

UTTARAKHAND JUDICIAL & LEGAL ACADEMY



HISTORICAL AND GEOGRAPHICAL PHENOMENON OF UTTARAKHAND

1. SHRI ABHISHEK KUMAR MISHRA

2. SHRI JATIN MITTAL

3. SHRI NAVEEN RANA

4. MS. TANYA MIDDHA

HISTORICAL PHENOMENON OF UTTARAKHAND

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UTTARAKHAND

GARHWAL – THE TRADITIONAL NAME OF GARHWAL WAS KEDARKHAND MEANS "THE LAND OF GOD" (SKAND PURAN)

'HIMAVAT (IN MAHABHARAT)

THE LITERAL MEANING OF GARHWAL IS 'COUNTRY OF FORTS' OR 'COUNTRY OF GADH' (GLEN).

The Kingdom consists of many steep mountain ridges which divide each other by deep glen.

Garhwal kingdom was dominated by Rajputs.

This state was ruled by three dynasties mainly-

Katyuri dynasty (8th – 11th century)

Chand dynasty (14th –15th century)

Panwar/Parmar/Shah Dynasty (1815 – 1949 AD).




The region came under **the rule of Katyuri kings**, who ruled—unified Kumaon and Garhwal regions from Katyur Valley, Baijnath, **starting 6th century AD and eventually fading by the 11th century AD**

After their fall Kurmanchal was divided into numerous small principalities and they eventually lost the control over Garhwal region

The region of garhwal fragmented into several small forts (Garh).

Huen Tsang, the Chinese traveller, who visited the region around 629 AD, mentions a Kingdom of Brahmapura in the region

- 
- Harsha Vardhan died in 647 AD
 - Political instability came in the Central Himalayan state

- During this period **Brahmapura**, Shatrughan and Govishan states came into existence.

- Around 675 AD, the largest state of Brahmapur had collapsed.

Thereafter, around 700 AD, **BASANT DEV** established an independent state by making district Almora place near Kartikeyapur (Bajjnath) of Katyur valley as the center(capital).

Basant Dev Dynasty { 700 -870 AD}

It is known from the inscription of Tribhuvanraj received from Bageshwar that the first Katyuri king was Basant Dev whose capital was Kartikeyapur. Basant Dev got the title of Param-Bhattaraka-Maharajadhiraj-Parameshwar.

From which it is clear that Kartikeyapur was an independent state.

Kharpardev's dynasty{ 870-900 CE }

The description of **KHARPARDEV** dynasty is available from the Bageshwar inscription itself.

KHARPARDEV

KALYAN RAJ

TRIBHUVAN RAJ - got the title of *Param-Bhattaraka-Maharajadhiraj-Parameshwar Tribhuvan*, he donated land to Vyaghreshwar devta .

Rajnimbar dynasty - Rajnimbar dynasty, the third dynasty of Katyuri Valley, is found from the Bageshwar article.

Salonaditya dynasty - In the copperplate articles of Taleshwar and Pandukeshwar, the description of the rule of Salonaditya dynasty after Rajnimbar dynasty is found.

Palavansh Dynasty - Major rulers were Lakhan Pal, Tribhuvan Pal, Rudrapal and Uday Pal etc.

Dynasty of Krachaldev - Gopeshwar record - In 1223, Krachaldev defeated the immediate rulers and ruled in Katyuri valley.

Asanti Dev dynasty - founder was Asantidev, Asantidev dynasty ended along with Brahmadev in the second half of the 15th century

Till the 9th century,

Garhwal was ruled by 54 big and small Thakuri rulers, the most powerful of them was Bhanupratap, the king of Chandpurgarh.

In 887 AD, Kanakpal, the ruler of Dhar (Gujarat), came on pilgrimage, Bhanupratap welcomed and married his daughter.

in 888 AD Kanakpal laid the foundation of the Parmar dynasty in Chandpurgarh (Chamoli),

from 888 AD to 1949 AD there were 60 kings in the Parmar dynasty.

Ajaypal, the 37th king of this dynasty, conquered all the Garhpatis and unified the Garhwal land. ***It established its capital Chandpur Garh first at Devalgarh and then at Srinagar in 1517 AD.***

The Parmar rulers were **awarded the title of Shah by the ruler of the Lodi dynasty**, Bahlod Lodi, first Balbhadra Shah added Shah to his name.

In 1636 AD, the Mughal general Nawajat Khan attacked the Doon Valley and at that time, the protected queen of the Garhwal state, ***Karnavati, with her bravery, captured the Mughal soldiers and got their noses cut off, after this incident, Queen Karnavati was known as "Nakkati Rani". Became famous by name.***

Aurangzeb was angered by the fact that Parmar King Prithvipati Shah had given shelter to Shuleman Shikoh, the son of Mughal Prince Darashikoh.

The Gurkhas defeated the Chandos of Kumaon in 1790 AD, also attacked Garhwal in 1791 AD but were defeated.

The king of Garhwal imposed **an annual tax of 25000 rupees under the treaty with the Gorkhas and took a promise that they would not attack Garhwal again,**

but in 1803 AD, under the leadership of Amar Singh Thapa and Hastidal Chautaria, Gurkhas attacked the land-affected Garhwal. Captured a large part of them.

On May 14, 1804, Pradhuman Shah was killed in a battle with the Gorkhas at Khudbuda Maidan in Dehradun, thus the Nepali Gorkhas got their rights in entire Garhwal and Kumaon.

Kunwar Pritamshah, a son of Pradhuman Shah, was taken prisoner by the Gorkhas and sent to Kathmandu, while the other son Sudarshanshah stayed in Haridwar and tried to become independent and on his demand, the British Governor General Lord Hastings sent the British army against the Gorkhas in October 1814 and in 1815 Made Garhwal independent, but due to not being able to pay the expenses of the war to the British, the Garhwal king had to give his kingdom to the British in agreement.

Shudarshan Shah established Tehri Garhwal on 28 December 1815 from his capital Srinagar. Tehri continued to rule the state and after its merger with India, Tehri made a district of Uttar Pradesh on 1 August 1949.

Chand dynasty of Kumaon –

The founder of Chand dynasty in Kumaon was Somchand who ascended the throne in 700 AD

In Kumaon, Chand and Katyuri were contemporaries in the beginning and there was a struggle for power in which Chand was victorious in the end. The Chands made Champawat their capital. Initially only the areas around Champawat were under them, but the present Nainital, Bageshwar, Pithoragarh, Almora etc. areas became under them.

Bhishmchand shifted the capital from Champawat to Almora, which was completed during the time of Kalyanchand III (1560).

The practice of appointment of village head and land determination started in Kumaon during Chand rule.

Cow was the state symbol of some kings.

In 1790 AD, the Gorkhas of Nepal defeated Chand Raja Mahendra Chand in the battle of Hawalbagh and captured Kumaon, with this the Chand dynasty came to an end in Kumaon.

Gorkhas were from Nepal, Gorkhas defeated Chand Raja and captured Almora in 1790.

~~After taking control of Kumaon, attacked Garhwal in 1791 but was defeated~~ and in February 1803, going against the treaty, Gorkhas attacked Garhwal again under the leadership of Amarsingh Thapa and Hastidal Chautaria and succeeded.

On May 14, 1804, there was a war between the Garhwal King Pradhumna Shah and the Gorkhas at Khudbuda Maidan in Dehradun and the Garhwal King was martyred.

In 1814 AD, after being defeated in the war with the British in Garhwal, Garhwal Raj became free, now only the rule of Gorkhas remained in Kumaon.

Colonel Nichols and Colonel Gardner won Almora in Kumaon in April 1815 and General Ochterlony won the fort of Malav on May 15, 1815 from Veer Gorkha Sardar Amar Singh Thapa.

On 27 April 1815, under the **Treaty of SUGAULI** between Colonel Gardner and Gorkha ruler Bamshah, the power of Kumaon was handed over to the British.

The rule of Gorkhas in Kumaon and Garhwal lasted for 25 and 10.5 years respectively. This tyrannical rule, which was full of atrocities, is called Gorkhayali.

British rule

After taking control of Kumaon by April 1815, the British made all other areas except Tehri a non-regulation province and made it a part of the North Eastern Province, and appointed **Colonel Gardner** as the first commissioner of this region.

After sometime Kumaon Janpad was formed and Dehradun was included in Saharanpur Janpad in 1817.

In 1840, the headquarters of British Garhwal was shifted from Srinagar to Pauri and a new district named Pauri Garhwal was formed.

Nainital was made the headquarters of the Kumaon division in 1854.

In 1891 Kumaon was divided into two districts named Almora and Nainital, and till independence there were only 3 districts in Kumaon (Almora, Nainital, Pauri Garhwal) and Tehri Garhwal was in the form of a princely state

In 1891, the non regulation province system was abolished from Uttarakhand.

In 1902, the United Provinces of Agra and Oudh were formed and Uttarakhand was included in it.

In 1904, Uttarakhand was named as the Hill State in the Nainital Gazetteer.

India's Freedom Struggle .

The people of uttarakhand played a vital role in india's freedom struggle .

From the first war of independence of 1857 to Indian independence, they participated in every sphere of movement. Kalu Mehra was known as first freedom fighter of Uttarakhand. He made a secret organisation "Krantiveer" 1857 at champavat and carried struggle against British.

Debating Club was setup in 1870 at Almora which propagated freedom awareness sentiment among people. Jwala Dutt Joshi participated in 2nd congress session at 1886 at calcutta.



कूर्माचल केसरी बद्रीदत्त पाण्डे (Kuramanchal Kesari Badri Datt Pandey)

[f](#) @ExamPillar [t](#) @ExamPillar [i](#) @ExamPillar



Pt. Govind Ballabh Pant entered in 20th century in freedom movement and organise happy club in 1903.

Almora congress was setup by pt. G. B. Pant in 1912 to propagate political awareness.

Victor mohan joshi, Badrinath Panday, Chiranzi lal and Hemchandra started Home rule league movement in the state in 1914.

In 1916 **KUMAO PARISHAD WAS ORGANIZED BY GOVIND BALLABH PANT**, Har govind Dutt and Badridatt panday which spreaded **movement Kuli Begar, coolie – begar/ utar law** and Bandobast system.

Movement of Kuli Begar, coolie – begar/ utar in 1921

This parishad was merged with congress in 1926. Gharwal congress committee was organized by barrister Mukundi lal and Anusuya Prasad Bahuguna . They also participated in congress session in Amritsar.

Jyotiram kandpal, Bhairav dutt and gorkhaveer karang Bahadur participated in dandi march with Gandhi ji. Vimla, janki, Bhagirathi, shakuntala ,Savitri and Padma Joshi were active in salt satyagrah.

Newspapers and magazine also played important role Almora Newspaper was started in kumao language in **1871**. Badri Dutt Panday was an editor of this newspaper.

He also published a Magazine Shakti in 1918. Gharwali was published by Vishamber Dutt chandola in **1905**.

Karambhumi was published by Bhakt Darshan and Bhairav Dutt from Lansdown in **1939**.

Yugvani was published from Dehradun in **1941**.

UTTARAKHAND RAJYA ANDOLAN



As a unit of Indian independence movement in 1913, the national general convention of the Indian National Congress was held in Uttarakhand.

Most representatives from Uttarakhand participated in the session.

The same year in Uttarakhand, Tamta Sudharini Sabha held the convention for the upliftment of backwards and oppressed people of the area, as the Shilpkar Mahasabha.

In September 1916, the Kumaon Parishad was founded by some young enthusiasts—mainly Pt Hargovind Ballabh Pant, Govind Ballabh Pant, Badri Datt Pandey, Indralal Shah, Mohan Singh Damarwal Chandra Lal Shah, Prem Ballabh Pandey, Bhola Datt Pandey and Lakshmi Datt Shastri with the main objective to solve social and economic problems of the hill region.

By 1916, in addition to the local general reforms, certain- political objectives were added to the organization's goals.

In the Provincial elections of 1923 and 1926 the candidates of Kumaon Parishad, Hargovind Ballabh Pant, Govind Ballabh Pant, Mukundi Lal and Badri Datt Pandey badly defeated their counterparties.

In 1926 Kumaon Parishad was merged in the Indian National Congress.

In May 1938, according to official sources in the British Raj, in the national general convention of Indian National Congress held at Srinagar, Garhwal, Pandit Jawaharlal Nehru favoured the cause of the movement of the residents of hill region to have their own decisions according to their circumstances and supported the movement to enrich their culture.

The demand to make Uttarakhand a state was first raised at a special session of the Indian National Congress held in Srinagar on 5-6 May 1938.

In 1940., at Haldwani conference, Badri Datt Pandey voiced for the special status of the mountainous region. Anusuya Prasad Bahuguna proposed the formation of Kumaon - Garhwal as the separate units.





In 1954 the Uttar Pradesh Legislative Council member Indra Singh Nayal demanded the separate development plan for the highlands to then Chief Minister of Uttar Pradesh, Govind Ballabh Pant.

In 1955 the Justice Fazal Ali commission recommended the Government of India, formation of hill region as a separate state.

(Recommendations about the reorganization of India's states).

In the year 1957, deputy chairman of the Planning Commission, T. T. Krishnamachari suggested special attention be given to the issues of the hill region.

On 12 May 1970, then Prime Minister Indira Gandhi addressed the issues of hill region and admitted that the diagnosis of the problems of hill region is the responsibility of both State and Central Governments.



On 24 July 1979, the Uttarakhand Kranti Dal was founded in Mussoorie with the objective of the formation of a separate hill state.

In June 1987, at the party convention of UKD in Karnaprayag, party leaders called for the **constitution of conflict and isolation.**

In November 1987 UKD passed the party resolution for the formation of the new state in the memorandum and the party president also sought to include Haridwar in the proposed state.

Throughout the year 1994, students all over the region participated in the collective movement for separate statehood and reservations. Uttarakhand movement then further intensified in the field by Anti-Uttarakhand statement of then Chief Minister of Uttar Pradesh, Mulayam Singh Yadav.

The leaders of UKD held fast-unto-death in the support of their demand for a separate state.

State government employees struck work for three months, and the events of the Uttarakhand movement got more intensified with the blockades and confrontation with the police.



रामपूर तिराहा सड़क पर धरना देते उत्तराखण्ड आन्दोलनकारी

Uttarakhand activists in Mussoorie and Khatima were shot down by the police.

Under the aegis of the, Sanyukta Morcha on **2 October 1994** the massive demonstrations and protests for the support of statehood took place in the national capital Delhi.

Thousands of Uttarakhand activists marched to Delhi to participate in this struggle.

The activists peacefully taking part in the demonstration near Rampur Tiraha crossing, Muzaffarnagar, were tortured and openly fired without any warning prior to the firing.

Policemen were also alleged for indecent behavior and rapes with women activists.

Satya Pokhriyal was leader who leads all the people from the mishappening, other andolankari help other people and shows the bravery.

Several people were killed and many were injured. This misadventure by the police added fuel to the fire for the Uttarakhand movement.

The next day 3 October, the protests were called off for the demolition of firing and several deaths all over the region.

7 October 1994, a female activist died after the brutal attack by police in Dehradun while she was protesting against Rampur Tiraha Firings, and the activists in return stormed the police station.

15 October 1994, curfew took in Dehradun and one activist was killed on the same day in karanpur. ***MARTYR RAJESH RAWAT***

27 October 1994, then Home Minister of India, Rajesh Pilot held the talks with the statehood activists. Meanwhile, at Sriyantra Tapu, Srinagar several activists were killed in a brutal attack by the police.

15 August 1996, then Prime Minister H. D. Deve Gowda announced the formation of new state Uttarakhand from the Red Fort, Delhi.





~~In 1998 the BJP-led coalition government in the center sent the 'Uttaranchal Bill' to the Government of Uttar Pradesh through the President of India. With 26 amendments the Uttaranchal Bill was passed by the Uttar Pradesh Assembly and sent back to the Central Government.~~

The Central Government **on 27 July 2000**, presented the Uttar Pradesh Reorganisation Bill 2000 in the Parliament of India.

It was passed by Lok Sabha on 1 August 2000, and the Rajya Sabha passed the bill on 10 August 2000.

Then President of India, K. R. Narayanan approved the Uttar Pradesh Reorganisation Bill,

UTTARAKHAND FOUNDATION DAY

9th NOVEMBER



Uttarakhand Foundation Day

on 28 August 2000, and then it turned into Act and on 9 November 2000 the new state Uttaranchal came into existence as the 27th state of India now known as Uttarakhand.

In January 2007 the new state changed its name to Uttarakhand.....

Chipko Move



Chipko Movement, started in 1970's, was a non violent movement aimed at protection and conservation of trees and forests from being destroyed.

The name of the Chipko moment originated from the word 'embrace' as the villagers used to hug the trees and protect them from wood cutters from cutting them.

Three leaders of Chipko movement are Gaura Devi, Sudesha Devi, Bachni Devi and Chandi Prasad Bhatt.

The Chipko Movement gained momentum under Sunderlal Bahuguna.

The chipko protests achieved a major victory in 1980 with a 15 years ban on tree felling in the Himalayan forests of the state by the order of Mrs. Indira Gandhi.

Maiti Andolan



Maiti Andolan is a major environmental movement launched in the state of Uttarakhand.

Shri Kalyan Singh Rawat ji is considered to be the **father of Maiti movement**. And started in 1995 from gwaldam chamoli .

Many movements related to environmental protection are already going on in the state of Uttarakhand, such as Chipko Andolan. Similarly, there was another movement in Uttarakhand, whose name is '**Maiti Andolan**'. Today which is famous as a social custom in the whole of Garhwal. In which the general public actively participates.

SRI DEV SUMAN (25 May 1916 – 25 July 1944)



Born on 25 may 1916, in the village Jaul of Tehri Garhwal district of Uttarakhand

Suman's real name was Shri Dutt Badoni however later on as he contributed in the revolution of freedom he was renamed as Sri Dev Suman.

*In 1930 Sri Dev Suman was only 14 years old when he participated in “**Namak Satyagraha**” in Dehradun.*

he was arrested and sentenced to the imprisonment of 15 days in the Agra Central Jail. Where he wrote the following lines on our beloved motherland-

*“आज जननी है उगलती, अग्नियुक्त अंगार माँ जी,
आज जननी कर रही है, रक्त का श्रृंगार मां जी।
इधर मेरे मुल्क में स्वाधीनता संग्राम मां जी,
उधर दुनिया मे मची है, मार काट महान मां जी।।”*

He started to fight for the freedom of Tehri Riyasat from the clutches of the King of Garhwal Bolanda Badri (Speaking Badrinath).

Sri Dev Suman was highly influenced by Mahatma Gandhiji and used a Non-Violence way for the freedom of Tehri.

In that very time, there were many kinds of objectionable taxes incorporated on the poor subjects of **Tehri Riyasat**.

Sri Dev Suman was one of the first proponents of the unification of Uttarakhand. He was invited as a representative of the hills; to a conference held in February 1939, which was presided by Pandit Jawahar Lal Nehru in Ludhiana.

He was very keen to seek Blessings from his idol for the **Praja-Mandal** movement. On returning to Tehri he was arrested by the soldiers of Garhwal who had been trailing him. He was barred to enter the Tehri state and was arrested every time whenever he tried to do so.

However the enthusiasm in his heart was constantly increasing, therefore he vowed to fight against the ruthless administrators even at the cost of his life.

On 27December1943 when he was trying to enter into the Kingdom of Tehri, he was arrested at Chamba.

Mohan Singh was the in-charge of the jail and he never missed an opportunity to misbehave and torture Sri Dev Suman.

In that prison, Sri Dev Suman was anguished in many ways. On 3 May 1944, Sri Dev Suman started declining food and by July he was very critical. He was asked to give up his resolution and eat something for life.

Being imprisoned for 209 days and not eating for 84 days ultimately caused him to breathe his last.

Jail authorities decided not to disclose the death of Sri Dev Suman. They packed the mortal remains of Sri Dev Suman in a cotton bag and threw it into the Bhilangana River.

This heinous act of jail authorities ultimately came into the knowledge and the people of Tehri went wild on his death.

He was a doctor by profession and Martyred only at the age of 29, leaving behind his wife and a legacy of inspiration for the people like us.

His Balidan Diwas (The Day of Martyrdom) is celebrated 25th of July.

Geographical Division of Uttarakhand

Geographical Division of Uttarakhand: On the basis of surface configuration, **Uttarakhand is divided into 8 geographical regions.**

1. Trans Himalayan Region
2. Greater (Higher) Himalayan region
3. Small (Central) Himalayan Region
4. Doon Area
5. Shivalik Area
6. Bhabar Area
7. Lowland (Tarai) Area
8. Gangetic Plains

Geographical phenomena

THE GEOGRAPHIC PHENOMENA ARE THOSE DRASTIC AND OBSERVABLE CHANGES THAT TAKE PLACE IN NATURE. THEY CAN OCCUR ABRUPTLY AND ARE CAPABLE OF TRANSFORMING THE ENVIRONMENT, SO THAT, AFTER THESE PHENOMENA OCCUR, A NEW REALITY ARISES.

GEOGRAPHIC PHENOMENA ARE COMPLEMENTED BY GEOGRAPHICAL FACTS , WHICH REFER TO ELEMENTS THAT ARE STABLE AND WHOSE VARIATIONS ARE PERCEIVED OVER LONGER PERIODS. THEN, IN THE NATURE IS PART OF A GEOGRAPHIC FACT. THEN A PHENOMENON THAT GENERATES AN ABRUPT VARIATION IN THE ENVIRONMENT IS GENERATED, AND THE NEW REALITY THAT IS GENERATED LATER BECOMES A NEW GEOGRAPHIC FACT.

Types of geographical phenomena

Geographic phenomena can be classified according to the elements from which they occur. This classification includes three types:

Physical - Physical geographic phenomena refer to those that are generated without involving any living organism.

Biological - Biological geographic phenomena are those that are generated by living beings, excluding humans.

Human- These phenomena are the most obvious and, in many cases, invasive that can be found on the planet. Human geographic phenomena are caused exclusively by the action of man in his environment.

Geographical phenomena: Uttarakhand



Devbhumi Uttarakhand is the most disaster prone state of India. Both natural and man made disasters are common in the state. During the last decades the fragility of Uttarakhand Himalaya has been increased due to over exploitation of natural resources and excess tourism in the state. The frequency of earthquakes, landslides, cloudburst, tsunami, avalanches or glacier burst, flash flood, forest fire and sinkhole etc has also increased in the state.

Earthquake

An earthquake refers to the shaking of the earth's surface caused by a sudden release of energy within the earth's crust. This release of energy generates seismic waves, commonly known as S waves. The intensity and characteristics of an earthquake are determined by the seismic activities occurring in a specific region.

During an earthquake, the stored energy accumulated within the earth's crust is suddenly released, leading to the rapid movement and displacement of rock masses along fault lines. This movement produces vibrations that propagate through the earth in the form of seismic waves. The two primary types of seismic waves are [S \(secondary\) and P \(primary\) waves](#).

S waves, also called shear waves, travel through the earth by causing particles to move perpendicular to the direction of wave propagation. These waves are responsible for the side-to-side shaking motion experienced during an earthquake. On the other hand, P waves, or compression waves, cause particles to move in the same direction as the wave propagation. P waves are the first detected during an earthquake and are responsible for the initial abrupt jolts.

Understanding the nature of earthquakes and the behavior of seismic waves is crucial for assessing the potential risks associated with these natural disasters. It enables scientists and experts to study seismic patterns, develop early warning systems, establish building codes for earthquake-resistant structures and educate communities on preparedness and response measures.

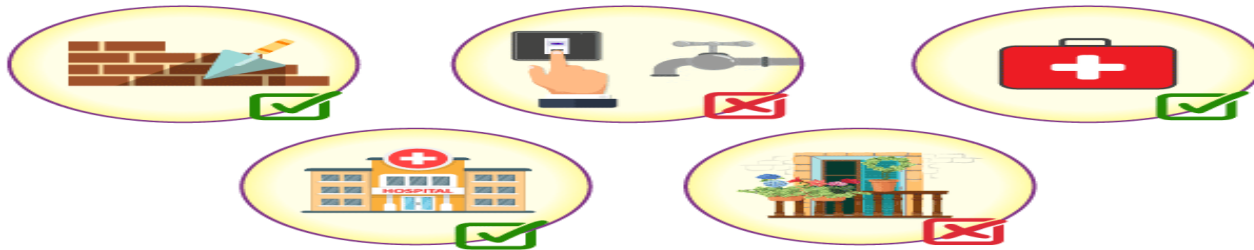
causes

Earthquakes occur due to sudden tectonic movements within the Earth's crust. The Earth's crust is divided into large sections called [tectonic plates](#), which float on the semi-fluid layer known as the asthenosphere. These plates are constantly in motion, albeit very slowly.

When two tectonic plates interact, various types of boundaries can form, such as convergent and divergent and transform boundaries. The most powerful and destructive earthquakes typically occur at convergent boundaries, where two plates collide or slide past each other.

At a convergent boundary, one tectonic plate may be forced beneath another in a process called subduction. As the plates collide or slide past each other, immense pressure and friction build-up. Eventually, the stress becomes too great, causing the rocks along the plate boundaries to break and slip. This sudden release of stored energy generates seismic waves, resulting in an earthquake.

Do's



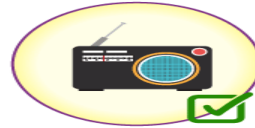
- **Make Connections Flexible**-Ensure that gas lines and appliances are properly installed with flexible connections. This helps prevent gas leaks and reduces the risk of fire hazards during an earthquake.
- **Create an Earthquake Readiness Plan**- Develop a well-thought-out plan that includes identifying a shelter area in your home. Stock up on essential supplies such as canned food, a well-stocked first aid kit, ample water, dust masks, goggles, firefighting equipment, a flashlight and a working battery-operated radio.
- **Consult Architects and Structural Engineers**-Building sturdy structures is vital for minimizing earthquake damage and ensuring the safety of occupants. If you reside in an earthquake-prone area, it's crucial to consult with architects and structural engineers before constructing buildings.
- **Spread Awareness**

During



- **Stay Indoors**-Remain indoors until the shaking stops and it is officially announced that it is safe to exit. Taking cover beneath a sturdy table or bed can provide vital protection against falling objects.
- **Avoid Hazardous Areas**-Steer clear of bookcases, heavy furniture and appliances that may topple over during the earthquake. Your safety should always be the top priority.
- **Find a Safe Spot**-Seek shelter under a sturdy piece of furniture, such as a table or bed. Hold on to a post or any other fixture to maintain stability and minimize the risk of injury.
- **If Outdoors, Move to an Open Area**- If you are outside when the earthquake occurs, find a clear spot away from buildings, trees and power lines. These objects pose a significant danger during seismic activity.

After



Once the earthquake subsides, it's important to proceed with caution and take the following measures:

- **Administer First Aid**-Attend to individuals with minor injuries using first aid kits. For those with more severe injuries, it's essential to wait for professional medical help and avoid moving them until it is safe.
- **CPR and Rescue Breathing**-If someone is not breathing, administer rescue breathing. If the person has no pulse, perform CPR (cardiopulmonary resuscitation) until medical assistance arrives.
- **Be Mindful of Hazards**-Attend any tumbling shelves or falling items and be cautious around damaged walls made of bricks or other unstable materials. Your safety should be a priority.
- **Check Gas and Power Connections**-Inspect gas valves for leaks and turn off the main power switch if damage is possible. Unplug broken appliances until they can be properly repaired.
- **Stay Clear of Power Lines** -Keep a safe distance from downed power lines and any objects or appliances in contact with them. Electricity poses a significant risk, so exercise caution.

Earthquake in Uttarakhand

Earthquake - A total of 163 earthquakes with a magnitude of four or above have struck within 300 kilometers (186 mi) of Uttarakhand, India in the past 10 years. This comes down to a yearly average of 16 earthquakes per year, or 1 per month. On average an earthquake will hit near Uttarakhand roughly every 22 days.

A relatively large number of earthquakes occurred near Uttarakhand in 2022. A total of 24 earthquakes (mag 4+) were detected within 300 km of Uttarakhand that year. The strongest had a 5.7 magnitude.

Uttarakhand Earthquake Statistics

AVERAGE EARTHQUAKE
16 YEARLY

Within 300 km, Mag 4+, last 10 years

LATEST EARTHQUAKE:
MAG 3.7

Jul 6, 2023 18:09



Earthquake Incidents

The **1803 Garhwal earthquake** occurred in the early morning of September 1 at 01:30 [local time](#). The estimated 7.8-magnitude-earthquake had an epicenter in the [Garhwal Himalaya](#) near [Uttarkashi](#), [British India](#). Major damage occurred in the Himalaya and [Indo-Gangetic Plain](#), with the loss of between 200 and 300 lives. It is among the largest Himalaya earthquakes of the 19th-century, caused by [thrust faulting](#).

In 1980 devastated India- Nepal border region on the evening of July 29. the epicenter of the 6.6M. Atleast 200 people died and 5,600 were injured in the disaster. Extensive damage occurred on both sides of the border, amounting to 245 million USD.

In **1991 Uttarkashi earthquake** occurred at 02:53:16 [Indian Standard Time \(UTC+05:30\)](#) on 20 October with a moment magnitude of 6.8 and a maximum Mercalli intensity of IX (*Violent*). This thrust event was instrumentally recorded and occurred along the Main Central Thrust in the [Uttarkashi](#) and Gharwal regions of the [Indian](#) state of [Uttarakhand](#) (then still part of [Uttar Pradesh](#)). High intensity shaking resulted in the deaths of at least 768 people and the destruction of thousands of homes. scientists from the [Indian Institute of Technology Kanpur \(IITK\)](#) conducted a survey of the affected areas between 27 October and 4 November. Their work revealed that more than 300,000 people in 1,294 villages were affected by the shock.

In The **1999 Chamoli earthquake** occurred on 29 March in the [Chamoli district](#) in the [Indian](#) state of [Uttar Pradesh](#) (now in [Uttarakhand](#)). Approximately 103 people died in the earthquake. Severe ground deformations resulted from the earthquake. Landslips cut off parts of Mandakini valley and Mandal valley and many major roads. Several hundred people were injured and approximately 50,000 houses were damaged. Over 2,000 villages were affected by aforesaid earthquake.

In 2017 earthquake occurred on 6 February,2017 in the rudraprayag district in the state of Uttarakhand. Less casualty was reported and many cracks in building were reported.

Cloudburst



Cloudburst



A cloudburst is a localized phenomenon experiencing an extreme amount of rain concentrated in a short period, sometimes accompanied by hail and thunder. The short spells of very heavy rainfall over a small geographical area cause widespread destruction, especially in hilly regions where this phenomenon is the most common. According to the Indian Meteorological Department (IMD), 100 mm of rain in an hour is called a cloudburst. Usually, cloudbursts occur over a small geographical region of 20 to 30 sq. km.

How does a cloudburst occur?



- In India, cloudbursts often occur during the monsoon season, when the southwesterly monsoon winds bring in substantive amounts of moisture in land.
- The phenomenon that is responsible for this large amount of precipitation in such a short duration is 'orographic lift'.
- It is the process by which clouds that are about to rain are pushed up by warm air currents.
- As they reach higher elevations, the water droplets within the clouds become bigger and new ones are formed and these dense clouds eventually burst when unable to hold the large volume of moisture.
- This results in torrential downpours in the geographical region right below and leads to overflowing of water bodies in a very short duration of time.
- Tall cumulonimbus clouds can develop in about half an hour as the moisture updraft happens rapidly, at a pace of 60 to 120 km/hr.
- A single-cell cloud may last for an hour and dump all the rain in the last 20 to 30 minutes, while some of these clouds merge to form multi-cell storms and last for several hours.
- Thus, an orographic lifting together with a strong moisture convergence leads to intense cumulonimbus clouds taking in huge volumes of moisture that is dumped during cloudbursts.

cloudburst prone areas?

- Cloudbursts in India, occur mostly over the rugged terrains of **the Himalayas, the Western Ghats, and northeastern hill States of India.**
- The heavy spells of rain on the fragile steep slopes **trigger landslides, debris flows, and flash floods**, causing large-scale destruction and loss of people and property.

Can cloudbursts be forecasted?



- Weather forecast models face a **challenge in simulating the clouds at a high resolution.**
- The India Meteorological Department forecasts rainfall events well in advance, but it **does not predict the quantum of rainfall.**
- The forecasts can be done about light, heavy, or very heavy rainfall, but weather scientists **do not have the capability to predict exactly how much rain is likely to fall at any given place.**
- Additionally, the forecasts are for a relatively large geographical area, usually a region, a state, a meteorological sub-division, or at best a district.
- As they zoom in over smaller areas, the forecasts get more and more uncertain.
- Moreover, the skillful forecasting of rainfall in hilly regions remains challenging due to the **uncertainties in the interaction between the moisture convergence and the hilly terrain**, and the heating-cooling mechanisms at different atmospheric levels.
- Theoretically, it is not impossible to forecast rainfall over a very small area as well, but it requires a very dense network of weather instruments and computing capabilities that seem unfeasible with current technologies.
- The IMD's forecasts, and in general, the weather prediction scenario, have advanced such that widespread extreme rains can be predicted two-three days in advance.
- Cyclones can be predicted about one week in advance.
- However, cloudburst forecasts still remain elusive.

Precautions during cloudburst

Follow these **safety measures** to stay safe in case there's a cloudburst near you:

1. Don't panic- First and foremost you should remain calm. Panic never helps in an **emergency situation** instead you should have your wits about you and ensure your safety and the safety of those around you.

2. Avoid Going Out-Don't go out unnecessarily when a **cloudburst** occurs. Cloudbursts can cause **flash floods** which can be a threat to human lives.

3. Have a secondary power supply ready- During heavy rainfall, **blackouts** are common. It is wise to plan ahead for such a scenario and have a backup power source ready beforehand like a **generator** or a **UPS**.

4. Take shelter-If you are already out of home at the time of a **cloudburst**, take shelter somewhere. Don't stand in the rain or go near flooded areas to prevent **drowning**. Also, stay away from electrical poles or wires to protect yourself from getting electrocuted.

5. Stay up-to-date with the latest news -It is important to stay updated on the latest news for important information like **flooded areas** and **weather predictions** for your safety.

6. Emergency kits can come in handy

CLOUDBURST: UTTARAKHAND



In recent times extreme rainfall events as cloudbursts are dominant phenomenon trigger large scale mass movement and flash floods in the Himalayan region. Cloudburst is a natural and common phenomenon in the Himalaya, especially in Garhwal and Kumaon region of Uttarakhand. Cloudburst and associated disaster affect thousands of people every year and cause loss of life, property, livelihood, infrastructure and environment.

Almost every year several parts of Uttarakhand Himalaya experience cloudburst and associated hazards. Cloudburst during August 1998 at Ukhimath (Rudraprayag) and Malpa (Pithoragarh), August 2001 at Phata (Rudraprayag), August 2002 at Burakedar (Tehri), August, 2012 in Asi Ganga (Uttarkashi), September, 2012 at Ukhimath (Rudraprayag) and June 2013 at Kedarnath (Rudraprayag) are some of the examples of recent cloudburst incidences associated with flash floods and landslides in Uttarakhand Himalaya.

Very recently a massive A massive flash flood triggered by a cloudburst washed a bridge away in Uttarakhand's Pithoragarh district. It has been reported that the cloudburst happened in Chal village of Dharchula town in the district. As the bridge washed away and debris got accumulated, hundreds of locals were stranded Video shows locals making way against the strong flow of water after the bridge was washed away.

Cloudburst incidences over many areas of Himalaya often go unnoticed due to the absence of meteorological observatories. Many a times these come to notice only when these are accompanied by losses and casualties. In the absence of losses these can only be identified on the basis of inundation occurring along streams. Mostly upper reach of first order and second order drainages (seasonal streams) have been observed to be overwhelmed by debris flow during these incidences. Slope failures and bank erosion are common during this phenomenon which result sedimentation and sometimes block the river course, turn them into big lake and create flood condition.



Considering extreme rainfall events in Uttarakhand Himalaya, it is suggested that instead of valleys and along abandoned channel of drains people should inhabit on the hard rock or firm ground of slopes for safety reasons.

This should precede implementation of permanent treatment measures. People living around these slopes should remain vigilant, particularly during the monsoon period and any physical change in the slope should immediately be brought into the notice of authorities.

On the basis of information collected from the local people, strong wind and lightning are very common during cloudburst. Even though locals consider it to be a cloudburst event it is hard either to accept or reject their assertion in absence of authentic meteorological data from the proximity of slope failure incidences.

Indiscriminate and unscientific construction should be banned especially in landslide affected areas

2013 kedarnath incident



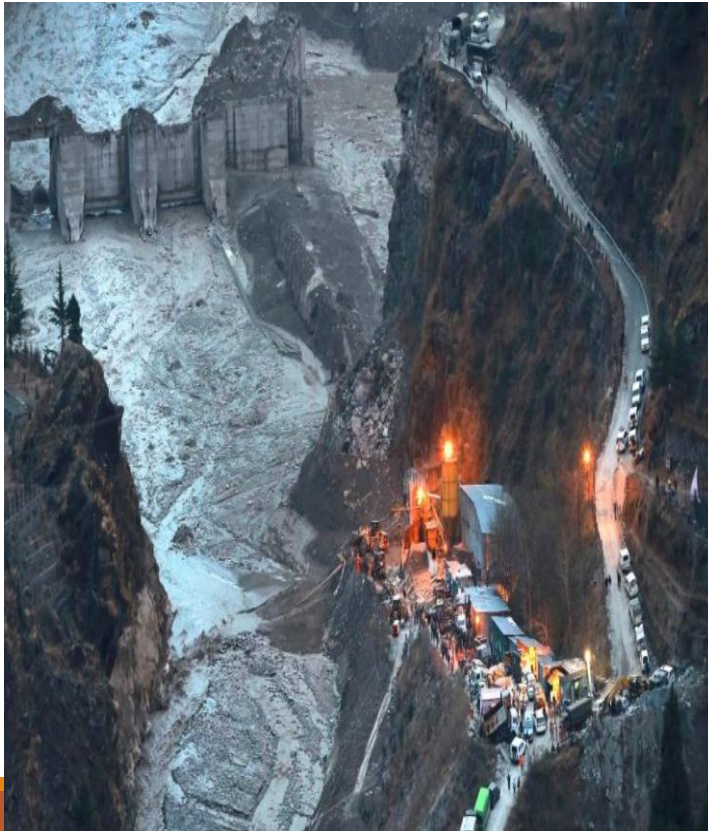
The high intensity rainfall of more than 100 mm/hour in a few square kilometer area is generally defined as cloudburst. Mostly cloudburst activities occur between Main Centre Thrust and Main boundary Thrust . Bheti-Paundar (August, 1998), Phata (July, 2001) and Okhimath (September, 2012) in Rudraprayag districts are the evidence for cloudburst events.

Besides, in the year 2005, close to national highway (NH 58), Rudraprayag to Kedarnath national highway (NH 109), Agastmuni and Vijaynagar villages in Mandakini valley were affected by cloudburst. Several people had been reported to be buried under the debris and many were wounded due to the sudden torrential rainfall .

It is observed that the debris flow was the main cause of devastation in all the previous cloudburst incidences in Mandakini valley. As many as 22 locations of cloudburst events are thus identified during the field work in Rudraprayag district. Most of these (41 percent) are located in Okhimath tehsil.

Geomorphic features like funnel shaped valleys with high relief difference and dense forest cover especially oak trees with average height of 1600 to 2200 meters provide suitable conditions for its occurrence. It has been observed that cloud burst generally occurs along the more isolated slope generally facing towards west and south direction and in general occurs during the late hours of the day .

avalanche



avalanche

A mass of material moving rapidly down a slope. An avalanche is typically triggered when material on a slope breaks loose from its surroundings; this material then quickly collects and carries additional material down the slope.

There are various kinds of avalanches, including rock avalanches (which consist of large segments of shattered rock), ice avalanches (which typically occur in the vicinity of a glacier), and debris avalanches (which contain a variety of unconsolidated materials, such as loose stones and soil).

The occurrence of avalanche depends on the interaction of mountainous terrain, weather conditions, and a trigger. Slab avalanches typically occur on slopes of 30 to 50 degrees.

In order to reduce fatalities and to protect villages and roads, people attempt to predict and prevent avalanches. Accurate prediction requires an experienced avalanche forecaster who often works both in the field to gather snowpack information and in the office with sophisticated tools such as remotely accessed weather data, detailed historical weather and avalanche databases, weather models, and avalanche-forecasting models.

Recent incidents

in April 2021, the road access was cut off at four or five locations due to multiple landslides after the avalanche struck in Chamoli district. an avalanche hit a location about 4 km ahead of sumna on sumna-rimkhim road in Uttarakhand. The area has experienced heavy rains and snow since the last five days or more.

On 4 October 2022, an avalanche hit the [Draupadi Ka Danda](#) peak in [Uttarakhand](#), India. 27 mountaineers in the Advanced Mountaineering Course of the [Nehru Institute of Mountaineering](#) were killed as a result. The death toll and people missing makes this the worst mountaineering disaster recorded in India.

Do's

If you become caught in an avalanche, try to:

- Push machinery, equipment or heavy objects away from you to avoid injury.
- Grab onto anything solid (trees, rocks, etc.) to avoid being swept away.
- Keep your mouth closed and your teeth clenched.
- If you start moving downward with the avalanche, stay on the surface using a swimming motion.
- Try to move yourself to the side of the avalanche.

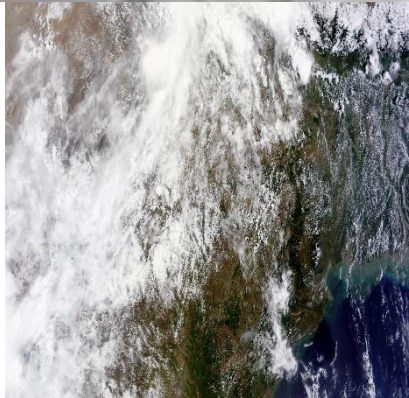
When the avalanche slows, attempt to:

- Push yourself towards the surface.
- Make an air pocket in front of your face using one arm.
- Push the other arm towards the surface.

When the avalanche stops, begin to:

- Dig yourself out, if possible.
- Relax your breathing, particularly if you cannot dig yourself out.
- Stay calm and shout only when a searcher is near.

Floods and flash flood



Floods and Flash Flood

A flood is an overflow of water on land. Sometimes a river might receive extra water, either from heavy rains or other natural disasters. When this happens, the water overflows from its normal path in the river bed and onto the dry land.

A flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall.

Difference between flood and flash flood

1. Flood, in general is caused by rain and bad weather while flash flood is the result of water overflowing from a contained location like a lake, river or reservoirs.
2. Flood is a generic term that can be used to describe any type of water overflow while flash floods are specific to broken dams, overflowing lakes and clogged rivers.
3. Flood happens gradually while flash flood occurs swiftly and almost instantaneously.
4. It's much safer to experience flood by rain than a flash flood that seemingly comes out of nowhere without warning.

Causes of flood

During a flood, people should move themselves and their most precious belongings to higher ground quickly. The process of leaving homes in search of a safe place is called evacuation. Floods occur at irregular intervals and vary in size, duration and the affected area.

Water naturally flows from high areas to low lying areas. This means low-lying areas may flood quickly before it begins to get to the higher ground.

Floods can also occur in rivers when the flow rate exceeds the capacity of the river channel, particularly at bends or meanders in the waterway. Floods often cause damage to homes and businesses if they are in the natural flood plains of rivers. Here are The following factors can lead to flooding:

Rains -Whenever there are more rains than the drainage system can take, they can cause floods.

River overflow- Rivers can overflow their banks to cause a flood. This can happen when there is more water upstream than usual, and as it flows downstream to the adjacent low-lying areas there is a burst and water gets into the land.

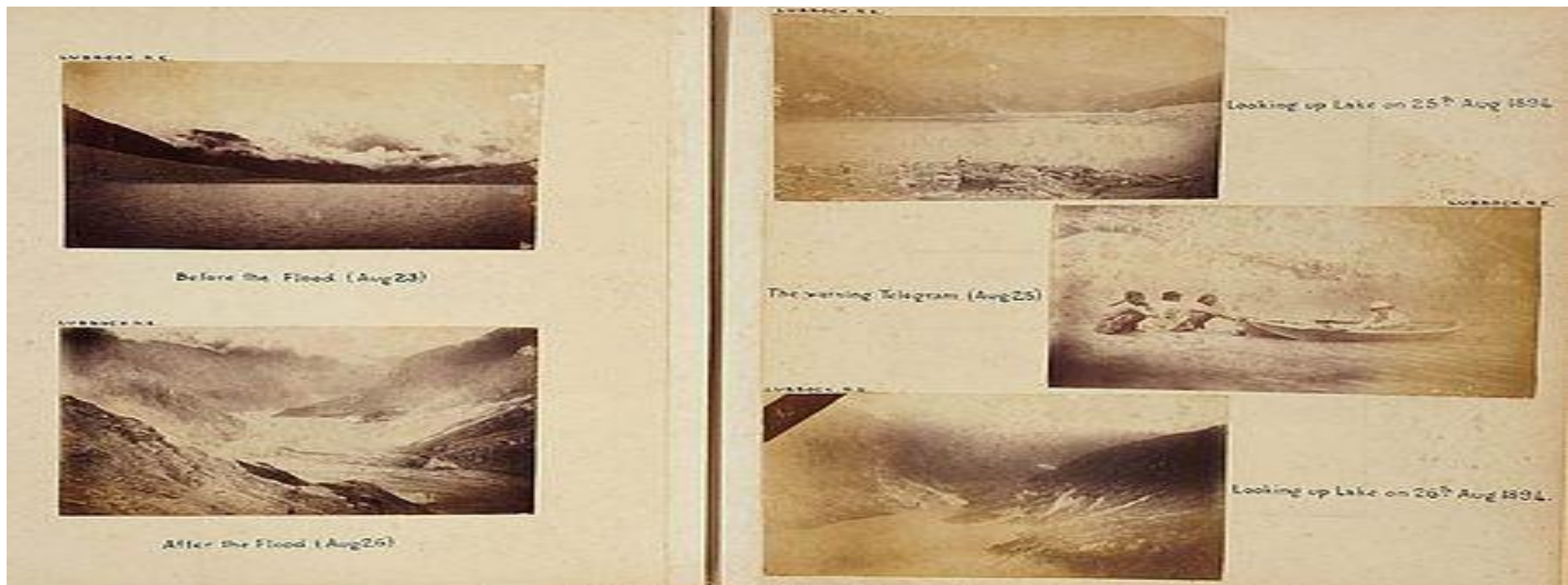
Strong winds in coastal areas - Seawater can be carried by massive winds and hurricanes onto the dry coastal lands and cause flooding. This is made worse if the winds carry rains with themselves. Sometimes water from the sea resulting from a tsunami can flow inland to cause damage.

Dam breaking- Dams are man-made structures mounted to hold water flowing down from a highland to a lowland. The power in the water is used to turn propellers to generate electricity. Sometimes, too much water held up in the dam can cause it to break and cause overflow in the area. Excess water can also be intentionally released from the dam to prevent it from breaking and that can also cause floods.

Ice and snow melts -In cold regions, heavy snow over the winter usually stays unmelted for some time. Some mountains have an ice cap on them. Sometimes the ice suddenly melts when the temperature rises, resulting in massive movement of water into places that are usually dry. This is usually called a snowmelt flood.

Floods and Flash Flood in Uttarakhand

1. 1894 Gohna lake - The **Durmi Lake dam-burst** was a flood in the Garhwal Region of India in 1894 caused by a landslide-induced temporary lake.



2. In 2012 flash flood: the state was most affected by the torrential rain. ten people died and 38 others are missing as a result of the flash floods. Several houses were washed away and the [Char Dham yatra](#) has been suspended leaving the pilgrims stranded. 19 labourers at the Assi Ganga hydel power project are reported to be missing in the [Uttarkashi](#) region. Nearly 30 homes have been washed away in the [Garhwal](#) region after the Gangotri bridge collapsed. A major chunk of the Gangotri National Highway has also been washed away.

3. From 16 June 2013 a well-marked cyclonic circulation developed around a low pressure area over the Bay of Bengal, moving westwards, rapidly intensified due to moisture supplied from both the Bay of Bengal and the Arabian Sea, combining with intense western disturbances from the north, thus causing the Indian state of [Uttarakhand](#) and adjoining areas to receive heavy rainfall, leading to 375% of the benchmark rainfall during a normal monsoon. This caused the melting of Chorabari Glacier at the height of 3800 meters and cresting of the [Mandakini River](#), which led to heavy floods near Gobindghat, [Kedar Dome](#), [Rudraprayag district](#), [Uttarakhand](#),

The **2021 Uttarakhand flood**, also known as the **Chamoli disaster**, began on 7 February 2021 in the environs of the [Nanda Devi National Park](#), a [UNESCO World Heritage Site](#) in the outer [Garhwal Himalayas](#) in [Uttarakhand](#) state, India (Maps 1 and 2). It was caused by a large rock and ice [avalanche](#) consisting of material dislodged from [Ronti](#) peak. It caused flooding in the [Chamoli](#) district, most notably in the [Rishiganga](#) river, the [Dhauliganga](#) river, and in turn the [Alaknanda](#)—the major [headstream](#) of the [Ganges](#) (Maps 2 and 3). The disaster left over 200 killed or missing. Most were workers at the [Tapovan dam](#) site.

Do's during flood and flash floods

- Elevate your home from the base while constructing to avoid entry of floodwater or construct walls to stop it.
- Install "check valves" in sewer pipes to prevent floodwater from entering the drains of your home.
- If your home is in very low land, then shift to a safer place and keep all furniture at an elevated level.
- Keep all your documents in a safe water-proof bag.
- Keep updated with flood safety tips given by the Government.
- Know the safest route of escape to the nearest shelter.
- Install the electricity supplying switches and plugs above a certain level from the floor, which is most unlikely to get reached by the floodwater.
- Keep all your electronic devices in secure water proof bags.

Don't

Do not go in the flood-prone zone or leave your home if there is any flood forecast.

- Take all valuables with you and do not keep any valuables at home as you have to evacuate the place.
- Do not ignore advice, messages, or instructions given by Government and local municipal bodies.
- Do not litter plastics, garbage, or any blockage making materials in the drains.

Human Geographical Phenomena -These phenomena are the most obvious and, in many cases, invasive that can be found on the planet. Human geographic phenomena are caused exclusively by the action of man in his environment. ~~human geographic phenomena alter the environment in a lasting way.~~ As a result of these transformations, positive and, in many cases, negative consequences can be generated.

Some examples of human geographic phenomena:

- **Construction of roads**

As a result of the need to expand its communication channels, human beings have transformed their environment. This has involved the construction of roads and roads that intervene openly in the environment.

The construction of this type of structures has been beneficial for the development of the human race, allowing to extend the interaction between the men and to generate a more effective communication.

However, in some cases the intervention has been detrimental to nature, because some Ecosystems Have been affected.

As a consequence of this type of constructions, entire species of flora and fauna can disappear, or deviations of water courses can be generated, among other manifestations.

Construction of dams

Hydraulic dams are structures, made of walls and containment elements, whose main function is to store or divert water from a river to serve different purposes.

Among the functions of a water dam are the regulation of water supply in a particular region, the storage of water for irrigation or energy production.

When constructing a dam, the human being intervenes to a great extent in the nature. These constructions generate positive consequences for human life, such as renewable energy production, flood control in certain areas and facilitating access to water for human consumption.

On the other hand, the construction of dams is considered a geographical phenomenon because it transforms the environment permanently:

- Generates stagnant water, which can bring disease
- Block the passage to different marine species, affecting migratory movements
- Promotes the extinction of whole colonies of organisms, which make life in the rivers.



The Tehri Dam has been the object of protests by environmental organizations and local people of the region. Virendra Dutt Saklani, lawyer and founder of the Anti-Tehri Dam Struggle Committee, was quick to point out the consequences associated to the large project. Environmental activist [Sunderlal Bahuguna](#) led the Anti-Tehri Dam movement from 1980s till 2004. The protest was against the displacement of town inhabitants and environmental consequence of the weak ecosystem and prone to earthquake and other disasters.

Geographical phenomena

LANDSLIDES

LANDSLIDES-----

- **About:**



A landslide is defined as the movement of a mass of rock, debris, or earth down a slope.

- They are a type of mass wasting, which denotes any downward movement of soil and rock under the direct influence of gravity.

The term landslide encompasses **five modes of slope movement: falls, topples, slides, spreads, and flows.**

LANDSLIDES-----Causes:

Causes-

Slope movement occurs when forces acting downward (mainly due to gravity) exceed the strength of the earth materials that compose the slope.

- Landslides are caused due to three major factors: geology, morphology, and human activity.
- Geology refers to characteristics of the material. The earth or rock might be weak or fractured, or different layers may have different strengths and stiffness.
- Morphology refers to the structure of the land. For example, slopes that lose their vegetation to fire or drought are more vulnerable to landslides.
- Vegetation holds soil in place, and without the root systems of trees, bushes, and other plants, the land is more likely to slide away.

LANDSLIDES----Mitigation:

• Mitigation:

- **Restriction on the construction and other developmental activities** such as roads and dams in the areas prone to landslides.
- **Limiting agriculture to valleys** and areas with moderate slopes.
- **Control on the development of large settlements** in the high vulnerability zones.
- **Promoting large-scale afforestation programmes** and construction of bunds to reduce the flow of water.
- **Terrace farming** should be encouraged in the northeastern hill states where Jhumming (Slash and Burn/Shifting Cultivation) is still prevalent.

LANDSLIDES----Step Taken:

• Step Taken:

- The [Geological Survey of India \(GSI\)](#) has done a national landslide susceptibility mapping for 85% of the entire 4,20,000 square km landslide-prone area in the country. The areas have been divided into different zones according to the propensity of the disaster.
- Improvement in early warning systems, monitoring and susceptibility zoning can reduce the damage caused by landslides.

What Causes a Landslide in India?

1. Deforestation

Human interference is one of the major causes of landslides in India. Deforestation is one such phenomenon which may trigger landslide. For example, the Himalayan region has become more vulnerable to landslides due to the indiscriminate cutting of trees.

Removal of trees reduces the binding properties of soil and rocks. This enables the water to seep into the sub-surface, making the topsoil vulnerable. Even GSI confirmed that increased deforestation is one of the reasons for landslides in Western Maharashtra and the Konkan region.

2. Shifting Cultivation

Shifting cultivation is common in hilly regions and Northeast areas. Every year, residents burn the forests for cultivation purposes. However, this deteriorates the quality of topsoil, causing erosion during heavy rainfall. This makes such regions more vulnerable to landslides.

What Causes a Landslide in India?

3. Heavy Rainfall and Earthquakes

Above [40%](#) of the Kumaon Himalayan region are vulnerable to landslides due to earthquakes. Additionally, heavy rainfall often causes landslides. For example, heavy rain caused landslides in Talai village of Maharashtra in 2021.

4. Mining

Human activities like mining or quarrying remove the vegetation cover and soil gravel. This lowers the groundwater retention capacity. Also, it increases the risk of flooding. Therefore, landslides occur due to loose debris or excess floods during an earthquake and heavy rainfall, respectively.

5. Urbanisation

Increasing population pressure in few regions of India is alarming. For example, Dharamshala is prone to landslides. It is one of the fastest developing cities in the Himalayan region. Here, intensive urbanisation activities such as establishing commercial housing projects and road construction reduce the vegetation cover. This leads to an increasing frequency of landslides in this region.

What Are the Different Types of Landslides?

What Are the Different Types of Landslides?

Landslides in India are divided into four categories -

Types of Landslides	Meaning
Topples	This occurs due to fracture in rocks. It causes tilting for gravitational pull without collapsing.
Falls	This involves the collapse of rocks or debris from a cliff or slope. It results in the collection of debris at the base of a hill.
Spread	It occurs in gentle slopes where soft debris or other materials are widely available.
Slides	It occurs when debris, rocks or soil slide through a slope.

What Are the Impacts of Landslides in India?

- **It damages houses, roads and buildings. This further creates a financial burden for rebuilding infrastructure to rehabilitate the masses.**
- **The debris sliding down from slopes block the river channel fully or partially. This makes it difficult for locals to get the water supply.**
- **Landslides also increase the risk of floods. It is because the debris increases the river sediment. As a result, irregular course rivers become frequent, resulting in floods.**

What Are the 3 Landslide Zones in India?

1 .Moderate-Low Vulnerable Landslide Zones

- Trans Himalayan region
- Spiti of Himachal Pradesh
- Aravalli mountains
- Deccan Plateau
- Chhattisgarh
- Jharkhand
- Odisha

What Are the 3 Landslide Zones in India?

2. High Vulnerable Zones

- Northeastern region
- Eastern Ghats
- Konkan Hills
- Nilgiris

3. Very High Vulnerable Zones

- Andaman and Nicobar Island
- Western Ghats
- Darjeeling
- Sikkim
- Uttarakhand

Required to Prevent Landslides?

- **An increase in forest cover is a must in community lands to reduce the hazard of landslides.**
- **People must store the excess water in catchment areas. It will reduce the effect of flash floods and also recharge groundwater levels.**
- **People must restrict the grazing of their animals. Also, reduce the urbanisation activities such as building dams or other commercial projects.**
- **Implementation of public awareness regarding preventive measures during landslides and other hazard management is necessary.**

About Landslides in India

According to the report of National Disaster Management Authority, the Himalayan foothills are most commonly and severely affected by landslides. This includes states like Uttarakhand, Himachal Pradesh, Northern part of West .

While natural ways like reforestation is useful to reduce landslides, improving drainage facility and modifying slope geometry is useful to prevent landslides.

Earthquake and heavy rainfall may destabilise the soil which may eventually trigger landslides.

landslides can occur at any time. Although, they might occur as a result of increased human activity or earthquake and heavy rainfall.

landslides are caused by both natural phenomena as well as due to human actions such as deforestation and mining.

What to Do Before a Landslide?

Do's

- **Assess the soil before constructing your home or taking any property in a landslide-prone or hilly area.**
- **Make buildings away from the steep slopes, edge of mountains, drainage ways, or natural erosion valleys.**
- **Build embankments on the gradient slopes.**
- **Build retaining walls.**
- **Fit flexible gas pipes to avoid leakage.**
- **Buy insurance that covers the damage caused to your property for landslide damage.**
- **Implement land-use zoning cover in areas most vulnerable to landslides or other natural hazards.**
- **Prepare evacuation plans and an emergency supply kit containing all necessary items required during such hazards.**
- **Stay updated with the latest emergency information through radio alerts and television sources**

What to Do'nt Before a Landslide?

Don'ts

- Don't ignore signs of cracks or roaring sounds of sloping rocks, cracking of trees.
- Watch the channel of stormwater drainage and runoff water converge near your building. Don't take your way of exit through these paths during landslides or storms.
- Don't try to divert the pathway of debris flow to neighbours land as you will be liable to pay for the damage later on.

What to Do During a Landslide?

- If you stay in a landslide-prone area, then try to evacuate the place as early as possible.
- Be aware of unusual cracking or rolling of huge stones.
- Keep a watch on the water in the stream or channel. A rise in water level or transformation of colour from clear to muddy can be alarming.
- Stay out of the path of debris or landslides.
- Keep watch on the road for mud blocks or debris overflow.
- Try to connect with the local authority for relief or help.
- Make your neighbours aware of the calamity.
- Just take your necessary documents and valuables with you.
- Prioritize your life more than your furniture at home or vehicles on the road.

What Not to Do During a Landslide?

- Don't drive during the landslide.
- Don't cross any stream or flooding river.
- Do not ignore damp areas or any mark of cracks on roads and buildings.
- Do not get close to any loose electrical wiring or pole.
- Avoid obstructing the path of a steep slope by placing waste materials or debris.

What to Do if a Landslide Is Likely to Hit Your Area?

do's

- Shift to safer land.
- Take all your valuables and documents with you.
- Inform your neighbours and relatives residing in that area.
- Take out your pets and vehicles to a safer place.
- Evacuate the place.
- In case escaping out is not possible, then protect your head.
- Stay alert and awake to take an instant action in case of potential danger.
- If you live in a landslide-prone area, make sure to plant sturdy vegetation on slopes which might help in preventing erosion.
- Watch out for any cracks on your building or any tilted poles/trees.

What to Don't if a Landslide Is Likely to Hit Your Area?

- Don't disobey the Government's instruction.
- Try to avoid the predicted path of the landslide.
- Report any assistance required for injured people to official rescue authorities.

What to Do if There Is a Need of Evacuation?

Do's

- Evacuate the landslide susceptible place as early as possible.
- Carry necessary documents with you.
- Carry emergency medicine kit, dry food, and drinking water.
- Use alternate routes which have less landslide susceptibility to reach an evacuation shelter location.
- Use a battery-powered radio to follow any updates on evacuation instructions provided by local Government authorities.

Don'ts

- Don't stay back in the place, which is susceptible to landslides and needs evacuation.
- Avoid using elevators since there can be a sudden power outage.

What to Do After a Landslide?

Do's

- Connect with the local government authority for the latest updates.
- Report to the respective authorities about resuming utility services.
- Report about any potential hazard if you or your acquaintance has come across.
 - Check your building and land with a professional to recover from damages.
- Keep checks on the flash flood.
- Try to recover and help others to revive from anxiety, stress, and fear of landslides.
- Connect with the insurance company to invigilate the losses and process claims.
- Clear the drainage system of the house. Also, opt for maintenance service if required.

What to Don't After a Landslide?

Don'ts

- Don't ignore any signs of illness or infection. Consult the doctor for any infectious diseases.
- Don't claim for what is not covered under the insurance policy.
- Don't ignore the necessary measures that can save you from the upcoming calamity.

Joshimath Land Subsidence

What is Land Subsidence?

- Land subsidence is a gradual settling or sudden sinking of the Earth's surface.
- Subsidence - sinking of the ground because of underground material movement—is most often **caused by the removal of water, oil, natural gas, or mineral resources out of the ground** by pumping, fracking, or mining activities.
- Subsidence can also be caused by **natural events such as earthquakes, soil compaction, glacial isostatic adjustment, erosion**, sinkhole formation, and adding water to fine soils deposited by wind (a natural process known as loess deposits).
- Subsidence can happen over very large areas like whole states or provinces, or very small areas like the corner of your yard.

Joshimath Land Subsidence

Where is Joshimath Located?

- Joshimath is a hilly town located on the **Rishikesh-Badrinath National Highway (NH-7) in Chamoli district of Uttarakhand.**
- The city serves as a **tourist town** as it acts as an **overnight rest stop** for people visiting **Badrinath, Auli, Valley of Flowers, and Hemkund Sahib, among other important religious and tourist locations** in the state.
- Joshimath is also of great strategic importance to **the Indian armed forces and is home to one of the Army's** most important cantonments.
- The town (fall in **high-risk seismic Zone-V**) is traversed by running streams with a high **gradient from Vishnuprayag, a confluence of the Dhauliganga and the Alaknanda rivers.**

Why is Joshimath Sinking?

Due to land subsidence, Joshimath - a key transit point for tourists travelling to Badrinath and Hemkund Sahib - developed cracks, **causing panic and protests among the local population.**

- Joshimath has been declared a **landslide-subsidence zone** and over 60 families living in uninhabitable houses in the sinking town have been evacuated to temporary relief centre.
- Cracks on walls and buildings were **first reported in 2021**, as Chamoli district of Uttarakhand experienced frequent landslides and flooding.
- As per reports, the Uttarakhand government's expert panel in 2022 found that several pockets of **Joshimath are "sinking" owing to man-made and natural factors.**
- It was found that a gradual settling or sudden sinking of the earth's surface due **to the removal or displacement of subsurface materials** — has induced structural defects and damage in almost all wards of the city.

Joshimath Sinking

Reasons:

- **Site of an Ancient landslide:** According to the **1976 Mishra Committee report**, Joshimath lies on a deposit of sand and stone, it's not on the main rock. It lies on an ancient landslide. The report added that undercutting by river currents of Alaknanda and Dhauliganga are also playing their part in bringing landslides.
- The committee had recommended that **restrictions be placed on heavy construction work, blasting or digging to remove boulders** for road repairs and other construction, felling of trees.
- **Geography:** Scattered rocks in the area are **covered with old landslide debris comprising boulders**, gneissic rocks, and loose soil, with a low bearing capacity.
- These gneissic rocks are highly weathered and have a low cohesive value with a tendency of high pore pressure when saturated with water, especially during monsoons.
- **Construction Activities:** Increased construction, hydroelectric projects, and the widening of the NH have made the slopes highly unstable in the last couple of decades.
- **Land Erosion:** Due to the running streams from Vishnuprayag and sliding along the natural streams are the other reasons behind the city's fate.

What can be done to save Joshimath?

- Experts recommend a **complete shutdown of development and hydroelectric projects in the region**. But the urgent need is to relocate the ~~residents to a safer place and then reimagine the town's planning~~ to accommodate the new variables and the changing geographical factors.
- Drainage planning is one of the biggest factors **that needs to be studied and redeveloped**. The city is suffering from poor drainage and sewer management as more and more waste is seeping into the soil, loosening it from within. The irrigation department has been asked by the state government to look into the issue and create a new plan for the drainage system.
- Experts have also suggested **replantation in the region, especially at the vulnerable sites to retain soil capacity**. There is a need for a coordinated effort between the government and civil bodies with the aid of military organizations like the [Border Roads Organisation \(BRO\)](#) to save Joshimath.
- While the state already has weather forecasting technology that can warn people of local events, **its coverage needs to be improved**.
- Weather forecasting in Uttarakhand is done through satellites and Doppler weather radars (instruments that use electromagnetic energy to find precipitation and determine its location and intensity).
- The state government also **needs to take scientific studies more seriously, which clearly spell out the reasons for the current crisis**. Only then will the state put an end to its development frenzy.

Geographical phenomena

FLASH FLOODS

Flash Floods:

• About:

- These are **sudden surges in water levels** generally during or following an **intense spell of rain**.
- These are **highly localised** events of **short duration** with a very high peak and usually have less than six hours between the occurrence of the rainfall and peak flood.
- The flood situation **worsens in the presence of choked drainage lines or encroachments** obstructing the natural flow of water.

Flash Floods:

glacial break in the Tapovan-Reni area of Chamoli District of Uttarakhand led to massive [Flash Flood](#) in Dhauli Ganga and Alaknanda Rivers, damaging houses and the nearby Rishiganga power project.

- In June 2013, flash floods in Uttarakhand wiped out settlements and took lives.

- **Cause of Flash Flood in Uttarakhand:**

- It occurred in river Rishi Ganga due to the falling of a portion of Nanda Devi glacier in the river which exponentially increased the volume of water.
- Rishiganga meets Dhauli Ganga near Raini. So Dhauli Ganga also got flooded.

Flash Floods:

- Major Power Projects Affected:

- 1 .Rishi Ganga Power Project:

- It is a privately owned 130MW project.

- 2 . Tapovan Vishnugad Hydropower Project on the Dhauliganga:

- It was a 520 MW run-of-river **hydroelectric project** being constructed on **Dhauliganga River**.

- 3 .Several **other projects on the Alaknanda and Bhagirathi river basins** in northwestern Uttarakhand have also been impacted by the flood.

Flash Floods:

• Causes:

- It may be caused by heavy rain associated with a severe thunderstorm, hurricane, tropical storm, or meltwater from ice or snow flowing over ice sheets or snowfields.
- Flash Floods can also occur due to Dam or Levee Breaks, and/or Mudslides (Debris Flow).
- In areas on or near [volcanoes](#), flash floods have also occurred after eruptions, when glaciers have been melted by the intense heat.
- The intensity of the rainfall, the location and distribution of the rainfall, the land use and topography, vegetation types and growth/density, soil type, and soil water- content all determine just how quickly the Flash Flooding may occur, and influence where it may occur.

Category: Disasters in Uttarakhand

- [1980 Nepal earthquake](#)
- [1991 Uttarkashi earthquake](#)
- [1996 Haridwar and Ujjain stampedes](#)
- [1998 Malpa landslide](#)
- [1999 Chamoli earthquake](#)
- [2012 Himalayan flash floods](#)
- [2013 North India floods](#)
- [2016 Uttarakhand forest fires](#)
- [2020 Uttarakhand forest fires](#)
- [2021 Uttarakhand flood](#)

• [COVID-19 pandemic in Uttarakhand](#)

[1803 Garhwal earthquake](#)

• [Gohna Lake dam-burst](#)

• [2017 Uttarakhand earthquake](#)

Forest fire



Forest fire

Forest fires can be defined as any uncontrolled and non-prescribed combustion or burning of plants in a natural setting such as a forest, grassland, brushland, or tundra, which consumes the natural fuels and spreads based on environmental conditions (e.g., [wind](#), topography).

Forest fire is one of the major causes of degradation of forests in our country. Precious forest resources and carbon is lost which has an impact on the flow of goods and services from the forest areas. The Forest Fire & Disaster Management wing of the Uttarakhand Forest Department has been alerting Divisions, Ranges, Circles & various stakeholders on the detection of fire in a Particular location as per the information received from FSI. Reporting and records management software has the ability to make communities safer, increase collaboration through data sharing, and ultimately make the work of data collection and reporting easier for its first responders at the ground(forest field personnel).

causes

- Natural causes like lightning can set fires on trees which may be spread by wind. Sometimes, High atmospheric temperatures and dryness (low humidity) offer favorable circumstances for a fire to start.
- Man-made causes are usually the ones that become dangerous. Fire is caused when a source of fire like naked flame, cigarette, electric spark, or any source of ignition comes into contact with inflammable material.
- Other human-led causes are land clearing and other agricultural activities, maintenance of grasslands for livestock management, extraction of non-wood forest products, industrial development, resettlement, hunting, negligence, and arson.

Types of forest fire

There are three basic types of fires:

1 . Crown fires

- This type burn trees up their entire length to the top.
- They burn through the canopy, spreading from treetop to treetop.
- These are the most intense and dangerous forest fires as they are very difficult to contain.
- It needs strong winds, steep slopes, and a heavy fuel load to continue burning.

2. Surface fires

- They burn only surface litter like dried leaves, twigs, and grasses.
- These are the easiest fires to put out and cause the least damage to the forest.
- Parched grass or fallen leaves often fuel surface fires.

3. Ground fires

- These are sometimes called underground or subsurface fires.
- They occur in deep accumulations of humus, peat, and similar dead vegetation that become dry enough to burn.

- These fires move very slowly but can become difficult to fully put out, or suppress.
- Ground fires can smolder for a long time, even an entire season, until conditions are right for them to grow to a surface or crown fire.
- Underground fires spread slowly and are hard to detect, hence they may burn for months destroying the vegetative cover of soil.

Consequence of wildfire

- Wildfires emit billions of tonnes of carbon dioxide into the atmosphere which causes harm to climate.
- This can also impact the carbon cycle due to excess CO₂ and loss of vegetation.
- High-intensity forest fires destroy flora and fauna.
- Wildfires can impact the economy as many families and communities depend on the forest for food, fodder, and fuel.
- It burns down the small shrubs and grasses, leading to landslides and soil erosion.
- It can change the microclimate of the area with unhealthy living conditions
- Excessive forest fires can also add to the [ozone layer depletion](#) process

Forest fire in Uttarakhand

Forest fires caused by humans in the [Himalayan](#) state of [Uttarakhand](#) have been a regular event. Since the formation of the state in 2000, more than 44,518 hectares (110,010 acres) of forest land has been lost to fire.^[2]

Some fires during 1921, 1930, and 1942 have been associated with popular movements against the then [British government's](#) forestry policies and as a call for independence. Most of these fires occur in the [chir pine \(*Pinus roxburghii*\)](#) zone which is prone to fire.

A major cause for the fires was attributed to the record high temperatures and severe lack of rainfall due to a dry winter.^[9] The Uttarakhand forest fires had also come as India suffered one of its worst droughts in years with the government noting over 330 million were affected by water shortages.

But the [pine](#) itself is resistant to the fire. Instead of harming them, these fires help in their [regeneration](#) by reducing coverage of [broad-leaf trees](#), which leads to an increase in the land covered by [chir pine](#).

The **2016 Uttarakhand forest fires** were a series of widespread, damaging [wildfires](#) that took place in [Uttarakhand](#), [India](#) between April and May. The fires were caused by a [heatwave](#) that spread across Uttarakhand and were the worst recorded in the region with a reported 4,538 hectares (11,210 acres) of forest burnt down and seven people dead.

Officials detected nearly 1,600 total fires which were brought under control by 2 May, and as rain fell the following day, it reduced the impact of the wildfires. [\[4\]\[5\]\[6\]](#) An initial report on 4 May noted that 3,500 hectares (8,600 acres) had been destroyed by the fire.

Forest fire management

Forest fire is one of the major causes of degradation of forests in our country. Precious forest resources and carbon is lost which has an impact on the flow of goods and services from the forest areas. The Forest Fire & Disaster Management wing of the Uttarakhand Forest Department has been alerting Divisions, Ranges, Circles & various stakeholders on the detection of fire in a Particular location as per the information received from FSI. Reporting and records management software has the ability to make communities safer, increase collaboration through data sharing, and ultimately make the work of data collection and reporting easier for its first responders at the ground(forest field personnel).

Presently Uttarakhand Forest Fire & Disaster Management department has developed a dedicated website for fire reporting. Looking at the sensitivity of impact of forest which not only impacts livelihood of people who solely are dependent on forest produce but disturbs the overall natural biodiversity. Hence it requires urgent attention to have a sound fire reporting system so that a forest fire can be controlled in a timely and effective manner.

Forest fire management

Pre Fire Activities



Establishment Of MCR

A Master Control Room(MCR) is a nodal forest fire information centre, and is located in each Forest Divisional Headquarter. The MCR are provided with Wireless Communication Network.



Establishment Of Crew Stations

A crew station has a deployment of 4-5 Fire Watchers equipped with firefighting tools and wireless communication network. They are who respond to each fire incident.



Watch Towers

Each watch tower serves as a view point that offers a large section of forest to be monitored for various activities.



Control Burning



Fire Line Cleaning



Wireless Communication

Uttarakhand Disaster Management Authority



Major disaster in Last 10 Years

- 1) earthquake
- 2) Cloudbursts
- 3) Floods / Flash Floods
- 4) Landslides
- 5) Avalanches and GLOF
- 6) Lightning strikes
- 7) Road Accidents
- 8) Epidemics

Major Initiative

Decision Support System

Early Warning Systems

Monitoring of high mountain hazards

Incident Response System (IRS)

Drone Application in Disaster Management

Inter Agency Group (IAG)

Training & Capacity Building

Resettlement and Rehabilitation

Satellite communication in remote areas

Establishment of Landslide Mitigation and Management Centre

Establishment of a Decision Support System (DSS)



Monitoring and
Observation



Evacuation instructions



Collection and reporting
of damage information



Lifesaving



Settlement of Emergency
operating center



Monitor
Shelter Establishment



Road traffic control/
Elimination of road obstacles



Reporting and announcement

EARLY WARNING SYSTEMS



WEATHER FORECAST

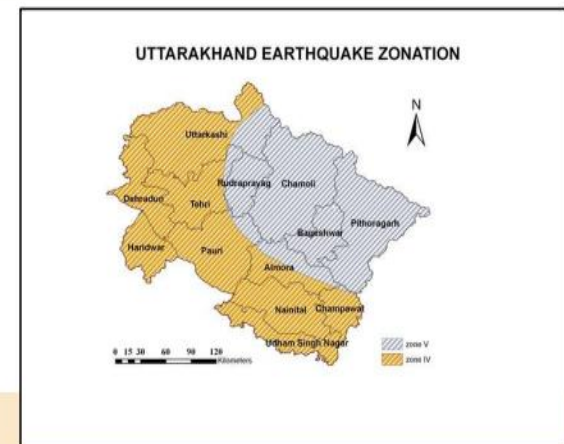
❖ 176 weather instruments (107 AWS, 28 ARG, 16 ASG & 25 SFO) are installed over the Uttarakhand State and the data is shared with IMD to strengthen the early warning system.

❖ 3 Doppler Weather Radars established in Uttarakhand by IMD



FLOOD WARNING

- ❖ Central Water Commission (CWC) established 74 river gauging sites (28 Telemetry and 46 Manual) along the major rivers.
- ❖ Irrigation department is establishing network of 59 Automatic Water Level Recorders (AWLR) in NHP
- ❖ THDC has installed 11 AWS & 04 AWLR in the U/S of Tehri dam
- ❖ Sirens with voice message dissemination facility installed along the course of Ganga between Koteshwar and Rishikesh at 08 places with the support of THDCIL



EARTHQUAKE WARNING

- ❖ Realtime earthquake warning sirens were placed over the Uttarakhand region.
- ❖ Mobile Application named **Uttarakhand Bhookamp Alert** is developed. This app gives alert of Uttarakhand's earthquake having magnitude greater than 5. It warns about 10 to 30 seconds before the disastrous wave.

WEATHER MONITORING

Hydromet Sensors



Automated Rain Gauge



Surface Field Observatory



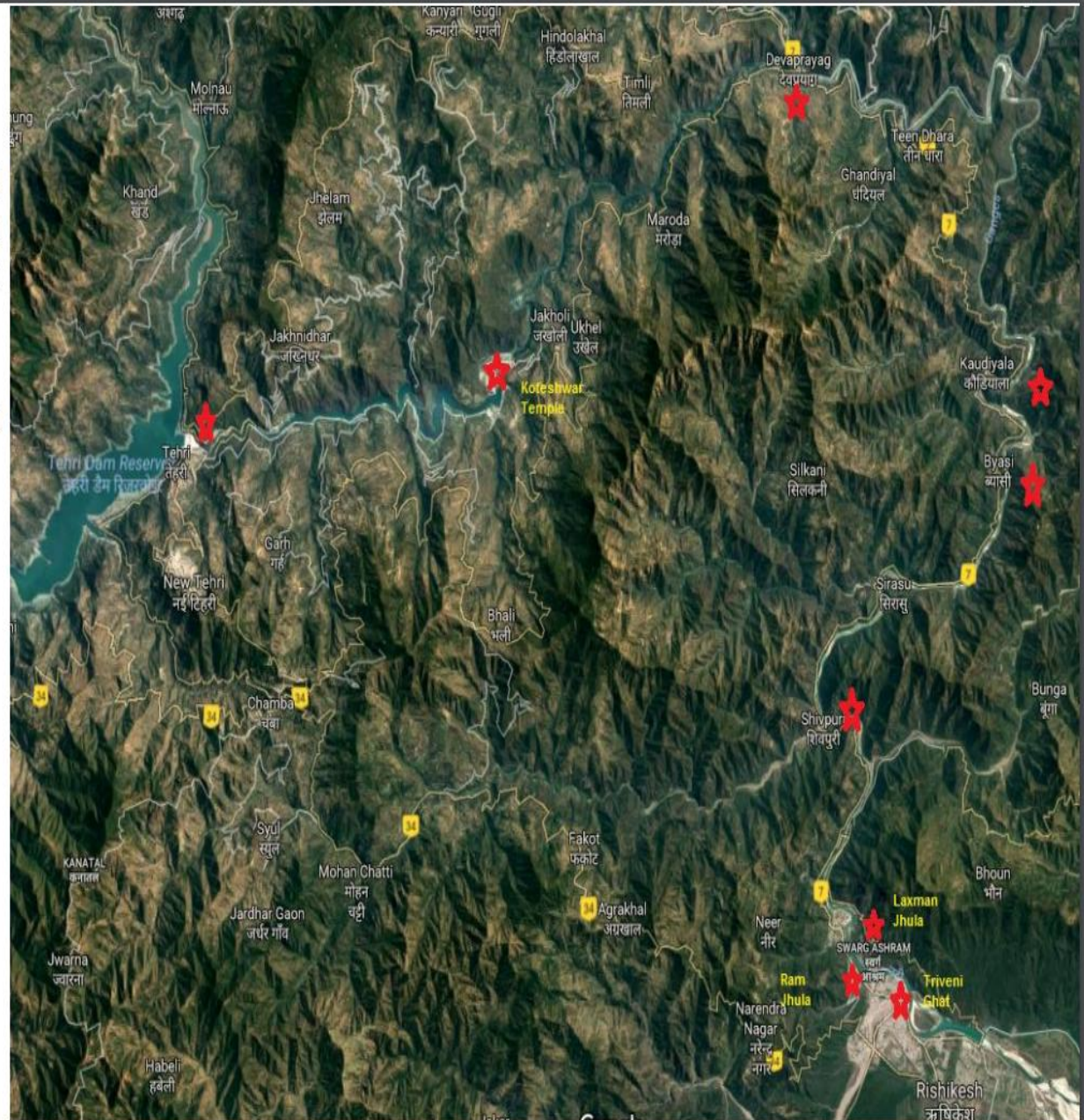
Automated Snow Gauge



Automated Weather Station

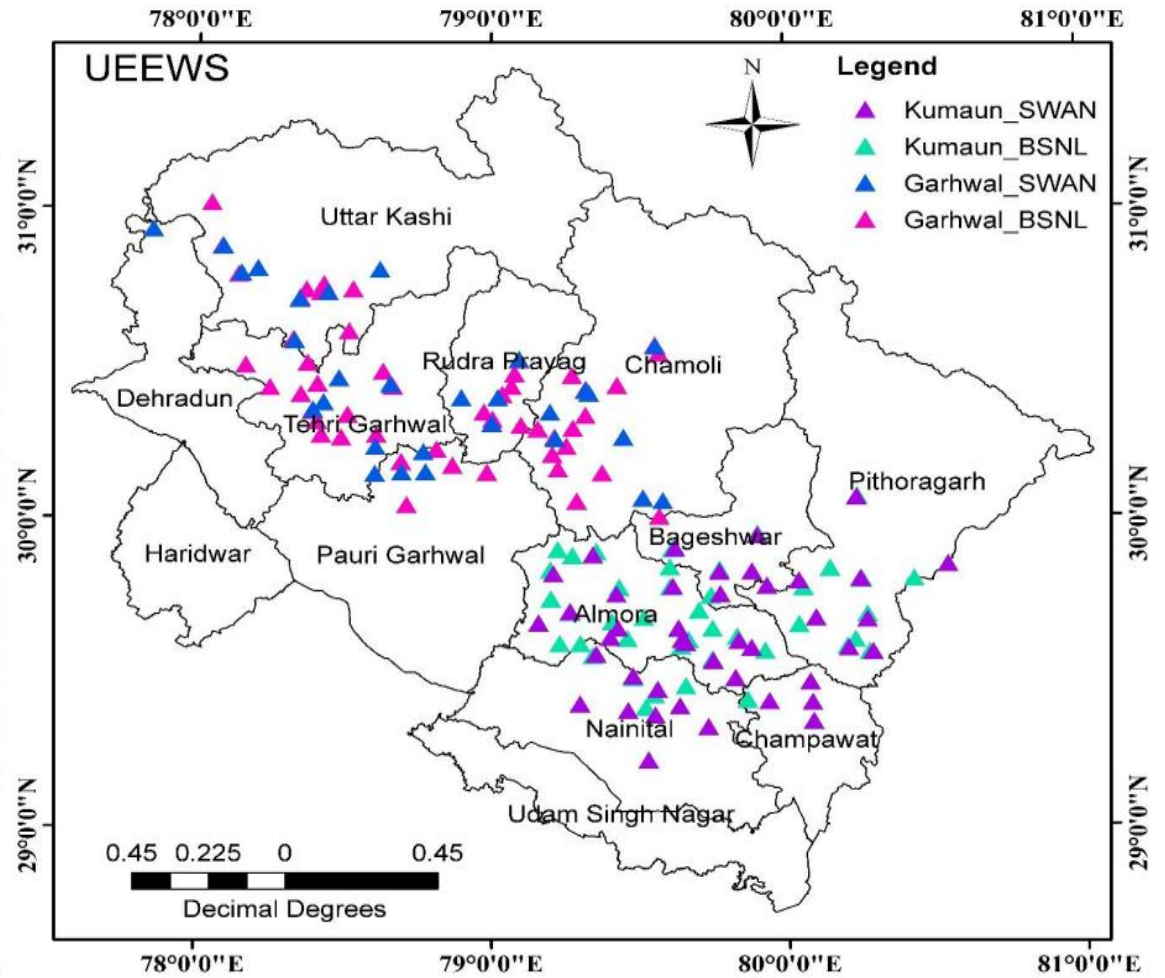
Early Warning System

- ❖ The System is supervised and monitored from Koteshwar Dam Control station and Dehradun SEOC activation centre.
- ❖ Sirens and speakers are installed at following 8 locations:
 - ✓ Koteshwar Mahadev Temple
 - ✓ Dev Prayag
 - ✓ Kaudiyala
 - ✓ Bayasi
 - ✓ Shivpuri
 - ✓ Laxman Jhoola, Rishikesh
 - ✓ Ram Jhoola, Rishikesh
 - ✓ Triveni Ghat , Rishikesh

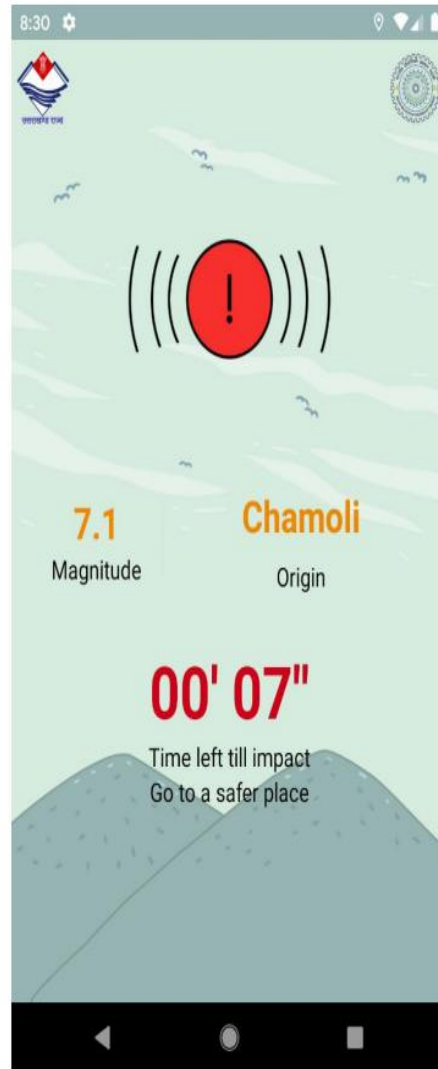


Earthquake Early Warning System

Garhwal	Kumaun
77	85



Mobile App Overview



Icon of the App



QR code for Android:



QR code for iPhone:

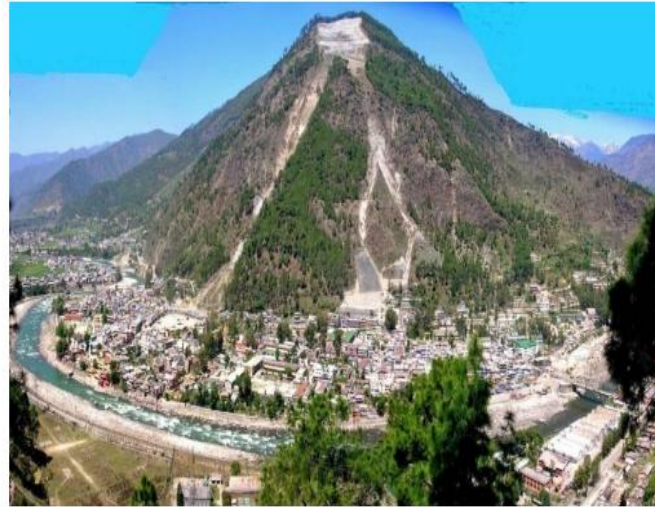


Satellite Phone Distribution

S.No	Location	Number
1	Pithoragarh	51
2	Uttarkashi	19
3	Chamoli	17
4	Pauri	65
5	Forest Department	32
6	DDMO's of all 13 district	46
7	SDRF Vahini	20
	Total	250

Establishment of Uttarakhand Landslide Mitigation & Management Centre

- Peer centre for landslide mitigation
- Study of landslide zones
- Monitoring of landslide
- Mapping and geo-tagging of vulnerable areas
- In-house capacity to develop DPRs
- Solutions of landslide mitigation (Advance & NbS)



Disaster Management Act, 2005

The Disaster Management Act of 2005 (DMA 2005) is an act passed by the government of India for the 'efficient management of disasters and other matters connected to it. It came into the news with the onset of COVID-19 and pan-India lockdown that followed. The lockdown was imposed under the Disaster management Act.

Containing 11 chapters and 79 sections, the act received the assent of the [President of India](#) on 23 December 2005. r
Management Act 2005.

Features of the Disaster Management Act 2005?

The following governing bodies are established by DMA 2005.

1. National Disaster Management Authority (NDMA): The [National Disaster Management Authority](#) is headed by the Prime Minister of India as the chairperson and will have no more than nine members including a Vice-Chairperson. All the members will have a tenure of five years.

The main responsibility of the NDMA is to lay down the policies, plans and guidelines for disaster management to ensure an effective response in the event of any disaster.

2. National Executive Committee: The DMA empowers the Central Government to create a National Executive Committee (NEC) to assist the National Disaster Management Authority. The NEC consists of Secretary level officers of the government in the home, health, power, finance and agricultural ministries. The NEC is responsible for the preparation of the National Disaster Management Plan for the whole country and to ensure that it is “reviewed and updated annually”.

3. State Disaster Management Authority: The State Disaster Management Authority (SDMA) is responsible for drawing the disaster plan for its respective state. It consists of the Chief Minister who is the chairperson and 8 members appointed by the Chief Minister.

The SDMA is mandated under section 28 to ensure that all the departments of the State prepare disaster management plans as prescribed by the National and State Authorities.

4. District Disaster Management Authority: The Chairperson of District Disaster Management Authority (DDMA) will be the Collector or District Magistrate or Deputy Commissioner of the district.

To know what role the [National Disaster Management Plan](#) (NDMP) plays in disaster mitigation in India, visit the linked article

5. National Disaster Response Force (NDRF): The [National Disaster Response Force](#) is tasked with responding to a threatening disaster or a situation similar to it. The NDRF is led by a Director-General appointed by the Central Government. The NDRF has played a major role in rescuing people from many disaster-related events in the past such as the Kashmir floods of 2014 and the Kerala floods of 2018

Uttarakhand State Disaster Management Authority

Uttarakhand State Disaster Management Authority (USDMA) is a part of State Government and is a nodal agency for planning, co-ordination and monitoring activities related to disaster prevention, mitigation, preparedness and management.

USDMA lays down policies on disaster management for the state.

It approves disaster management plan in accordance to the guidelines laid down by National Authority and co-ordinates its implementation.

It provides guidelines and reviews the measures being taken for mitigation, capacity building and preparedness by the Government and issue guidelines as necessary.

USDMA recommends provision of funds for mitigation and preparedness measures. Uttarakhand State Disaster Management Authority (USDMA) was set up and notified as per sub-section (1) of section 14 of Disaster Management Act 2005.

Uttarakhand State Disaster Management Authority

1. Hon'ble Chief Minister – Chairperson
2. Hon'ble Minister, Disaster Management – Vice-Chairperson
3. Hon'ble Minister, Health and Family Welfare – Member
4. Hon'ble Minister, Drinking Water and Irrigation – Member
5. Hon'ble Minister, Transport – Member
6. Hon'ble Minister, Rural Development – Member
7. Chairperson of the State Executive Committee – Member and (Chief Secretary) Chief Executive Officer
8. Principal Secretary, Finance – Member
9. Principal Secretary, Disaster Management – Member

Powers and functions of State Authority.—

(1) Subject to the provisions of this Act, a State Authority shall have the responsibility for laying down policies and plans for disaster management in the State.

(2) Without prejudice to the generality of provisions contained in sub-section (1), the State Authority may—

(a) lay down the State disaster management policy; _____

(b) approve the State Plan in accordance with the guidelines laid down by the National Authority;

(c) approve the disaster management plans prepared by the departments of the Government of the State;

(d) lay down guidelines to be followed by the departments of the Government of the State for the purposes of integration of measures for prevention of disasters and mitigation in their development plans and projects and provide necessary technical assistance therefor;

(e) coordinate the implementation of the State Plan;

(f) recommend provision of funds for mitigation and preparedness measures;

(g) review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein;

(h) review the measures being taken for mitigation, capacity building and preparedness by the departments of the Government of the State and issue such guidelines as may be necessary.

(3) The Chairperson of the State Authority shall, in the case of emergency, have power to exercise all or any of the powers of the State Authority but the exercise of such powers shall be subject to *ex post facto* ratification of the State Authority.



THANKS

Uttarakhand