), and SOCPAC's Public Affairs. The WFP also attended the event, and the event culminated with a tabletop exercise centered around an earthquake scenario.[200]

Bhutanese participants have also attended regional security courses at the Daniel K. Inouye Asia-Pacific Center for Security Studies (DKI APCSS), a U.S. DoD institute.[201, 202]

ENDNOTES

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