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Q15

How can the mountain ecosystem be restored from the negative impact of development initiatives and tourism?

UPSC Civil Services Mains 2019 · GS I · 15 marks · World's Physical Geography

Salient features of world's physical geography.

Core demand of the question

- Show the negative impact of development initiatives and tourism on mountain ecosystems
- Explain how those mountain ecosystems can be restored

Revision summary

Himalayan and Ghat roads, dams, and mines cut slopes, sediment, and habitat.

Mass tourism overloads water, sewer, and alpine meadows.

Kedarnath 2013 and Joshimath show development-plus-weather risk.

Restoration needs local species, springs, environmental flows, and no-go zones.

Gadgil-Kasturirangan, NMHE, FRA, and GSI landslide maps should gate projects.

Cap vehicles and hotel beds; score success by living springs, not sapling tallies.

Introduction

The Himalaya, the Western Ghats, and India's north-eastern hills are water towers and biodiversity walls. Roads, dams, mines, and mass tourism have cut slopes, forests, and streams. Restoration means putting ecology back into project design, not only planting a ceremonial row of trees.

Body

Negative impact of development

- Hydropower tunnels, riverbed mining, and sequential dams on the Alaknanda-Bhagirathi and other Himalayan rivers change flow, sediment, and fish passage.
- All-weather highways, the Char Dham widening debate, and hill airstrips cut toes of slopes; Joshimath subsidence and repeated landslides show the cost of ignoring geology.
- The 2013 Kedarnath disaster mixed extreme rain with debris on a built-up pilgrimage corridor, which is development risk, not only weather.
- Mining, limestone, and unplanned urban sprawl in hill stations from Mussoorie to Shillong replace oak-rhododendron and shola-grassland with concrete and dump.
- In the Western Ghats, ghat roads, quarries, and reservoirs fragment elephant and lion-tailed macaque habitat; Gadgil (WGEEP) and Kasturirangan reports already mapped this conflict.

Negative impact of tourism

- Peak-season loads at Shimla, Manali, Nainital, Darjeeling, Ooty, and Tawang exceed sewer, parking, and water capacity, so springs fail and ridges become dumps.
- Adventure and religious tourism bring plastic, diesel generators, and river-bank camps that kill riparian cover.
- Homestays can help, but hotel high-rises and second homes raise rents, firewood demand, and slope loading.
- Trekking without waste rules damages alpine meadows (bugyals) and high-altitude lakes that recover slowly in cold air.

What restoration must mean

- Restoration is re-vegetation with local species, slope stitching, spring recharge, river environmental flows, and a cut in new hazardous construction, not only CAMPA plantation of exotics.
- The **National Mission on Himalayan Ecosystem** under the National Action Plan on Climate Change asks for science-based land use, not a second plains model in the hills.
- Eco-sensitive zones, the **Forest Rights Act, 2006**, and Van Panchayats in Uttarakhand can put village users into protection if they are not only paper.
- Carrying-capacity studies, as hill states now announce after crises, must cap vehicles and beds before the next season, not after the next slide.

Tools, maps, and institutions

- Geological Survey of India landslide zonation, ISRO slope maps, and river-basin EIA with cumulative impact (not dam-by-dam) should gate hydropower and highways.
- The Western Ghats ecology expert panel logic of graded ESZ, and similar Himalayan zoning, should rank no-go ridges, restricted tourism, and permitted agroforestry.
- CAMPA funds, MGNREGA spring-shed works, and state ecotourism policies need one ridge-to-valley plan so money does not fight itself.
- Plastic bans, mule and ropeway options instead of endless hill-cut parking, and pilgrim registration (as in some Char Dham seasons) are practical restoratives.

Way forward for policy

- Freeze new construction on red-zone slopes and river floodways; retrofit drains and retaining only where geology allows.
- Tie hotel licences to sewage treatment and local hiring; shift from mass weekend tourism to timed, low-impact stays.
- Give gram sabhas and van panchayats a veto on hill-cut projects that fail GSI and cumulative EIA tests.
- Restore forests with oak, rhododendron, shola, and bamboo suited to the slope, and monitor springs as the scorecard, not sapling counts.

Flow diagram

Roads dams mines -> Slope forest river damage
Mass tourism -> Slope forest river damage
Slope forest river damage -> Restore springs forests
ESZ carrying capacity -> Restore springs forests
GSI FRA NMHE -> Restore springs forests
Restore springs forests -> Safer mountain ecology

Conclusion

Development roads, dams, and mines, plus unmanaged tourism, have stressed India's mountain water, forest, and slope systems. Restoration is zoning, local species, spring and river repair, and hard caps on beds and vehicles, using GSI maps, ESZ logic, FRA institutions, and the Himalayan climate mission rather than a plains building code.

Facts & figures

Kedarnath disaster, 2013

Flood and debris event on a built pilgrimage belt that showed tourism-plus-development exposure.

WGEEP / Gadgil report

Western Ghats Ecology Expert Panel that proposed graded ecological sensitive zoning.

Kasturirangan report

Later high-level working group that redrew Western Ghats ESZ with a smaller no-go share.

National Mission on Himalayan Ecosystem

NAPCC mission for Himalayan science, land use, and community adaptation.

Forest Rights Act, 2006

Law that can support community forest protection in hills if titles and gram sabhas are real.

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