

# **Desertification in Different Regions of India**

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**ABSTRACT:** Recently, a document published by ISRO (Indian Space Research Organisation) named Desertification and Land Degradation Atlas shows that Land Degradation and Desertification has increased significantly in recent years.

- The Atlas provides a state wise area of degraded lands for the time frame. It also provides the change analysis for the duration of 15 years, from 2003-05 to later.
- Earlier, the Prime Minister delivered a keynote address at the United Nations' (UN) "High-Level Dialogue on Desertification, Land Degradation and Drought" via video conference.
  - Land degradation is caused by multiple forces, including extreme weather conditions, particularly drought. It is also caused by human activities that pollute or degrade the quality of soils and land utility.
  - Land degradation within dry land regions (arid, semi-arid and dry sub-humid regions) is termed as 'desertification'.
  - Desertification is the process by which the biological productivity of drylands is reduced due to natural or manmade factors. It does not mean the expansion of existing deserts.

**KEYWORDS:** land degradation, desertification, India, drought, manmade, pollution, weather, areas

## **INTRODUCTION**

Some 97.85 million hectares (29.7%) of India's total geographical area (TGA) of 328.72 mha underwent land degradation during current year. In 2003-05, 94.53 mha (28.76% of the TGA) underwent land degradation. The number increased to 96.40 mha (29.32% of the TGA) in 2011-13. Some 83.69 mha underwent desertification in latest time period. This was greater than the 81.48 mha in 2003-2005 and 82.64 mha in 2011-13 that underwent desertification. Around 23.79% of the area undergoing desertification / land degradation with respect to TGA of the country was contributed by Rajasthan, Maharashtra, Gujarat, Karnataka, Ladakh, Jharkhand, Odisha, Madhya Pradesh and Telangana. India witnessed an increase in the level of desertification in 28 of 31 states and Union territories between 2011-13 and further, a closer look at data in the atlas showed. Loss of soil cover, mainly due to rainfall and surface runoff, is one of the biggest reasons for desertification. It is responsible for 11.01% of the desertification in the country. Cutting forests adversely affect the soil and cause degradation. As urbanization increases, the demand for resources is also increasing. [1,2] Vegetation degradation is defined as, "the temporary or permanent reduction in the density, structure, species composition or productivity of vegetation cover". It is found to be responsible for 9.15% of desertification in the country. It results in Badland Topography which itself is an initial stage of desertification. Badlands are a type of dry terrain where softer sedimentary rocks and clay-rich soils have been extensively eroded. In 2011-13, water erosion was responsible for 10.98% of desertification in the country. Sand encroachment by wind reduces fertility of the soil making the land susceptible to desertification. It was found to be responsible for 5.46% of the desertification in India. It may exacerbate desertification through alteration of spatial and temporal patterns in temperature, rainfall, solar radiation and winds. [3,4]

Land degradation threatens agricultural productivity. It reduces soil health, thus in turn impacting the livelihood of rural people. It is exacerbating climate change events, which in turn, are causing even greater degradation. For e.g. degraded land loses its capacity to absorb carbon-dioxide (CO<sub>2</sub>), a greenhouse gas (GHG) that is the biggest factor in worsening

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global warming. Land degradation has resulted in a deterioration in the quantity and quality of both surface and groundwater resources.

The dryland population vulnerable to water stress and drought intensity is projected to reach 178 million under the most ideal conditions of 1.5 deg-C warming later. Insecure land tenure affects the ability of people and communities to fight climate change, which is further endangered by land degradation.[5,6]

## II.DISCUSSION

- Measures taken by India to Curb Desertification/Land Degradation:
  - Integrated Watershed Management Programme:
    - It aims to restore ecological balance by harnessing, conserving and developing degraded natural resources with the creation of Rural Employment. Now it is subsumed under Pradhan Mantri Krishi Sinchai Yojana which is being implemented by NITI Ayog.
  - Desert Development Programme:
    - It was launched in 1995 to minimize the adverse effect of drought and to rejuvenate the natural resource base of the identified desert areas.
    - It was launched for hot desert areas of Rajasthan, Gujarat, Haryana and cold desert areas of Jammu & Kashmir and Himachal Pradesh.
  - United Nations Convention to Combat Desertification (UNCCD):
    - India became a signatory to the UNCCD in 1994 and ratified in 1996. India is working to restore 26 million hectares of degraded land.[7,8]
    - India is working hard to achieve its national commitment on Land Degradation Neutrality (LDN) (Sustainable Development Goal target 15.3).
      - LDN is a state whereby the amount and quality of land resources, necessary to support ecosystem functions and services and enhance food security, remains stable or increases within specified temporal and spatial scales and Ecosystems.
  - National Afforestation Programme:
    - It has been implemented since 2000 for the afforestation of degraded forest lands. It is being implemented by the Ministry of Environment, Forest and Climate Change[9,10]
  - National Action Programme to Combat Desertification:
    - It was prepared in 2001 to address issues of increasing desertification and to take appropriate actions.

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○ National Mission on Green India:

- It was approved in 2014 with the objective of protecting, restoring and enhancing India's diminishing forest cover with a deadline of 10 years.

Six states in northeastern India were among the top 10 places in the country with the highest rates of desertification between 2003 and later, according to a recent report. These are Mizoram, Arunachal Pradesh, Assam, Tripura, Nagaland and Meghalaya.

Punjab, Delhi, Jammu and Kashmir and Uttarakhand in northern India also witnessed some of the highest rates of desertification, the most recent estimates by Space Applications Centre under Indian Space Research Organisation (ISRO).[11]

Land degradation is defined as decline in productivity of land in terms of biodiversity and economy, resulting from various causes, including climate and human dominance, leading to loss of ecosystem.

Desertification is a type of land degradation in which a relatively dry region becomes increasingly arid, typically losing its water bodies as well as vegetation and wildlife.

The scientists at ISRO compared the data collected between 2003 and 2005 with that gathered in further years.

Mizoram desertifying fastest

Mizoram in the North East has been desertifying at the fastest rate in the country, the ISRO data showed. Land degradation and desertification increased 2.8 times in the state in the 15-year period studied. [12,13]

A total of 0.18 million hectares (mha) underwent degradation/desertification in those years — an increase of over 188 per cent.

The state lost more than 13 per cent of its land to degradation/desertification in current time itself, according to the Desertification and Land Degradation Atlas of India

In 2003-05, 4.55 per cent of the state's total geographical area (TGA) underwent land degradation. This increased to 8.89 per cent TGA in 2011-13, according to the ISRO atlas.

Rapid degradation in Arunachal, Nagaland

In Arunachal Pradesh, 2.4 per cent of the area or 0.2 mha underwent degradation / desertification this year. The actual figure may be small compared to other places in India but the rate of degradation was the third highest.

Between 2003-05 and further, degradation / desertification increased 46 per cent in the state.

In Nagaland, over half the 200,683 ha geographical area was found to be degraded / desertified in further years, whereas, the share of degraded land was 38.74 per cent in 2003-05.

The actual desertified area rose by over 29.4 per cent in 15 years.

Loss of vegetation main cause [14,15]

Deforestation and loss of green cover are the main reasons for land degradation and desertification in the region.

In Mizoram, the role of vegetation loss in the degradation of land of Mizoram increased over the years: It was responsible for 3.88 per cent of the desertification in 2003-05, 7.92 per cent in 2011-13 and 12.04 per cent, according to ISRO.

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The entire region lost vast stretches of forests between 2011 according to the State of India's Forests report by the Forest Survey of India

Mizoram, for instance, lost over 5.8 per cent of its forest cover during the period and Nagaland 6 per cent.

Human settlements and water erosion are other main reasons behind increasing vegetation loss and the resulting desertification in these states.

Agricultural land in Assam and Meghalaya also extensively suffered from water logging, the second factor behind the increasing desertification rates. [16]

Heightening climate crisis

Land degradation reduces the soil's ability to absorb carbon, according to the Intergovernmental Panel on Climate Change (IPCC) Special Report.

Land degradation and climate change fuel each other, said IPCC.

The monsoon rainfall pattern of Pakke-Kessang district in Arunachal Pradesh may have been driven partly by major landscape modifications, said MD Subash Chandran, professor of ecology at the Indian Institute of Science, Bengaluru.

The northeastern states have been receiving lower rainfall than normal for several years and the distribution is skewed, data from India Meteorological Department established.

The region recorded a rainfall deficit of 12 per cent. Over half the districts in Arunachal Pradesh, Nagaland, Mizoram experienced deficient precipitation.

## **III.RESULTS**

India is highly vulnerable to desertification. Desertification not only leads to loss of biodiversity but can also negatively affect food production leading to poverty, hunger, economic instability, competition for scarce land and water resources and migration.

What is desertification? It is a form of land degradation where fertile land gradually deteriorates into a wasteland. This can be disastrous! Climatic variations and human activities such as overgrazing, deforestation, agricultural activities, overexploitation of vegetation for domestic use, bio-industrial activities are the major causes of desertification.

The main factors responsible for desertification in India are the extension of cultivation in marginal lands, inadequate soil and water conservation measures, intensive cropping systems and poor irrigation management and overexploitation of groundwater.[17]

India loses more and more land to desertification

Recent analysis reveals that the area under desertification in India is increasing with 29.32 percent of the Total Geographic Area (TGA) of the country found to be undergoing land degradation/desertification and 23.95 percent of it is contributed by the states of Rajasthan, Maharashtra, Gujarat, Jammu & Kashmir, Karnataka, Jharkhand, Odisha, Madhya Pradesh and Telangana.

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Desertification affects the south of the country too

A recent study by S. Dharumarajan et al published in the journal Current Science makes a comparative analysis of the extent and reasons for desertification of three high-risk states in south India namely Karnataka, Andhra Pradesh and Telangana. The study finds that:

- The topography of the region and the local land use patterns and practices have an impact on the levels of desertification.
- Karnataka has the most land area affected by desertification followed by Telangana and Andhra Pradesh.
- Desertification in Andhra Pradesh and Karnataka has increased by 0.19 percent and 0.05 percent respectively, while Telangana seems to show some improvement due to land reclamation where desertification seems to have decreased by about 0.52 percent.
- Vegetal degradation is the dominant cause for desertification in Andhra Pradesh followed by water erosion and waterlogging while water erosion is dominant followed by vegetal degradation and salinisation in Karnataka.
- The main causes for vegetal degradation in Andhra Pradesh are a number of manmade activities such as over-mining for minerals and metals, excessive use of firewood, severe deforestation and forest fires. Anantapur district shows high levels of land degradation followed by Kurnool, Prakasam and Chittoor districts.
- In Karnataka, deforestation and mining activities are triggering water erosion and an increase in salinity due to lack of trees, high evaporation and low precipitation are main drivers of desertification. Belgaum, Gulbarga, Tumkur and Bijapur districts have a high area under desertification. Bellary district experiences high vegetal degradation due to increased mining activities and extraction for timber. [18]

## IV.CONCLUSIONS

To reduce the severity of the desertification process, the study suggests the adoption of proper and regular management practices such as:

- Identifying suitable areas for afforestation with the selection of suitable climate-resilient multipurpose tree species, perennial forage and fodder species.
- Managing soil erosion by adopting location-specific soil and water conservation practices.[19]
- Dealing with soil salinity in agricultural lands through proper irrigation water management, development and maintenance of surface and subsurface drainage systems.
- Adopting proper agriculture and land management practices.
- Converging these activities with the ongoing national and state government programmes like Joint Forest Management, Integrated Watershed Management Programme and Mahatma Gandhi National Rural Employment Guarantee Act, etc. [20]

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