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Q18

**Describe the various causes and the effects of landslides.
Mention the important components of the National Landslide
Risk Management Strategy.**

UPSC Civil Services Mains 2021 · GS III · 15 marks · Indian Economy

Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

Core demand of the question

- Describe the various causes and the effects of landslides. Mention the important components of the National Landslide Risk Management Strategy
- Keep the explanation within a 15-mark length

Revision summary

Causes of landslides are geology, monsoon pore pressure, earthquakes, and human toe-cutting and deforestation.

Effects include fatalities, cut highways, river damming, and sediment disasters.

NDMA's National Landslide Risk Management Strategy (2019) centres on hazard mapping, land-use regulation, early warning, structural and bio-engineering, awareness, and R&D.

GSI, IMD, BRO, and States must share one inventory.

Enforcement on construction and road design is the usual failure, not the absence of a document.

Introduction

A landslide is the downslope movement of rock, debris, or earth under gravity. In India it is a Himalayan, Western Ghats, and north-eastern monsoon hazard, made worse by roads cut into weak slopes. The National Landslide Risk Management Strategy (NDMA, 2019) is the Union's checklist: map, regulate, warn, and build capacity - not only send NDRF after the hill has moved.

Body

Causes

- **Geology:** fractured Himalayan thrust sheets, laterite and gneiss in the Ghats, and thick debris on steep valleys fail when strength drops.
- **Rainfall and cloudbursts:** pore-water pressure in the monsoon is the usual trigger; **Kedarnath 2013** mixed flood, debris flow, and slope failure.
- **Earthquakes:** shaking adds load; 2015 Nepal and 2011 Sikkim showed co-seismic slides.
- **Human:** road and rail **toe-cutting**, unplanned **hill construction**, mining, deforestation, and drainage blocked by debris or poor culverts.

- **Hydropower and tunnelling** in fragile belts, if poorly designed, change slope water.
- **Climate:** more intense rain bursts raise the frequency of debris flows even on old scars.

Effects

- Immediate **death and burial** of settlements and pilgrims (Malin 2014, many Himachal and Uttarakhand seasons, Manipur and Mizoram slides).
- **Isolation:** highways such as NH-10, NH-6, and hill State roads close, which is an economic landslide after the physical one.
- **Damming of rivers** and outburst risk; damage to hydropower, transmission, and army logistics in border hills.
- **Sediment** in reservoirs and plains floods downstream.
- Livelihood loss for terrace farmers and a long reconstruction bill that poor hill panchayats cannot pay.

National Landslide Risk Management Strategy - important components

- **Hazard zonation and mapping** at usable scales, with inventory of past slides and a national database.
- **Land-use and mountain-zone regulation:** restrict building on red zones; enforce town-and-country rules in hill stations.
- **Early warning** from rainfall thresholds, slope instruments, and community watch, linked to IMD and State SDMA.
- **Loss reduction:** safe alignment of roads, retaining structures, drainage, and bio-engineering rather than only blasting a new cut.
- **Awareness, capacity, and preparedness:** local masons, panchayats, and tourist-route protocols; pre-positioned NDRF/SDRF.
- **Research, monitoring, and institutional coordination** among NDMA, GSI, NRSC, BRO, NHAI, and State DGMs.
- **Recovery** that does not rebuild on the same scar without a geotechnical veto.

Practice gap

- Maps exist; **enforcement on hotels and highway contractors** is the missing component more often than a new slogan.

Flow diagram

Weak slope rain quake -> Landslide
 Road cutting building -> Landslide
 Landslide -> Death isolation river damming
 NDMA 2019 strategy -> Map regulate warn
 NDMA 2019 strategy -> Safe roads capacity

Conclusion

Landslides join weak rock, water, quakes, and human cuts. Their effects are death, isolation, and river trouble. NDMA's 2019 strategy is mapping, land-use control, warning, engineered roads, awareness, and research. It works only if the next hill road obeys the map.

Facts & figures

NDMA Strategy 2019

National Landslide Risk Management Strategy: India's framework for mapping, regulation, warning, and capacity.

GSI

Geological Survey of India: national landslide hazard zonation and investigation agency.

Kedarnath 2013

Uttarakhand disaster combining cloudburst, floods, and debris flows on a pilgrimage landscape.

Malin 2014

Maharashtra village landslide that showed Western Ghats risk beyond the Himalaya.

BRO / NHAI

Hill-road builders whose cut-and-fill practice can either trigger or reduce slides.

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