



## Mains Practice Question

**Q.** Landslides are more than just a natural phenomena. Discuss the statement and suggest the ways to mitigate the disaster. (250 words)

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### Approach

- Introduce by defining landslides.
- Write the natural causes of landslides.
- Also, mention the man made factors responsible for landslides.
- Suggest ways to mitigate the disaster.
- Conclude on a positive note.

### Introduction

- The term 'landslide' includes all varieties of mass movements of hill slopes and can be defined as the downward and outward movement of slope forming materials composed of rocks, soils, artificial fills or combination of all these materials along surfaces of separation by falling, sliding and flowing, either slowly or quickly from one place to another.
- Although the landslides are primarily associated with mountainous terrains, these can also occur in areas where an activity such as surface excavations for highways, buildings and open-pit mines takes place.

### Body

**Natural Causes of Landslide:** There are several natural causes of landslides. Some of the major causes are as follows:

- **Geological Weak material:** Weakness in the composition and structure of rock or soil may also cause landslides.
- **Intense rainfall:** Storms that produce intense rainfall for periods as short as several hours or have a more moderate intensity lasting several days causes erosion of the slopes that triggers abundant landslides.
  - Heavy melting of snow in the hilly terrains also results in landslides.
- **Earthquake** shaking has triggered landslides in many different topographic and geologic settings. Rock falls, soil slides and rockslides from steep slopes involving relatively thin or shallow disaggregated soils or rock, or both have been the most abundant types of landslides triggered by historical earthquakes.
- **Volcanic eruption:** Deposition of loose volcanic ash on hillsides commonly is followed by accelerated erosion and frequent mud or debris flows triggered by intense rainfall.

### Man-made Factors responsible for Landslides:

- **Human Excavation** of slope and its toe, loading of slope/toe, a drawdown in reservoir, mining, irrigation, vibration/blast, Water leakage from services.

- Erosion of slopes due to human interference increases the vulnerability of the terrain to slide down.

▪ **Other factors:**

- Intense deforestation, soil erosion;
- Construction of human settlement in landslide prone areas;
- Roads or communication lines in mountain areas;
- Building with weak foundations;
- Buried pipelines;
- Lack of understanding of landslide hazards, lack of warning system.

### **Possible Risk Reduction Measures**

- **Hazard mapping** locates areas prone to slope failures. This will help to avoid building settlements in such areas. These maps will also serve as a tool for mitigation planning.
- **Land use practices** such as:
  - Areas covered by degraded natural vegetation in upper slopes are to be afforested with suitable species. Existing patches of natural vegetation (forest and natural grassland) in good condition, should be preserved.
  - Any developmental activity initiated in the area should be taken up only after a detailed study of the region has been carried out.
  - In the construction of roads, irrigation canals etc. proper care is to be taken to avoid blockage of natural drainage
  - Total avoidance of settlement in the risk zone should be made mandatory.
  - Relocate settlements and infrastructure that fall in the possible path of the landslide.
  - No construction of buildings in areas beyond a certain degree of slope.
- **Retaining Walls** can be built to stop land from slipping (these walls are commonly seen along roads in hill stations). These are constructed to prevent smaller sized and secondary landslides that often occur along the toe portion of the larger landslides.
- **Surface Drainage Control Works:** The surface drainage control works are implemented to control the movement of landslides accompanied by infiltration of rainwater and spring flows.
- **Increasing vegetation cover:** it is the cheapest and most effective way of arresting landslides. This helps to bind the top layer of the soil with layers below while preventing excessive run-off and soil erosion.
- **Insurance** will assist individuals whose homes are likely to be damaged by landslides or by any other natural hazards.

### **Conclusion**

- Increasing human interference with nature has led to rise in the number of natural disasters.
- However, the **National Disaster Response Force** under The **Disaster Management Act, 2005** have conducted several successful rescue operations by providing aid and assistance to the affected state, including deploying, at the State's request, of Armed Forces, Central Paramilitary Forces, and such communication, air and other assets. They have also worked to increase the awareness among people to reduce the effect of such natural calamities by organising preparedness campaigns.