

DEFORESTATION AND DROUGHT IN SURKHANDARYA REGION, UZBEKISTAN

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Abstract. *This article examines the relationship between deforestation, drought, and land degradation in Surkhandarya Region, Uzbekistan. It explores the main environmental causes and impacts of vegetation loss and water scarcity, using scientific literature and environmental reports. The study also discusses sustainable land management strategies, including forest restoration, soil conservation, and efficient water use, to reduce environmental degradation and improve ecosystem resilience.*

Keywords. *Deforestation, drought, land degradation, Surkhandarya region, Uzbekistan, climate change, sustainable land management.*

INTRODUCTION

Forests and natural vegetation play an essential role in maintaining ecological balance, protecting soil from erosion, conserving biodiversity, and regulating water resources. However, deforestation, drought, and land degradation pose significant challenges in arid and semi-arid regions, where ecosystems are particularly vulnerable to climatic variability and human activities. These issues are especially relevant to Uzbekistan, where water scarcity, agricultural demands, and pressure on natural resources create challenges for sustainable land management.

According to the Food and Agriculture Organization of the United Nations (FAO), Uzbekistan's reported forest area reached approximately 3.89 million hectares in 2025, compared with 3.69 million hectares in 2020 (FAO, 2025). This represents an increase of approximately 5.6% over five years. Nevertheless, an increase in total forest area does not necessarily indicate improved ecological conditions in all forests or the recovery of natural vegetation in every region. National statistics provide an overview of changes in forest extent but do not, by themselves, explain forest quality or the local causes of vegetation degradation. Regional assessments are therefore necessary to identify areas where forest degradation, drought, and unsustainable land-use practices may threaten ecosystem stability.

Land degradation, desertification, and drought are also major concerns for agriculture, natural-resource management, and ecosystem stability in Uzbekistan. According to figures reported by the FAO in April 2026, approximately 2.5 million hectares of the country's 25.6 million hectares of rangelands are degraded, while a further 6 million hectares have experienced vegetation-cover loss. The same report indicates that approximately 45%

of Uzbekistan's 1.9 million hectares of irrigated cropland is affected by salinization. It also reports a decline in average rangeland productivity from 3.2 to 2.4 centners per hectare (FAO, 2026). These figures highlight the pressure on land resources and the need to improve rangeland management, restore degraded areas, and promote sustainable agricultural practices.

These challenges reflect a broader global concern about land degradation and desertification. The deterioration of productive land can reduce agricultural capacity, disrupt ecosystem functions, and threaten the livelihoods of communities that depend on natural resources. Addressing these problems requires coordinated efforts to conserve vegetation, restore degraded landscapes, improve water management, and strengthen ecosystem resilience to climatic stress.

Despite the reported increase in Uzbekistan's national forest area, official regional statistics indicate a decline in the total area recorded for forest enterprises in Surkhandarya Region. According to the National Statistics Committee of the Republic of Uzbekistan, this area decreased from 320.8 thousand hectares in 2013 to 299.1 thousand hectares in 2023, representing a reduction of approximately 6.8% (National Statistics Committee of the Republic of Uzbekistan, n.d.). However, this indicator should be distinguished from the area actually covered by forests, as the total land managed by forest enterprises may include land that is not forested. Further investigation is therefore necessary to determine whether the observed decline reflects changes in forest-land administration, forest cover, or other land-use conditions. This distinction is important when assessing the potential relationships between drought, vegetation degradation, and forest dynamics in Surkhandarya Region.

Located in southern Uzbekistan, Surkhandarya Region contains agricultural plains, river valleys, foothills, and mountain landscapes that support diverse land uses and ecosystems. These environments may be exposed to water scarcity, soil erosion, vegetation loss, and climatic variability. The removal or degradation of trees and shrubs can reduce soil protection and increase susceptibility to erosion. Meanwhile, prolonged drought can limit plant growth and regeneration, while high temperatures and insufficient soil moisture can intensify vegetation stress. These processes may interact with grazing pressure and land-use changes, contributing to the degradation of vulnerable landscapes. Their relative importance in Surkhandarya, however, must be established through region-specific evidence rather than inferred solely from national statistics.

Remote sensing, geographic information systems (GIS), and climate data provide useful methods for investigating these environmental changes. Satellite imagery can be used to assess changes in vegetation cover over time, while precipitation records, temperature observations, and drought indices can help identify periods of climatic water stress. Combining these datasets can help determine whether vegetation decline coincides with drought and identify areas where land-cover changes are most pronounced. Nevertheless, a decline in vegetation indices alone cannot establish deforestation or prove that drought caused

a particular change. Land-cover classification and consideration of other environmental and human factors are also necessary.

The aim of this study is to examine changes in forest area and investigate the potential relationship between deforestation, drought, and land degradation in Surkhandarya Region, Uzbekistan. Specifically, the study seeks to identify environmental pressures associated with vegetation loss, discuss their potential consequences for soil and water resources, and consider sustainable land management strategies that could strengthen ecosystem resilience.

METHODOLOGY

This study employs a descriptive and analytical approach to examine changes in forest area and the potential relationship between deforestation, drought, and land degradation in Surkhandarya Region, Uzbekistan. The research draws on secondary data from the National Statistics Committee of the Republic of Uzbekistan, the Food and Agriculture Organization of the United Nations (FAO), official environmental reports, and relevant scientific publications. Regional forest statistics for 2013 and 2023 are compared to assess changes in recorded forest area over the study period. The available figures indicate a decrease from 320.8 to 299.1, equivalent to approximately 6.8%, subject to verification of the original units and statistical definitions. To investigate vegetation dynamics and drought conditions further, the study proposes using satellite imagery, including Landsat and Sentinel-2 observations, together with the Normalized Difference Vegetation Index (NDVI), precipitation records, and temperature data. Geographic information systems (GIS) can be used to identify spatial patterns of vegetation change and areas potentially vulnerable to land degradation. Where consistent time-series data are available, vegetation trends can be compared with drought indicators to examine whether changes in vegetation coincide with periods of climatic water stress.

However, forest-area changes may also result from land-use changes, grazing pressure, and other human activities; therefore, the analysis does not assume that drought is the sole cause of forest decline. The reliability of the findings depends on the consistency of statistical records, the availability of climate data, and the validation of satellite-derived observations.

CONCLUSION

Deforestation, drought, and land degradation represent interconnected challenges for the long-term environmental sustainability of Surkhandarya Region. The reported decline in regional forest area between 2013 and 2023 highlights the importance of investigating local forest dynamics alongside national trends. Although drought, water scarcity, land-use changes, and grazing pressure are potential contributors to vegetation degradation, their individual effects in Surkhandarya require further empirical assessment.

Combining official forest statistics, satellite observations, and climatic data would provide a stronger basis for identifying changes in vegetation cover and assessing their

relationship with drought. Such an approach could help distinguish changes in recorded forest area from broader vegetation stress and identify landscapes that require conservation measures.

Improving environmental resilience in Surkhandarya requires an integrated approach that combines forest conservation, restoration of native vegetation, sustainable grazing, soil protection, and efficient water management. Future research should quantify forest-cover changes, assess the severity and duration of drought, and investigate the relative contributions of climatic and human factors to land degradation. These efforts could support evidence-based regional planning and the sustainable management of Surkhandarya's natural resources.

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