

The Spine of Haryana: Ecological and Historical Significance of Aravalli Hills

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Abstract:- Natural resources are crucial for the development of civilizations; men-nature relationship is the axis of it and the Aravalli hills in India hold significant importance as the oldest mountain range on earth. Spanning across four states, they play a crucial role in shaping the climate and biodiversity of the region. Not only do they act as a watershed between the Indus and Ganga basins, but their forested patches also serve as a vital defence against air pollution and soil erosion. Recognizing their ecological value, the Ministry of Environment and Forest of India has implemented regulations to protect the Aravalli Range from activities causing environmental degradation. However, despite these efforts, the range faces threats such as deforestation, land degradation, encroachments, developmental activities, and mining, leading to adverse consequences like desertification, dust storms, loss of biodiversity, and air pollution. It is imperative to address these challenges to safeguard the ecological balance and natural heritage of the Aravalli hills. The aim of this present paper is to highlight the ecological as well as other importance of Aravalli hills in Haryana.

I. INTRODUCTION

The relationship between humans and natural resources has been a fundamental aspect of civilization's development throughout history. The utilization of resources for economic advancement has been a consistent theme across different time periods. As human populations have grown, the demand for land has increased, leading to the expansion of settlements and agricultural activities at the expense of natural habitats such as forests and wetlands. This expansion has resulted in a reduction in both the quantity and diversity of vegetation, impacting biomass and biodiversity. It is evident that agriculture has been and will continue to be the primary driver of human-induced changes to the Earth's lands and ecosystems.¹

The Aravalli Range, once towering high in ancient times, has gradually worn down over millions of years due to weathering.

II. GEOGRAPHICAL AND HISTORICAL OVERVIEW OF ARAVALLI TRACT

The Aravalli hills in India hold the distinction of being the oldest mountain range on Earth. Derived from the Sanskrit words "ara" and "vali", Aravalli translates to "line of peaks".² The highest point, *Guru Shikhar* on Mount Abu, stands at 1,722 m (5,650 ft). With its origins dating back to the Proterozoic era, the Aravalli Range is considered one of the oldest geological features on the planet.³ Spanning across Gujarat, Rajasthan, Delhi, and Haryana, it significantly influences the climate and biodiversity of western India. Running from Delhi to the northeastern edge of Gujarat State, the range consists of detached ridges shaping inland drainage basins. It maintains a relatively continuous presence south of Ajmer.

In contrast, the Himalayas, being young fold mountains, continue to rise steadily. The diminished growth of the Aravalli Range can be attributed to the cessation of upward thrust caused by the tectonic plates in the Earth's crust below them. This phenomenon has resulted in the Aravalli Range connecting two ancient segments of the earth's crust, namely the Aravalli Craton and the Bundelkhand Craton.

The Aravalli Craton, located northwest side of the Aravalli Range, represents a stable part of the continental lithosphere that has remained relatively undeformed over time. Similarly, the Bundelkhand Craton segment, located southeast side of the Aravalli Range, also demonstrates characteristics of an old and stable part of the earth's crust. Both cratons are integral components to the larger Indian craton, known for its resilience amidst continents merging and rifting cycle.⁴

It is noteworthy that cratons are found in the interiors of tectonic plates and play a crucial role in understanding the geological history of a region. Their stability and lack of deformation provide valuable insights into the evolution of continents and the Earth's crust. Despite the Aravalli Range no longer experiencing significant growth, its geological significance remains paramount in unravelling the complexities of India's geological past. In conclusion, the Aravalli Range's transformation from a towering ancient mountain to its current state serves as a testament to the

enduring forces of nature and the dynamic nature of Earth's geology. The juxtaposition of the Aravalli Range with young and rising Himalayas exemplifies the diverse geological processes that have shaped our planet over millions of years.

The Aravalli Craton in Rajasthan and western and southern Haryana contains commercially significant mineral deposits including rock phosphate, lead-zinc-silver, pyrophyllite, serpentinite, kyanite, talc, apatite, beryl, and asbestos.⁵ This region is characterized by the presence of the Mewar Craton in the west and east with geological boundaries defined by the Great Boundary Fault, Thar desert, Indo-Gangetic alluvium, and the Son River-Tapti River basins River-Narmada. The geological formations in this area consist mainly of greywacke, quartzite, pelite, extinct volcanoes, and marble within the Aravalli Orogen of -Delhi region. The Malani Igneous is the third largest suite globally and the largest in India.

The Aravalli range in India has a rich history of mining copper and other metals, dating back to at least the 5th century BCE.⁶ Recent research suggests that copper mining was already underway during the Sothi-Siswal period around 4000 BCE⁷, with ancient settlements such as Kalibangan and Kunal in Haryana obtaining copper from this region.⁸

The geological uniqueness of the Malani Igneous Suite at Jodhpur has led to its designation as a National Geological Monument by the Geological Survey of India.⁹ This recognition highlights the significance of the site in the study of geology. The Tosham hills are home to several Indus Valley civilization sites, situated within the Southwest Haryana copper-bearing zone and Aravalli hill range of Northeast Rajasthan.¹⁰ This area has been of particular interest to researchers, with excavations revealing early to mature pottery, Harappan phase IVC materials, and semiprecious beads made from carnelian and lapis lazuli. Additionally, metallurgical activities evidence, including furnace lining, ash, crucibles for pouring molten metal, ore slugs and burnt floor, has been uncovered.¹¹

Notably, Ravindra Nath Singh and team members from Banaras Hindu University conducted excavations backed by ASI-financed at site of Indus Valley civilization site situated in the Government School in Khanak. Their findings have provided valuable insights into the ancient civilization's activities in the region, shedding light on their use of resources and technological capabilities.¹² Overall, the historical significance of copper mining in the Aravalli range is underscored by the presence of ancient settlements and evidence of advanced metallurgical activities. Continued research and excavation efforts in this region promise to further enhance our understanding of early human civilizations and their utilization of natural resources.

III. ENVIRONMENTAL IMPORTANCE & PRESENT SCENARIO

The Aravalli Mountain range in India plays a crucial role in the geographical and environmental region landscape. Acting as a watershed between the Ganga and Indus basin, the Aravalli have significant implications for the distribution of water resources and the overall ecosystem.¹³

The forested patches within the Aravalli range serve as essential green lungs, playing a vital role in mitigating air pollution and preventing soil erosion. This not only benefits the local environment but also has wider implications for the surrounding areas. In addition to their role in preserving the environment, the Aravalli hills also have a significant impact on weather patterns and the spread of desert regions. The hills moderate wind velocity and have effectively prevented the Indian Desert named Thar from encroaching further towards Haryana, eastern Rajasthan, Western Uttar Pradesh, and the Indo-Gangetic plains.

Furthermore, the Aravalli range serves as a source for several important rivers in the region and their main tributaries. The Sahibi and Banas rivers, which are important tributaries of the Yamuna, along with Luni River, which flows in the region called Rann of Kutch, all originate from the Aravalli range. This further emphasizes the critical role of the Aravallis in maintaining the water cycle and supporting various ecosystems downstream. The climatic variations across different parts of the Aravalli range further highlight its diverse impact. The Aravalli range in India spans across different regions, each with its own unique climate. In Delhi and Haryana, the Northern Aravalli range experiences a humid subtropical climate with hot summers and cool winters. Moving towards Rajasthan, the Central Aravalli range has an arid and dry climate. On the other hand, the Southern Aravalli range in Gujarat exhibits a tropical wet and dry climate. These diverse climates across the Aravalli range contribute to the rich ecological and environmental diversity of the region.

In conclusion, the Aravalli Mountain range is not only a geographical feature but also a crucial component of the environmental and climatic dynamics of the region. Its role as a watershed, its impact on air quality and soil erosion, and its influence on weather patterns and river systems underline its significance in sustaining the ecological balance in the surrounding areas. Understanding and preserving the unique characteristics of the Aravalli range is essential for ensuring the continued well-being of both the environment and local communities.

The Aravalli Range, spanning across multiple states in India, is indeed a crucial habitat for various wildlife species. The Great Green Wall of Aravalli, a significant ecological corridor, serves as a vital refuge for Indian leopards and jackals within the region. However, the increasing urban development, including the construction of highways and railways, poses a significant threat to this delicate ecosystem by disrupting the wildlife corridor. In particular, the Haryana

side of the Gurugram-Faridabad Aravalli hill forests faces challenges related to water scarcity, leading to a decrease in wildlife sightings. To address this issue, the Government of Haryana has taken proactive measures, such as using drones for aerial surveys and creating ephemeral pits to store rainwater. Furthermore, plans are underway to make these pits perennial by connecting them with pipelines from nearby villages, ensuring a more sustainable water supply for the wildlife in the area.¹⁴

The Aravalli Range is home to a variety of national parks, wildlife reserves, and forests, all of which play a vital role in preserving the biodiversity of the region. These include the Aravali Biodiversity Park in Gurgaon, Madhogarh Biodiversity Park Forest, Nuh Aravalli Biodiversity Park Forest, Satnali Biodiversity Park Forest, Tosham Hills Range Biodiversity Park, Masani Barrage Wildlife Area, Matanhail Wildlife Area, Chhuchhakwas-Godhari Wetland, Khaparwas Wildlife Sanctuary, Bhindawas Wildlife Sanctuary, Sarbashirpur, Sultanpur National Park, Basai, Bandhwari Forest, and Mangar Bani Forest. Each of these areas contributes significantly to the overall environmental diversity and richness of the Aravalli Range.

It is evident that the Aravalli Range is not only rich in wildlife but also faces various challenges due to human activities. However, with proactive measures and conservation efforts, there is hope for preserving this unique ecosystem for future generations.

The Environment Impact Assessment (EIA) has been a significant tool for decision-making in various countries, including India. The Government of India took a proactive step by enacting the Environment (Protection) Act in 1986, which was further supported by a series of notifications related to environmental impact assessment. Specifically, in May 1992, the Ministry of Environment and Forest of India issued restrictions under the Environment Protection Act 1986 to address environmental degradation in the Aravalli Range, particularly in Haryana. This led to the protection of certain areas from mining activities, with subsequent bans and extensions by the central government and the Supreme Court in 2003, 2004, and 2009. These measures aimed to safeguard the ecological balance and natural resources in the region.¹⁵

The Aravalli range is currently facing significant threats such as encroachments, developmental activities, deforestation, mining, and land degradation. These are serious consequences including drying up of lakes, desertification, loss of biodiversity, increased frequency of

dust storms, air pollution, and human-wildlife conflicts¹⁶. Despite numerous reports and judgments documenting such activities of exploitation in the Aravalli hills, continue to face several challenges. It is imperative to address these issues and implement sustainable measures to protect and preserve the ecological balance in the Aravalli range.

The degradation of the Aravalli ecosystem is a matter of great concern, as highlighted by various studies where one of them conducted by the Wildlife Institute of India called as WII.¹⁷ The reduction in green cover in the Aravalli region has been identified as a significant factor contributing to the escalating storms of dust with high intensity in the regions of Indo-Gangetic plains. The study conducted by WII in Haryana's Aravalli region revealed that unchecked activities related to development are resulting in posing a threat to wildlife and deforestation. It is evident that existing laws, policies, and directives from the Supreme Court have been disregarded, leading to a long-standing failure in effectively implementing measures to safeguard the Aravalli region. This has created a situation where the unregulated activities of the real estate sector continue to exploit the forests of Aravalli, perpetuating the risk of deforestation and environmental degradation.¹⁸

The Aravalli ecosystem, being one of the oldest mountain ranges, holds significant ecological importance. However, it has already suffered extensive destruction. It is imperative to impose a comprehensive sanction on mining and development-related activities within a determined range to protect and preserve this unique ecosystem. The detrimental impact of uncontrolled urbanization, excessive exploitation of natural resources such as water and minerals, unregulated mining practices, non-recycled disposal of human waste, loss of forest cover, destruction of wildlife habitats and environmental pollution are all pressing concerns that need to be addressed. Furthermore, the lack of a comprehensive management agency dedicated to the Aravalli region exacerbates these challenges.

In conclusion, urgent and decisive action is required to address the various threats facing the Aravalli ecosystem. This should include stringent enforcement of regulations to prevent further degradation, establishment of protected areas, and the creation of a dedicated management authority for the sustainable preservation of the Aravalli region. It is essential to prioritize the conservation and restoration of this ecologically significant landscape for the benefit of current and future generations.

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