



Impacts of Pollution on Vegetation of Aravalli Hills of Rajasthan

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ABSTRACT: The Supreme Court have discovered one more reason for deteriorating air quality. The unrestrained mining activities by real estate firms have caused much damage to Aravalli Hills in Rajasthan. In fact, 31 out of 128 hills in the range have already disappeared and the number is only increasing. Rajasthan government has been held responsible for not keeping a check on illegal mining activities being performed in 115.34 hectare area of the range. The court has instructed the state to take immediate steps to restrict these activities within 48 hours. The state government was getting a royalty of ₹5,000 crore against illegal mining activities conducted on the hilly area. Aravalli Hills have been playing a crucial role in balancing the climate of Indus-Ganga plain in Northern India. Many climatic factors like rainfall, and soil conservation are dependent on the old mountain range.

While a recent survey by the Wildlife Institute of India (WII) has shown an increase in the number of animals in the Aravallis, unchecked deforestation and development activities have led to significant shrinkage in the forest cover.

KEYWORDS: Aravalli Hills, Rajasthan, Pollution, Impacts, Vegetation, Mining Activities, Illegal

I. INTRODUCTION

The three-billion-year-old Aravalli range has been providing north India for millennia: it arrests the eastward march of the Thar desert, thereby minimising the threat of desertification to the National Capital Region (NCR). Desertification is a slow process in which land productivity and resilience steadily decline due to overgrazing, deforestation and unsustainable agricultural practices, mining and climate change. In India, the main reason for desertification is loss of soil cover, mainly due to rainfall and surface run-off. 100 school students from the national capital region (NCR) protested against environmental dilutions in the (NCR) Draft Regional Plan . They met Hardeep Singh Puri, India's union minister for housing and urban affairs, about excluding India's oldest mountain range, the Aravallis, and tributaries of the Ganga and Yamuna rivers from the plan that is meant to decide the future of India's 55,000 sq km NCR, sprawled across three states and a union territory.[1,2] In the NCR Regional Plan , the Aravallis, forest areas and all water bodies were protected under "Natural Conservation Zones", earmarking them for conservation not construction. In the Regional Plan , the term Natural Conservation Zones has been replaced by 'Natural Zones', which don't even mention the term Aravalli. The plan has been criticised by environmentalists and conservationists for protecting only those geographical features, such as mountains, hills, rivers, water bodies and forests, recognised in land records and notified for conservation under central or state laws. The plan, which will aim to provide a development plan for the NCR, comprising Delhi and bordering districts of Haryana, Uttar Pradesh and Rajasthan. The plan claims to be environment-friendly, technologically driven, citizen-centric and in tune with the global sustainable development goals.[3,4]

The Regional Plan was released by the National Capital Regional Planning Board (NCRPB) and put in the public domain for public suggestions and objections. A meeting, scheduled to discuss public feedback, did not take place. Officials reported NCRPB received suggestions to restore the term 'Natural Conservation Zones', which was evident in the plan. The Aravallis run about 700 km in north-western India, starting from Gujarat, and passing through Rajasthan, Haryana and Delhi. The mountain range has become an ecologically vulnerable region today due to mining, deforestation, toxic landfills, real estate, illegal encroachments and development projects.

Aravalli Bachao Citizens Movement was co-founded by Neelam Ahluwalia, a former journalist who started her career reporting for 'Living On The Edge,' a weekly TV show on environmental issues aired by Doordarshan, the public broadcaster, in the 1990s. In addition to creating awareness among citizens and putting pressure on the government and the administration to protect the Aravalli forests and hills from disappearing in the four states, the Aravalli Bachao



Citizens Movement has a community of environment-conscious citizens working towards environment and forest protection across India. [5,6]

The movement has submitted letters and signatures of more than 260,000 citizens asking the government to stop the environmental dilutions in the NCR Draft Plan . The group has won two landmark judgments passed by the Supreme Court and the National Green Tribunal respectively; the first protecting thousands of acres of the Aravallis as forests under the Punjab Land Preservation Act, 1900, and the second confirming rampant illegal mining in the Aravallis in Haryana. In an interview, Ahluwalia explained how the NCR Draft Regional Plan would, “threaten the right to breathe and water security of millions of people living in one of the most polluted regions of the world, Delhi NCR”.

II. DISCUSSION

Because of excessive run off and soil erosion, the Aravalli region risks ending up as barren mountains devoid of vegetation, said the survey by the WII, Dehradun. Apart from assessing the presence of wildlife population in the area, the survey also mapped land cover pattern of the Aravallis in the state. This was important as the state has less than 4% green cover and there is an urgent need to increase the forest area. Also, the Aravalli ranges in the Gurgaon district in Haryana along with Alwar district of Rajasthan have been notified (May 1992) as ecologically sensitive areas. Therefore in-depth study of the area is essential, the survey said.

Evaluating the present scenario, the WII officials called for removal of weeds as it will facilitate the process of restoration and preservation of the green landscape. They have advised long-term ecological monitoring on sites crying out for preservation. “We have submitted the report to the state forest department and hope they will undertake necessary measures to save the Aravallis,” Bilal Habib, project head, WII, said.[7,8]

One of the major reasons that hamper the forest cover in the region is the salinity of soil. It adversely affects the vegetation by reducing the plant growth and rendering areas unsuitable for normal cultivation. Areas with such soils are left barren because of their non-productive nature.

According to the survey, the Aravalli ranges are not continuous and the mountains checked the expansion of the desert area till it was densely forested. The denudation of forests along the northern and central Aravalli tracts is causing the advancement of the desert area, particularly in areas between the ranges, with increasing intensity of dust storms, explained the report. We have been monitoring the area and also preparing ways to increase forest cover in the region. The report establishes the fact that the 3.2 billion-year-old ecosystem still has good number of wildlife left. We need to preserve the Aravallis as it acts as a water recharge system for the area ,” said MD Sinha, conservator of forest, South Haryana.

The change analysis in the report indicates a decrease in the green area from 1980- 2016. There is a need to substantially increase the green cover in order to improve the environmental conditions.[9,10]

One of the biggest threats I have observed in rural areas is deforestation, especially in the Mewat region of Haryana. While working on the ground, I met a Sarpanch, Ibrahim Haji and through him, I got to know how earlier when the forests were managed by the native community, they used to feel a sense of ownership towards the forests and natural resources; hence they used to take care of the forests and natural resources. Since the pattern of ownership has changed and natural resources have come under the forest departments, the equation between native people and natural resources has changed dramatically.

The second biggest threat is mining, which continues to happen on a very large scale across the Aravalli range in Haryana, Rajasthan and Gujarat. Because of mining, the people in rural areas have been affected by air pollution from the dust released into the air due to the crushing and blasting of stones. People across Rajasthan especially are suffering from a lot of lung ailments. A lot of people around these ranges suffer from silicosis which is a long-term lung disease caused by inhaling large amounts of silica dust. The dust from mining activities also gets accumulated on the crops on farms which negatively affects the yield.

Mining has resulted in the local johads drying up and groundwater tables plummeting. I have also met people, many of them young children who got injured by the big stones from the blasting sites hitting their heads. People’s homes have got big cracks as a result of blasting activities. [11,12]



The foothills of the Aravalli are the grazing grounds for the cattle and villagers call them charagah. Their cattle are also getting affected. When these hills are razed out of trees, it leads to the destruction of the green cover and plant species which means less grazing area for these cattle. On the one hand, pollution is increasing and on the other forests are decreasing.

A survey done revealed that the Aravalli range harbours a rich variety of plants and animal species. Animals like leopards, striped hyenas, mongooses, and golden jackals have been found in Gurugram Aravallis. It is important to protect this critical wildlife habitat and a biodiversity hotspot with more than 400 species of native trees, shrubs, grasses and herbs. Every plant and animal species forms an integral part of the environment, hence it is important to protect their natural habitat which is the Aravalli range.

The Haryana legislative assembly amended the Punjab Land Preservation Act (PLPA) which was effectuated in 1900 for “conservation of sub-soil water” and “prevention of erosion,” by giving the state the power to “regulate, restrict or prohibit” certain activities, including “clearing or breaking up” of land. This amendment also removed several hills of the Aravalli range from the category of “restricted area,” making around 63,000 acres of the Aravalli range available for construction and mining activities. By the same amendment, the Haryana government also attempted to legitimise several illegal constructions in the range. However, the Supreme Court, through an order, promptly nullified the amendment

The Aravallis of Northwestern India, one of the oldest fold mountains of the world, now form residual mountains with an elevation of 300m. to 900m. They stretch for a distance of 800 km. from Himmatnagar in Gujarat to Delhi, spanning Haryana, Rajasthan, Gujarat, and Delhi, the 692 kilometre (km). The mountains are divided into two, main ranges – the Sambhar Sirohi Range and the Sambhar Khetri Range in Rajasthan, where their extension is about 560 km. The hidden limb of the Aravallis that extends from Delhi to Haridwar creates a divide between the drainage of rivers of the Ganga and the Indus. These are fold mountains of which rocks are formed primarily of folded crust, when two convergent plates move towards each other by the process called orogenic movement. The Aravallis date back to millions of years when a pre-Indian sub-continent collided with the mainland Eurasian Plate. Carbon dating has shown that copper and other metals mined in the ranges date back to at least 5th century BC. [13,14]

The Aravallis act as a barrier between the fertile plains in the east and the sandy desert in the west. Historically, it is said that the Aravalli range checked the spread of the Thar desert towards the Indo-Gangetic plains, serving as a catchment of rivers and plains. The Aravalli is rich in biodiversity and provides habitat to 300 native plant species, 120 bird species and many exclusive animals like the jackal and mongoose. Aravallis have an impact upon the climate of northwest India and beyond. During monsoons, it provides barrier and monsoon clouds move eastwards towards Shimla and Nainital, thus helping nurture the sub-Himalayan rivers and feeding the north Indian plains. In the winter months, it protects the fertile alluvial river valleys from the cold westerly winds from Central Asia. For Haryana, having the lowest forest cover at around 3.59% of the total forest cover in India, the Aravalli range is the only saving grace, providing the major portion of its forest cover. Aravallis also function as a groundwater recharge zone for the regions around that absorb rainwater and revive the groundwater level. This range is considered the “lungs” for the world’s most polluted air of Delhi–National Capital Region (NCR)

III. RESULTS

Aravallis, the oldest mountain range in the world, running across 4 states in North India – Delhi, Haryana, Rajasthan and Gujarat is severely degraded. 31 Aravalli hills have disappeared in Rajasthan due to illegal mining. Real estate is eating up the Aravalli forests in Haryana which incidentally has the lowest forest cover in India (just 3.6%). Illegal felling of trees and encroachments across all states are destroying the Aravalli forests. As the oldest mountain range in the world is disappearing, the intensity of dust storms coming in from the Thar desert is increasing and the North Indian states are moving closer to desertification. The degradation of the Aravallis also threatens the water security of North India. The high levels of natural cracks and fissures in the Aravalli hills [15,16] make this mountain range a superior zone for recharging ground water, which is extremely in the red zone at this point of time as extraction is 3 times more than what is put back into the ground. Native planting needs to be taken up on war footing across all the 4 Aravalli states to save North India’s water recharge zone, green lungs and shield against desertification.

More than 25% and 31 hill ranges of the Aravallis in Rajasthan had vanished due to illegal quarrying. Loss of a great number of flora and fauna like leopards, striped hyenas, golden jackals, nilgais, palm civets, wild boar, Many rivers originating in the Aravalli like Banas, Luni, Sahibi and Sakhi, are now dead. A serious ecological impact of digging or



mining to a great depth is puncturing of aquifers, which disturbs the water flow, results in drying of lakes and popping up of new ones. Many water bodies such as famous Badkhal lake has been dried up and new water bodies due to depression left by illegal miners are popping up thus creating an environmental imbalance. The major reason for air pollution in the NCR region is particulate matter, especially Respirable Particulate Matter (RPM), a direct contribution of mining, and crushing. Man-wild animal conflict as natural forests along aravallis are being lost. The hydrological system and consequent water table in the whole NCR region is under threat, with altered natural drainage patterns. The price of the exploitation of such natural resources will also be paid by future generations. Therefore, it is necessary to track down the transfer of the Aravalli range-related equity from one generation to the next in the legal context. The concept of “intergenerational equity” was introduced in the Stockholm Declaration. The natural resources of the earth, including the air, water, lands, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of the present and future generations through careful planning or management, as appropriate. [17,18]

Further, the concept was elucidated in the Rio Declaration that states: The right to development must be fulfilled to equitably meet developmental and environmental needs of present and future generations. In the absence of proper industrialization, and lack of sustained livelihood source people are depending upon mining and ancillary industry for income. There is phenomenal demand for construction material in NCR and adjacent region, mining in Aravalli meets those needs. Implementational lacuna: even with the Supreme Court ban in place, illegal mining only proliferated, thus showing lack of political will. Like mining in Rajasthan, the illegal construction activities in Haryana shocked the Supreme Court. Although the Supreme Court categorically banned real estate activities in the Aravalli range falling under Haryana, the Haryana government not only gave a nod to the construction projects, but also actively aided in the running of these projects. The Supreme Court has laid down the “precautionary principle,” stating that the central and/or the state governments, while considering a project, must foresee environmental degradation and shall prevent such degradation without waiting for scientific evidence to show that there will be irreparable damage to the environment (Vellore Citizens Welfare Forum v Union of India and Others 1996). In 2010, the term “precautionary principle” was adopted by the National Green Tribunal (NGT). Section 20 of the NGT Act, 2010 specifically states that the tribunal can apply the precautionary principle while passing any order, decision, or award. MoEFCC issued an unprecedented notification on May 7, 1992, known as “The Aravalli Notification”. This notification clearly prohibits the setting up of new industries, mining, deforestation as well as construction activities, including roads and laying of transmission cables, without the prior permission from MoEFCC.

Supreme Court Orders

- 1992: Approval from the Central government would be needed for all mining and industrial activity in the Aravalli region.
- 1996: Mining leases could not be renewed within 2Km to 5Km radius of Badkhal lake without permission from the central and state pollution control boards.
- 2002: Banned mining activities in Haryana following large scale degradation in Faridabad and neighbouring areas
- 2009: Banned mining throughout the Aravallis again.
- 2017: ordered for complete demolition of the Kant enclave, residential complex of about 424.84 acres in the forest range of Aravalli, and directs the company to fully reimburse those who invested in the property.

Around 2009, the Municipal Corporation of Gurgaon declared it a biodiversity park and partnered with civil society, corporates and residents to plant trees and restore the forest. Today, it has nearly 200 species of plants, 183 species of birds, numerous species of reptiles and insects. Residents along with volunteers from iamgurgaon, a citizen action group involved in the conservation of the Aravallis were assisted by ecologists to create a self-sustaining Aravalli. This model should be followed and implemented to save aravallis and brewing concurrent environmental disaster. [19,20]



IV. CONCLUSIONS

Vijay Dhasmana, the ecologist behind the creation of Gurgaon's city forest shares, "My special task was to try and understand where each kind of plant species would be most 'at home' based on their evolution in the Aravalli hills over millions of years. Some plants are 'generalists' but most flora species, more so in arid or water stressed environments have their preferences and specialise in where they are best adapted to live and do well. During my travels for native seed collection to different Aravalli states, I learnt that the Dhau (*Anogeissus pendula*) grew on steep rocky slopes that can withstand thin soils and rapid runoff, the Salai (*Boswellia serrata*) is partial to the shoulders of the Aravalli hills, the Kadam (*Mitragyna parvifolia*) grows in the valleys that can withstand both waterlogging and to a certain extent drought, the Babool (*Acacia nilotica*) likes to grow where the soil is deep and of good quality with water close to the surface. I also observed how different flora species support each other in the forest ecosystem growing in various tiers. This learning from observing natural Aravalli forests like the Mangarbani near Gurgaon, Sariska in Rajasthan and others helped our team to draft the vision for creating the Aravali Biodiversity Park. The idea was to create diverse micro habitats in this city forest, including grasslands that would support varied forms of life, typical of the northern Aravallis." Often, forest plants are not found in normal nurseries. So sourcing native seeds and creating a nursery is an essential step in the rewilding journey. Once the nursery was set up in the Aravali Biodiversity Park, 35 flora species were germinated in the first year and then gradually more than 200 species were added. Operations of the nursery along with all the other costs of maintaining the native saplings planted have been funded by donations from Gurgaon city's corporate sector. No chemical fertilizers have been used for the 1,20,000+ native saplings planted in the Aravali Biodiversity Park. Natural leaf compost made at the site has been the only nutrient along with water given to the saplings. Water for irrigation has been sourced from the sewage treatment plants of nearby hotels. A drip irrigation network ensures watering in the areas where the gardeners cannot reach easily. Vijay Dhasmana shares, "It took us years from 2011 onwards to complete the rewilding exercise on 380 acres of wasteland and implement our vision to create this native city forest. We monitored the plants regularly and only provided irrigation when there was water stress noticed. The saplings were not given water more than 8 times in a year and only up to a period of 3 years after which the plants become strong enough to bear the brunt of the climatic conditions on their own."

Vijay Dhasmana, the ecologist advises, "If an institution or a housing complex in the cities of the National Capital Region and the states of Haryana, Rajasthan and Gujarat is large enough, I would recommend that they create small forest patches of the Aravallis with native trees, shrubs and grasses. Main canopy Aravalli tree species can be that of Dhau, Salai, Amaltash, Dhak, Kullu, Ronjh, Kumath, Doodhi, Barna, Sargooro, Gurjan, Roheda, Gamhar, Harsingar, Krishan Kadam (depending on the local ecology). Understorey trees like Bistendu, Chamrod, Harsingar, Kuda that are of lesser height as compared to the main canopy trees can be planted as the 2nd tier. Shrub species such as Goyakhair, Gangeti, Kair, Adusa, Marodphali and others can be planted as the 3rd tier. There are some gorgeous climbers that should be added such as *Vallisneria* spp, *Ichnocarpus* spp, *Telosma phallida*, *Watakaka volubilis* and many others." [21]

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