

Climatic Impacts of Aravali Mountain Extraction to its Neighbouring Areas

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Abstract

The Aravali Range is among the oldest mountain ranges in the earth, and also it spans across Gujarat up to Rajasthan emerging into Haryana and Delhi. It has been known as a strong ecological fort situated in northwest India. Its existence influences the local climatic patterns, sustains the ground water system, and halts the desertification of fertile plains. The integrity of this has however been compromised due to centuries of mining, deforestation and policy alterations. The present paper discusses the climatic changes in case the Aravali Range was to be substantially decreased or eliminated. On the basis of the study of region-specific data, satellite investigation, and climate modelling, we draw attention to the consequences of adjustments of rainfall patterns, temperature regimes, dust storm frequency, ground water recharge, and ecosystem health. Results indicate that the disappearance of the Aravallis would make water shortage more severe, heat waves more intense, dust pollution more frequent, and desertification more widespread in north India. Policy recommendations are given at the end of the paper to preserve and rehabilitate this important landscape.

1. Introduction

The Aravali Range is not much high or dramatic like the Himalayas but its impact on the climate and ecology of northwest India is enormous. This low mountain arc is approximately 800km long and has served a historical role as a natural barrier between the fertile plains and the Thar Desert, which is located in the west and east respectively. It tames winds, refills aquifers, sustains forests and fauna and serves as a shield against desertification and dust storms into urban and agricultural core lands. During the last decades, however, quartzite, marble, limestone and other minerals mining and urbanization has almost destroyed great parts of this range. It has been reported that more than a quarter of the original Aravalli hills

have already disappeared, primarily as a result of mining and land conversion, and that forest cover is declining drastically in the main cores. (Tourism Rajasthan)

This paper assesses the climatological consequences of what would occur should this process be allowed to go on to the extent that the mountains would be practically eliminated.

2. Study Area

The area of interest is the Aravali Range and its area of influence, to the extent of Gujarat in the southwest, through the middle part of Rajasthan and Northeast to Haryana and areas of Delhi. The cause of rainfall in this region is arid (less than 300mm/year) in the Thar, but semi-arid (300-600mm/year) in the eastern foothills. The Aravallis disrupt the winds and their distribution as well as influence the distribution of moisture; some river sources and seasonal watercourses are also found in the Aravallis. Recharge of the groundwater is also used to support urban and agricultural consumption in the fast-developing states like Jaipur, Gurugram, and Faridabad.

3. Objectives

The objectives of the study are as follows:

1. To know the Aravali Range climatic functions.
2. To determine the effects of eliminating the range on local and regional climatic systems.
3. In order to measure possible effects on rainfall, temperature, frequency of dust storms, and water resources.
4. To speak about environment and social implications.
5. To suggest ways of mitigation and policy directions to preserve the Aravallis.

4. Methodology

The study synthesizes the climatic functions of the Aravalies as studied by peers, vegetation cover change is monitored by satellite to observe land use and report on mining and rate of degradation by government and NGO. Geographic and meteorological related studies on climate modelling.

The paper regarded tendencies of several decades comparing places with well-preserved mountain ecology with those being heavily mined or deforested. The methodology entailed a qualitative analysis and quantitative data where necessary.

5. Discussion and Interpretations

5.1 Barrier Effect and Patterns of Rainfall

The Aravallis can be used as wind and moisture screen. Although they are not high enough to generate high orographic rainfall as the Himalayas, they have an effect that influences the flow of southwest monsoon winds hence the distribution of rain in northwest India. They also contribute to the dampening of dry winds which are caused by Thar Desert. It has been revealed that there is a correlation between destruction of forest cover and the increasing rate of dust storms in areas east of the range, as well as dry spells.

5.2 Temperature Extremes

Erosion of the hills and the vegetative cover associated with it decreases shade and evapotranspiration which are two cooling mechanisms of nature. This is prone to heighten heat intensity and heat waves in the area. The absence of these natural coolers leads to increased maximum temperatures in the city and the countryside, and warmer nighttime temperatures, which adds to heat stress among the population and livestock.

5.3 Dust and Air Pollution

The Aravallis assist in trapping the dust and fine particles. In cases of stripping or lowering, dust storms and particles are carried freely in the plains and urban centres especially Delhi-NCR. Mining on its own is a major contributor to the particulate matter within the area, and lack of hills increases this. (finovation.co.in)

5.4 Water Availability and Groundwater Recharge

The forested valleys and the rocky slopes of the range were historically sluggish to the runoff and thus permitted the rainwater to sink deep into the ground. The loss of this mechanism increases surface runoff, and decreases recharge, and leads to falling water tables. In Haryana and Rajasthan, the groundwater level has reduced drastically- in certain regions, it has declined to more than 1-1.5 metres/year. (PMF)

5.5 Land Degradation and desertification

Desertification is the order of the day by depleting the Aravallis. The Thar Desert which is already on the way of expansion might extend to Haryana, western Uttar Pradesh, and even the Punjab plains. Deforestation and soil desertification increases erosion and soil degradation. When these landscapes are left to deteriorate to a certain extent, they become very hard to rehabilitate.

5.6 Effects on Ecosystem and Biodiversity

Although climate is the theme of this paper, it is worth mentioning that climate and biodiversity are closely interconnected. Mountain removal causes loss of habitat which affects the local climate control mechanisms and species loss, further worsening ecological stress.

6. Findings

6.1 Rainfall interference: Regions below the former Aravalli footprint would experience inaccurate rainfall, which will elevate drought.

6.2 Increased temperatures: Increased heat trapping due to absence of shade and vegetation would make higher average temperatures a part of the institutions.

6.3 Poorer air quality: The natural barrier would be removed, and dust and particulate pollution would be on the rise, turning the respiratory health outcomes in the city such as Delhi into a nightmare.

6.4 Water scarcity: There would be slower recharge of the aquifers leading to deeper drilling and increased competition on the scarce water.

6.5 Hastened desertification: The Thar would cause soil erosion and dry winds; these would drive environmental conditions towards a desert-like regime across the plains in the north.

All these changes would lower the quality of life, agricultural productivity, as well as create pressure on water and health systems.

7. Conclusions and Suggestions.

7.1 Conclusions

The Aravali Range is not just another geographical feature. It is climatic controller and life support system to millions of people. Either eliminating or seriously weakening the range

would not only be a local modification but would reform the climate pattern of northwest India. The outcome would be increased temperatures, unreliable water, increased dust and pollution and declining agricultural productivity.

These risks are already preconditioned by climatic trends in the region. Historical records indicate the decrease in rainy days associated with the ecological degradation and the reports indicate that in the regions where the hills have been weakened, the desert has encroached more. (Down To Earth,)

7.2 Suggestions

The following are steps that can be used in practice to avoid the worst outcomes:

1. Close preservation of the remaining tracts of the Aravalli, not only mountainous peaks, but also hillocks, ridge formations.
2. Violent planting of native plants to stabilize the soil and increase the infiltration of rain.
3. Implementation of mining laws to stop the continued degradation and rehabilitation of mined areas.
4. City planning that takes into consideration the environmental-sensitive areas and removes sprawl into the Aravalli terrain.
5. The models of community-led stewardship which include the local residents in the process of monitoring and ensuring ecological health.
6. Combined climate-water management to safeguard aquifers and enhance the rain water collection at the watershed level.

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