Landslide and Flash Floods

Why in News
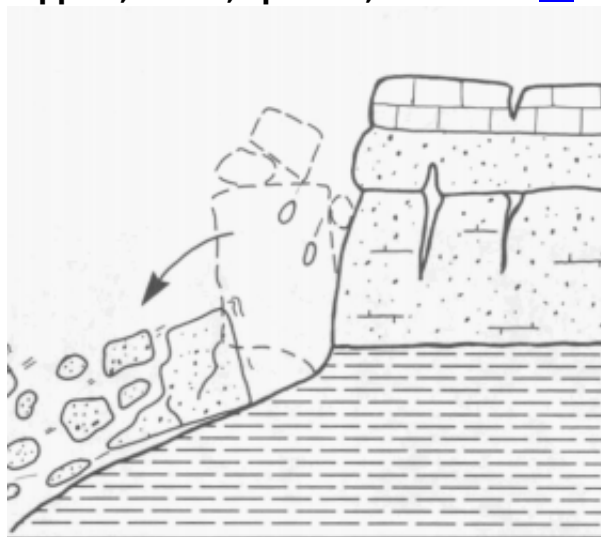
Recently, heavy rains caused **flash floods** and **landslides** in many parts of Himachal Pradesh.

Key Points

- **Landslide:**

  - **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.** //

  - **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.
  - **Human activity** which includes agriculture and construction increases the risk of a landslide.
- **Landslide-Prone Areas:**

  - The entire Himalayan tract, hills/mountains in sub-Himalayan terrains of North-east India, Western Ghats, the Nilgiris in Tamil Nadu Konkan areas are landslide-prone.
- **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.
- **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.

- **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.
  - **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.
  - **Mitigation:**

    - Instead of valleys, people should live in areas on slopes with firm ground for safety reasons.
    - In areas where ground fissures have developed, appropriate steps should be taken to check the infiltration of rainwater and surface water.
    - Banning "indiscriminate" and "unscientific" construction works.

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