



Impact of landslides on society & economy

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Date of Submission: 05-04-2026

Date of Acceptance: 16-04-2026

Abstract

Landslide brings a lot of socio economic problems & challenges with it which are faced in different ways by the people of that area. As it is a natural disaster, it can't be controlled by human but efforts may be made to reduce its risks and its socio economic impacts. Due to landslides, there is a huge loss of lives, live stocks, infrastructures, agricultural lands, industrial units, tax revenues and devaluation of property. It may cause blocking of rivers or barrier in flow of water which often results in flooding.

These landslides may occur due to (natural reasons) heavy rain/ earthquake/ floods/ storms/ droughts/ fires and (Humans made reasons) deforestation and mining etc. We may minimize the risks associated with landslides by -

- Stopping or minimizing the deforesting & mining activities
- Not stopping the ways of rivers and not tempering with nature
- Effective planning- keeping in view the incidents & hazards, population, environment and role of different agencies.
- Adopting preventive& mitigativemeasures
- Creating disaster relief- team /relief-funds and maintaining sufficient stock of foods & medical / health related services.
- Awareness about the precautions& preventive programs and train the people for the same.
- Developing good drainage system.
- Enforcing regulations for effective use of land
- Planting more and more trees in the forest areas and create a green & clean environment.
- Installation of early warning system& its compliance with Geo spatial & satellite imagery.

Key words: Deforestation, Eco system, Sewage disposal system, Rocks & minerals,artificialvibration, Drainage system.

Objectives of the study:

- To study the causes of landslides
- To discuss the impact of landslides on society & economy
- To highlight the preventive & protective measures
- To suggest some measures for effectively managing disasters.

Research Problems: There have been numerous researches on the topic but the problem is not solved. It is so because there is a lack of awareness programs on mass level and commercial /mining / developing activities are continue in hill/ forest areas without effective planning.

Methodology: The study is based on secondary data collected from different sources such as official reports released by the officials of the government and other published reports and websites of public and private sector undertakings and a mixture of qualitative & quantitative data is used to reach the conclusions of the study.

I. Introduction

Landslides happens when a piece of land/ soil/ rocks/ debris gravitationally move downwards on a sloped area of land. Heavy rainfall, floods, earthquake, droughts, fires make the slopes unstable, due to which landslides occur. It is a major hazard that affects the people of neighboring areas directly and others residents of country indirectly. There is a great loss of lives & infrastructures due to which the economy of a country suffers.

The landslides may be in the shape of-

- Falls as debris / rocks fall,
- Topleft- slope failure or when there are fractures between rocks & inclined rocks due to gravity,
- Slides- when piece of rock is separated & slides downward,
- Spread- when there is slight inclines of softer materials.

Why landslides occur:

Landslides may occur due to the following reasons

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- **Deforestation** or cutting trees decreases the binding properties of rocks & soil and increases the frequency of landslides as in Konkan regions which include western coasts of Maharashtra, Goa & Karnataka (Konkan means Kona or piece/ part of earth). The plants / trees having deep roots help in stopping erosion & landslides.
- The **warming temperature** may lead more rainfall in some areas of high mountain regions and this rainfall may be a cause of increasing landslides. More rainfall decreases the strength of soil due to which landslides occur. As per the data released by Indian meteorological department, the average temperature of north- west & central India for the month of April, 2022 was the highest temperature recorded in the last 122 years.(PTI, 2022)
- **Weathering and erosion** is also a reason of landslides. When rocks & minerals on earth surface are dissolved, it is known as weathering. It includes water, plants, acids, salts and temperature changes. When rock is dissolved, erosion transports the bits of rocks and minerals away.(Encyclopedic entry).Erosion take place due to 3W (wind, waves & water)&2G (Glaciers & Gravity).
- **Weak and fractured rocks** are also the geological reason of landslides.
- Transfer of vegetation of slopes to drought or fire invites landslides.
- **Shifting cultivation or slash & burn agriculture** is also a cause of occurring landslides. It is a process of rotational farming where land for agriculture is cleared by fire and after some years, it is left to regenerate. This practice may be helpful for growing a variety of species of plants but it invites landslides because quality of soil is deteriorated and there is erosion during rainfall.
- **Mining & quarrying activities** create a large amount of vibrations while blasting by explosives to break rocks.This vibration reaches under the soil surface and creates threats to the areas under risk of land sliding. Mining activities reduce gravel soil & retention capacity of ground water due to which the risk of floods increases and landslides occur.
- **Heavy rainfall** or downpour increases the soil erosion rate. The pressure of water within the slopes leads instability of slopes

due to which landslides occur as in Maharashtra in 2021.

- **Earthquake** is a natural disaster. In Kumaun Himalayan areas earthquake brings landslides with it. Earthquake shakes the earth rapidly and suddenly and breaks / shifts rock deep underground. Due to gravity, masses of rocks moves down a slope and landslides occur.
- Due to heavy growth rate of population, the problems of urbanization exist. The **constructions of Roads, bridges, houses and other commercial projects in hilly areas** are inviting landslides because vegetation cover is losing.

Impact of landslides:

Landslides have a great impact on the society as well as economy. As more than 12% of land in India is landslide prone area, which becomes the cause of deaths of almost 300 people each year and accounts for 400 billion dollar per year for managing the disasters.(godigit.com).

Impact on Society:

- Landslides affect the society in different ways. Many people loss their near& dears, family members, properties and the live stocks due to landslides. Recently in Krishna Nagar locality of Himachal Pradesh, eight houses were razed to the ground by a massive landslide, two persons were found dead and several were missing. Meanwhile a slaughter house was buried under debris.(Mishra, 2023)
- Most of the people of affected areas face mental & physical health problems. Physical health & mental health issues are related with each other. If a person gets physical injuries, it may create several brain problems as trauma, depression, mental stress, lack of sleep and may change his way of thinking, acting or feeling.
- Due to landslides, there is a great effect on essential services such as water and electricity supply and transportation services are interrupted.
- Many people get such injuries that they become dependent forever on others.
- Due to destruction of eco system, water quality is polluted and there is also a great effect on sewage disposal system/ dams/ forests/ grasslands and fisheries.



- Landslides destroy buildings and other infra structures and may block roads, railway & shipping lanes and the movement of people is affected.
- Due to debris, mud & rocks slide from the slope, river channels are often blocked and resulting, supply of water is interrupted.
- Migration of people to other safer areas.
- Many environmental problems may arise due to erosion.

Impact on Economy:

- Due to damage of soil/ land, infrastructures, facilities and interruption of transport system, there is a great loss of forest, agricultural & industrial productivity
- The beauty of nature is damaged & there is a huge loss of revenues from taxes and from tourism services.

- The value of properties of that area is reduced due to the damages of properties and because there is a fear of landslides in future.
- Agricultural/ fertile land is destroyed.
- There is a great economic loss due to replacement, repairing & maintenance of houses/ buildings & infrastructures.
- Various buildings/ houses/ roads are damaged which create a lot of financial burden on the government in rebuilding the infrastructure and rehabilitating the people.

India, after America & China has faced 3rd highest number of natural disasters since the year 1990 and as per SBI report, the economic loss due to floods/ landslides in Himachal & Uttara Khand in the year 2023 was estimated about 10 to 15 thousand crore. The total financial loss after considering 2020 floods in the country was 52500 crore, of which only 11% was covered by Insurance sector.(Madhukalya, 2023)

**Table No.1
Major landslides in India**

S.N.	Place of landslide	Date	Reason	Death near about	Impact
1	Guwahati (Assam)	September 18, 1948	Heavy rain	500	A village was completely buried.
2	Darjeeling (W.Bengal)	October 4, 1968	Flooding	1000	60 kms highway was damaged.
3	Malpa (U.K.)	August 11-17, 1998 (Largest landslide in India)	Earthquake	380	Ruining of a village completely.
4	Kedarnaath (U.K.)	July 16, 2013	Heavy rain/Flooding	5700	4200 villages were badly/ partially affected
5	Malin (Maharashtra)	July 30, 2014	Heavy rain	151	Almost 100 persons missing
6	Kuwari (U.K.)	March 10, 2018	Heavy rain	400	More than 100 houses were ruined.



7	Mumbai-Chembur & Vikhroli (Maharashtra)	July 18, 2021	Heavy rain	32	Several people were injured
8	Taliye, Madhliwadi (Maharashtra)	July 22, 2021	Heavy rainfall	86	Kondalkar wadi of Taliye was buried completely
9	Noney district (Manipur)	July 4, 2022	Deforestation, shifting & burn method of farming	47 (including 30 soldiers)	16 persons missing. It affected railway construction project costing Rs. 14320 crores.
10	Mandi, Kangra, Chamba (H.P.)	August 20, 2022	Heavy rain	36	5 people missing and a bridge was collapsed
11	India's Himalayas	Second week of August, 2023	Torrential rain,	57 people	10 persons missing, a temple collapsed after landslides in Shimla, power & railway network was disrupted, various buildings and bridges were destroyed in Uttara Khand & H.P.

Source: Data collected from different newspapers

It is clear from the above table that heavy raining is also a big factor responsible for landslides. In Kerala during summer monsoon, heavy rainfall showed an increasing trend in the last 20 years during 2001-2021. The highest number of major landslides was recorded in this state of our country in the last 7 years. During 2015- 2022, 3782 landslides were occurred in the country in which highest 2239 were reported in Kerala followed by J&K-184, Karnataka- 194, T.N.-196 & W, Bengal - 376.(timesofindia.com, 2022).It is also important to note that after U.S. & China, India ranks 3rdin natural disasters' events. During 1900- 2000, there have been 402 disasters while during 2001- 2021, 354 disasters have been occurred.(business-standard.com, 2021). It is a matter of great concern for us.

Preventive & protective measures:

Landslides can't be controlled but their risks or impacts may be minimized by adopting the following measures...

- Planting more & more trees in the forest areas and increase the forest cover.

- Avoiding the construction & urbanization schemes or commercial projects in hilly & forest areas.
- Awareness programs about the preventive & protective ways should be started to train the people of that areas where there is the risk of landslides.
- The reservoirs & catchment areas should be developed for storing the rainfall water.
- After analysis of environmental, ground & climatic conditions, an early warning system should be installed.
- Water channels should be widened
- Social & government agencies/ relief agencies or teams must be active in making sufficient provisions for health related services or foods in the areas previously affected by natural disasters.
- Professional agencies should play their direct role in planning the construction & maintenance activities in affected areas.
- The slope base must have a retaining wall
- Geological investigation must be made before construction of any project in the risky areas and good practices of engineering should be adopted.



- Don't live or work or make visit in the areas of landslide history
- Vegetation should be maintained on the slope for retaining the soil.
- There should be no irrigation system on hill sides & swimming pool on slopes.
- There should be insurance cover for the damages caused by landslides or natural disasters.
- If there is any signal of cracking trees or sound of sloping rocks, the residents of that area should adopt pre cautionary measures and shift to a safer place and must follow the government regulations.
- There should be effective drainage system.
- Industrial & commercial activities should be promoted and infrastructures should be developed in rural areas to minimize the urbanization rate.
- Green & clean environment should be developed by planting more & more trees in every village/ town/ city and steps should be taken to reduce the greenhouse gas emissions..
- Eco friendly and climate friendly resources & programs should be promoted.
- 5 'R' principles of Refusing, Reducing, Reusing, Repurpose and Recycling resources should be implemented.
 - Refusing means no use of single use plastic/ wasteful or non- recyclable item
 - Reduce waste means minimize the amount of wastages / trash which is generated by the people.
 - Reusing waste is searching for new methods or techniques to use items which otherwise would have been thrown out (roguedisposal.com, 2018) or new use of old items.
 - Repurposing is to use the item in a new way or modifying it for new use.
 - Recycling is a process of changing wasteful or discarded materials into a new product.

II. Conclusions & suggestions:

Landslides are the serious crises before any country. Therefore, it is necessary to avoid these or to reduce their impacts to the maximum possible extent. But it is natural disaster and it can't be fully controlled. So, we by knowing some causes of landslides for which human activities are responsible, we may control these activities by

taking precautions, promoting awareness programs and enforcement of government regulations effectively. Heavy rainfall is one of the main reasons of landslides because blocking of rivers' channels (Due to construction & mining activities on hill sides) and unsystematic drainage system invite this disaster. The impacts of other factors responsible for landslides as earthquakes & floods may also be minimized by adopting the precautionary & protective measures as discussed above. Finally it may be concluded **that evils, injustice & tyranny on large scale (these make angry to the Creator of the worlds) and the practices of tempering with nature, all are resulted in natural disasters.**

Therefore, it is suggested that-

- We must be eco- friendly, environment friendly and lover of nature.
- We should never temper with the nature.
- We should develop new green & clean parks in every towns/ cities and plant at least one tree in every home or before house and on the road sides.
- **We should leave our bad practices, promote justice for all & always think and do our best for the welfare of others.**