

Flora of Aravalli Range in Rajasthan

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ABSTRACT: The Aravalli Range (also spelled *Aravali*) is a mountain range in Northern-Western India, running approximately 670 km (420 mi) in a south-west direction, starting near Delhi, passing through southern Haryana,^[1] Rajasthan, and ending in Ahmedabad Gujarat.^{[2][3]} The highest peak is Guru Shikhar on Mount Abu at 1,722 m (5,650 ft). The Aravalli Range is arguably the oldest geological feature on Earth,^{[4][5][6][7]} having its origin in the Proterozoic era. The Aravalli Range is rich in natural resources and serves as check to the growth of the western desert.

KEYWORDS-Aravalli,Mountains,Range,Rajasthan,Flora,Resources,Natural,Desert

IINTRODUCTION

The Aravalli Range, an eroded stub of ancient mountains, is believed to be the oldest range of fold mountains in India.^[10] The natural history of the Aravalli Range dates back to times when the Indian Plate was separated from the Eurasian Plate by an ocean. The Proterozoic Aravalli-Delhi orogenic belt in northwest India is similar to the younger Himalayan-type orogenic belts of the Mesozoic-Cenozoic era (of the Phanerozoic) in terms of component parts and appears to have passed through a near-orderly Wilson supercontinental cycle of events. The range rose in a Precambrian event called the Aravalli-Delhi Orogen.^[1,2,3] The Aravalli Range is a northeast-southwest trending orogenic belt located in the northwestern part of Indian Peninsula. It is part of the Indian Shield that formed from a series of cratonic collisions.^[11] In ancient times, Aravalli were extremely high but since have worn down almost completely from millions of years of weathering, whereas the Himalayas, young fold mountains, are still continuously rising. Aravalli have stopped growing higher due to the cessation of upward thrust caused by the tectonic plates in the Earth's crust below them. The Aravalli Range joins two of the ancient earth's crust segments that make up the greater Indian craton, the Aravalli Craton which is the Marwar segment of earth's crust to the northwest of the Aravalli Range, and the Bundelkand Craton segment of the earth's crust to the southeast of the Aravalli Range. Cratons, generally found in the interiors of tectonic plates, are old and stable parts of the continental lithosphere that have remained relatively undeformed during the cycles of merging and rifting of continents.^[7,8,9]

It consists of two main sequences formed in the Proterozoic eon, metasedimentary rock (sedimentary rocks metamorphosed under pressure and heat without melting) and metavolcanic rock (metamorphosed volcanic rocks) sequences of the Aravalli Supergroup and Delhi Supergroup. These two supergroups rest over the Archean Bhilwara Gneissic Complex basement, which is a gneissic (high-grade metamorphism of sedimentary or igneous rocks) basement formed during the archean eon 4 Ga ago. It started as an inverted basin, that rifted and pulled apart into granitoid basement, initially during Aravalli passive rifting around 2.5 to 2.0 Ga years ago and then during Delhi active rifting around 1.9 to 1.6 Ga years ago. It started with rifting of a rigid Archaean continent banded gneissic complex around 2.2 Ga with the coexisting formation of the Bhilwara aulacogen in its eastern part and eventual rupturing and separation of the continent along a line parallel to the Rakhbdev (Rishabhdev) lineament to the west, simultaneous development of a passive continental margin with the undersea shelf rise sediments of the Aravalli-Jharol belts depositing on the attenuated crust on the eastern flank of the separated continent, subsequent destruction of the continental margin by accretion of the Delhi island arc (a type of archipelago composed of an arc-shaped chain of volcanoes closely situated parallel to a convergent boundary between two converging tectonic plates) from the west around 1.5 Ga. This tectonic plates collision event involved early thrusting with partial obduction (overthrusting of oceanic lithosphere onto continental lithosphere at a convergent plate boundary) of the oceanic crust along the Rakhbdev lineament, flattening and eventual wrenching (also called strike-slip plate fault, sideways horizontal movement of colliding plates with no vertical motion) parallel to the collision zone. Associated mafic igneous rocks show both continental and oceanic tholeiitic geochemistry (magnesium and iron-rich igneous rocks) from phanerozoic eon (541-0 million) with rift-related magmatic rock formations.^[12]

The Aravalli-Delhi Orogen is an orogen event that led to a large structural deformation of the Earth's lithosphere (crust and uppermost mantle, such as Aravalli and Himalayas fold mountains) due to the interaction between tectonic plates when a

continental plate is crumpled and is pushed upwards to form mountain ranges, and involve a great range of geological processes collectively called orogenesis.^{[13][14]}

The Archean basement had served as a rigid indenter which controlled the overall wedge shaped geometry of the orogen. Lithology of area shows that the base rocks of Aravalli are of Mewar Gneiss formed by high-grade regional metamorphic processes from preexisting formations that were originally sedimentary rock with earliest life form that were formed during the Archean eon, these contain fossils of unicellular organism such as green algae and cyanobacteria in stromatolitic carbonate ocean reefs formed during the Paleoproterozoic era. Sedimentary exhalative deposits of base metal sulfide ores formed extensively along several, long, linear zones in the Bhilwara aulacogen or produced local concentration in the rifted Aravalli continental margin, where rich stromatolitic phosphorites also formed. Tectonic evolution of the Aravalli Mountains shows Mewar Gneiss rocks are overlain by Delhi Supergroup type of rocks that also have post-Aravalli intrusions. Metal sulfide ores were formed in two different epochs, lead and zinc sulfide ores were formed in the sedimentary rocks around 1.8 Ga years ago during Paleoproterozoic phase. The tectonic setting of zinc-lead-copper sulfides mineralisation in the Delhi supergroup rocks in Haryana-Delhi were formed by mantle plume volcanic action around one billion years ago covering Haryana and Rajasthan during the Mesoproterozoic. In the southern part of the Aravalli [9,10,11] supergroup arc base metal sulfides were generated near the subduction zone on the western fringe and in zones of back-arc extension to the south-east. Continued subduction produced tungsten-tin mineralisation in S-type (sedimentary unmetamorphosed rock), felsic (volcanic rock), and plutons (crystallised solidified magma). This includes commercially viable quantities of minerals, such as rock phosphate, lead-zinc-silver mineral deposits at Zawar, Rikhabdev serpentinite, talc, pyrophyllite, asbestos, apatite, kyanite and beryl.^{[15][16]}

Mining of copper and other metals in the Aravalli range dates back to at least the 5th century BCE, based on carbon dating.^{[17][18]} Recent research indicates that copper was already mined here during the Sothi-Siswal period going back to c. 4000 BCE. Ancient Kalibangan and Kunal, Haryana settlements obtained copper here.^[19]

The Indian Craton includes five major cratons. Cratons are part of continental crust made up of upper layer called platforms and older bottom layer called basement rocks. Shields are part of a craton where basement rock crops out at the surface and it is the relatively oldest and most stable part that are undeformed by the plate tectonics. The Aravalli Craton (Marwar-Mewar Craton or Western Indian Craton)[17,18,19] covers Rajasthan as well as western and southern Haryana. It includes the Mewar Craton in the east and Marwar Craton in the west. It is limited by the Great Boundary Fault in the east, the Thar desert in the west, Indo-gangetic alluvium in the north, and the Son River-Narmada River-Tapti River basins in the south. It mainly has quartzite, marble, pelite, greywacke and extinct volcanos exposed in the Aravalli-Delhi Orogen. Malani Igneous Suite is the largest in India and third largest igneous suite in the world.^{[20][21]} The uniqueness of the geological feature of Malani Igneous Suite at Jodhpur prompted the Geological Survey of India to declare the site as a National Geological Monument.^[22]

The stratigraphic classification of the Aravalli Range can be divided into the following parts (north to south direction):

- The Archean basement is a banded gneissic complex with schists (medium grade metamorphic rock), gneisses (high grade regional metamorphic rock), composite gneiss and quartzites. It forms the basement rock for both the Delhi Supergroup and the Aravalli Supergroup.
- Aravalli Supergroup: The Aravalli supergroup passes through Rajasthan state, dividing it into two halves, with three-fifths of Rajasthan on the western side towards the Thar Desert and two-thirds on the eastern side consisting of the catchment area of Banas and Chambal rivers bordering the state of Madhya Pradesh. Guru Shikhar, the highest peak in the Aravalli Range at 5,650 feet (1,720 m) in Mount Abu of Rajasthan, lies near the south-western extremity of the Central Aravalli range, [28,29,30] close to the border with Gujarat state. The southern *Aravalli Supergroup* enters the north-east of Gujarat near Modasa where it lends its name to the Aravalli district, and ends at the centre of the state at Palanpur near Ahmedabad.
 - Champaner Group is a rectangular outcrop composed of subgreywacke, siliceous phyllite, pelitic schist, quartzite and peritomic conglomerate.
 - Lunavada Group is a polygon area in the south of the Aravalli Orogen composed of greywacke-phyllite
 - Jharol Group is spread over 200 km² area with average width of 40 km carbonate-free phyllite and arenite with turbidite facies and argillaceous rocks.

- Udaipur Group is a thick accumulation of greywacke-phyllite basement overlain by dolomite.
- Debari Group consists of Carbonates, Quartzite, and Pelitic rocks which are overlain by the Delwara group.[31,32,33]
- Delwara Group is spread over a 500 km² area with average thickness of 500 m and includes basement orthoquartzite overlain by volcanic conglomerate.
- Unconformities
 - Mangalwar/Sandmata Complex and Mewar Gneiss with enclaves of the Jagat group
- Delhi Supergroup
 - Alwar Group with arenaceous and mafic volcanic rocks
 - Delhi Ridge, in the north
 - Haryana Aravalli ranges, in the west
 - Tosham Hill range basement rocks include quartzite with chialstolite, the upper layers of quartz porphyry ring dyke, felsite, welded tuff and muscovite biotite granite rocks which have commercially nonviable tin, tungsten and copper. The Tosham Hill range, west of Bhiwani in Haryana, is the northernmost end of the Aravalli range. A northeastern extension of the Aravalli extends to the national capital of India also. Locally known as a ridge it diagonally traverses to the South Delhi (hills of Asola Bhatti Wildlife Sanctuary), where at the hills of Bandhwari, it meets the Haryana Aravalli range consisting of various isolated hills and rocky ridges passing along the southern border of Haryana.^[23]
 - Madhogarh hill
 - Satnali hill[38,39]
 - Nuh-Ferozpur Jhirka hill range, runs along Haryana-Rajasthan border from Nuh to the south of Ferozpur Jhirka.
 - Rajasthan Alwar range, in the east
 - Ajabgarh Group – Kumbhalgarh Group with carbonate, mafic volcanic and argillaceous rocks
 - Raialo Group with mafic volcanic and calcareous rocks

Human history

The Aravalli Range has been site of three broad stages of human history, early Stone Age saw the use of flint stones; mid-Stone Age starting from 20,000 BP saw the domestication of cattle for agriculture; and post Stone Age starting from 10,000 BP saw the development of the Kalibangan civilization, 4,000 years old Aahar civilization and 2,800 years old Gneswar civilization.

Tosham hills Indus civilization mines

The Tosham hills have several Indus Valley civilization sites in and around the hill range as the area falls under copper-bearing zone of Southwest Haryana and Northeast Rajasthan of Aravalli hill range.^{[24][25]}

Investigation of IVC network of mineral ore needs for the metallurgical work and trade shows that the most common type of grinding stone at Harappa is of Delhi quartzite type found only in the westernmost outliers of the Aravalli range in southern Haryana near Kaliana and Makanwas villages of Bhiwani district. [51,52,53]The quartzite is red-pink to pinkish grey in colour and is crisscrossed with thin haematite and quartz filled fractures with sugary size grain texture.^{[26][27]}

Ravindra Nath Singh and his team of Banaras Hindu University carried out ASI-financed excavations of Indus Valley civilization site on the grounds of the Government School in Khanak, during 2014 and 2016. They found early to mature Harappan phase IVC materials, pottery, semiprecious beads of lapis lazuli, carnelian and others. They also found evidence of metallurgical activities, such as crucibles (used for pouring molten metal), furnace lining, burnt floor, ash and ore slugs. Ceramic petrography, metallography, scanning electron microscope (SEM, non-destructive, surface images of nanoscale resolution), energy-dispersive X-ray spectroscopy (EDXA and EDXMA non-destructive, qualitative and quantitative elemental composition) and transmission electron microscopy (TEM, destructive method) scientific studies of the material found prove that the Khanak site was inhabited by the IVC metal-workers who used the locally mined polymetallic tin, and they were also familiar with metallurgical work with copper and bronze. The lowest level of site dates back as far the pre-Harappan era to Sothi-Siswal culture (4600 BCE or 6600 BP) tentatively.^[28]

Ganeshwar sunari Cultural Complex

The Ganeshwar sunari Cultural Complex (GSCC) is a collection of third millennium BCE settlements in the area of the Aravalli Hill Range. Among them, there are similarities in material culture, and in the production of copper tools. They are located near the copper mines.

"The GSCC is east of the Harappan culture, to the north-east of Ahar-Banas Complex, north/north west to the Kayatha Culture and at a later date, west of the OCP-Copper Hoard sites (Ochre Coloured Pottery culture-Copper Hoard culture). Located within the regions of the Aravalli Hill Range, primarily along the Kantli, Sabi, Sota, Dohan and Bondi rivers, the GJCC is the largest copper producing community in third millennium BCE South Asia, with 385 sites documented. Archaeological indicators of the GSCC were documented primarily in Jaipur, Jhunjhunu, and Sikar districts of Rajasthan, India ..."^[29]

Pottery found in the area include incised ware, and reserved slipware.

There are two main type sites, Ganeshwar, and Sunari, in Tehsil Kot Putli, Jaipur District (Geo coordinates: N 27° 35' 51", 76° 06' 85" E).

Environment

Climate

The Northern Aravalli range in Delhi and Haryana has humid subtropical climate and hot semi-arid continental climate with very hot summers and relatively cool winters.^[30] The main characteristics of climate in Hisar are dryness, extremes of temperature, and scanty rainfall.^[31] The maximum daytime temperature during the summer varies between 40 and 46 °C (104 and 115 °F). During winter, it ranges between 1.5 and 4 °C.^[32]

The Central Aravalli range in Rajasthan has an arid and dry climate.

The Southern Aravalli range in Gujarat has a tropical wet and dry climate

Rivers

Three major rivers and their tributaries flow from the Aravalli, namely Banas and Sahibi rivers which are tributaries of Yamuna, as well as Luni River which flows into the Rann of Kutch.

- North-to-south flowing rivers originate from the western slopes of the Aravalli range in Rajasthan, pass through the southeastern portion of the Thar Desert, and end into Gujarat.
 - Luni River, originates in the Pushkar valley near Ajmer, ends in the marshy lands of Rann of Kutch. It used to be one of the channel of the Saraswati River, as a result its banks have several Indus Valley civilisation sites including Lothal.
 - Sakhi River, ends in the marshy lands of Rann of Kutch.
 - Sabarmati River, originates on the western slopes of Aravalli range of the Udaipur District, end into the Gulf of Khambhat of the Arabian Sea.
- West to north-west flowing rivers originate from the western slopes of the Aravalli range in Rajasthan, flow through semi-arid historical Shekhawati region and drain into southern Haryana. Several Ochre Coloured Pottery culture sites, also identified as late Harappan phase of Indus Valley civilisation culture,^[33] have been found along the banks of these rivers.
 - Sahibi River, originates near Manoharpur in Sikar district flows through Haryana and meets its confluence with the Yamuna in Delhi where it is called Najafgarh drain, along with its following tributaries:^{[34][35][36][37]} Masani barrage, is an important wildlife area.
 - Dohan river, tributary of the Sahibi River, originates near Neem Ka Thana in Sikar district).
 - Sota River, tributary of the Sahibi River with which it merges at Behror in Alwar district.
 - Krishnavati river, former tributary of Sahibi river, originates near Dariba copper mines in Rajsamand district of Rajasthan, flows through Patan in Dausa district and Mothooka in Alwar district, then disappears in Mahendragarh district in Haryana much before reaching Sahibi River. It previously was a tributary to the Sahibi and part of its present canalised channel is called the *Outfall Drain No. 8*. Many important

wetlands lie in its paleochannel, including Matanhail, Chhuchhakwas-Godhari, Khaparwas Wildlife Sanctuary, Bhindawas Wildlife Sanctuary, Sarbashirpur, Sultanpur National Park, Basai and The Lost Lake (Gurugram).

- West to north-east flowing rivers, originating from the eastern slopes of Aravalli range in Rajasthan, flow northwards to Yamuna.
 - Chambal River, a southern-side tributary of Yamuna River.
 - Banas River, a northern-side tributary of Chambal River.
 - Berach River, a southern-side tributary of Banas River, originates in the hills of Udaipur District.
 - Ahar River, a right-side (or eastern side) tributary of the Berach river, originates in the hills of Udaipur District, flows through Udaipur city forming the famous Lake Pichola.
 - Wagli River, a right-side tributary of the Berach River.
 - Wagon River, a right-side tributary of the Berach River.
 - Gambhiri River, a right-side tributary of the Berach River.
 - Orai River, a right-side tributary of the Berach River.

Ecology

Wildlife corridors

The Great Green wall of India

"The Great Green Wall of Aravalli" is a 1,600 km long and 5 km wide green ecological corridor along Aravalli range from Gujarat to Delhi, it will be connected to Shivalik hill range and 1.35 billion (135 crore) new native trees will be planted over 10 years to rehabilitate the forest cover in this area. To be implemented on a concept similar to the Great Green Wall of Sahara in Africa, it will act as a buffer against pollution, 51% of which is caused by the industrial pollution, 27% by vehicles, 8% by crop burning and 5% by diwali fireworks.^[38]

Northern Aravalli leopard and wildlife corridor

The Sariska-Delhi leopard wildlife corridor or the Northern Aravalli leopard wildlife corridor is a 200 km long important biodiversity and wildlife corridor which runs from the Sariska Tiger Reserve in Rajasthan to Delhi Ridge.^[39]

This corridor is an important habitat for the Indian leopards and jackals of Aravalli. In January 2019, the Wildlife Institute of India announced that they will undertake the survey of leopard and wildlife, using pugmarks and trap cameras, subsequently, leopards and jackals will be tracked via the radio collars. Urban development, especially the highways and railways bisecting the Aravalli range and wildlife corridor in several places pose a great risk. Large parts of Aravalli are legally and physically unprotected, with no wildlife passages and little or no wildlife conservation work resulting in deaths of over 10 leopards in 4 years between January 2015 to January 2019.^{[40][41][42]}

The Haryana side of the Gurugram-Faridabad Aravalli hill forests lack availability of water due to which wild animals are seldom seen there. [55]The Government of Haryana used drones for aerial surveys and dug 22 ephemeral pits in 2018 to store the rainwater which became dry during the summer months. In January 2019, the government announced the plan to make the pit perennial by connecting those with pipelines from the nearby villages.^[43]

Human activity, such as unplanned urbanization and polluting industrial plants, also pose a great threat. There is often reluctance and denial on part of the government officials of the presence of wildlife such as leopard so that the forest land can be exploited and opened up for the intrusive human development.^{[44][45][43]}

This habitat is under serious threat from the wrong actions of the Government of Haryana which in 2019 passed the amendment to the Punjab Land Alienation Act, 1900 (PLPA). Governor has given his assent for the act, but it has not yet been notified by the Haryana government, hence it is in limbo and has not officially become a law. This amendment will reduce the Haryana's Natural Conservation Zones (NCZs) by 47% or 60,000 acres from 122,113.30 hectares to only 64,384.66 hectares. This is in violation of multiple guidelines of the Supreme Court of India as well as "NCR Planning Board" (NCRPB) notification which states the original 122,113.30 hectares ecologically sensitive forest of South Haryana is a forest, "The major natural features, identified as environmentally sensitive areas, are the extension of Aravalli ridge in Rajasthan, Haryana and



NCT-Delhi; forest areas; rivers and tributaries... major lakes and water bodies such as Badkhal lake, Suraj Kund and Damdama in Haryana sub-region".^[46] This area as part of Northern Aravalli leopard and wildlife corridor is an important habitat for the leopards in Haryana.

II. DISCUSSION

The Aravalli Range has several forests with a diversity of environment. The literal meaning of Aravalli Range is 'line of peaks'. It is the oldest fold mountain ranges in the world which stretching about 300 miles from the northeast to the southwest. The length of the Aravalis is about 1100 km which extends from Delhi to Ahmadabad. Guru Shikhar is the highest point which is located in Mount Abu. The Aravalli range is very rich in natural resources and gave rise of numerous peninsula rivers like Banas, Luni, Sakhi, and Sabarmati. This region is also famous for heavily forested consisting of large areas of sand and stone and of masses of rose-coloured quartzite.

Features of Aravalli Mountain Range

- It is dry deciduous forest
- Very rich in floral diversity especially medicinal plants.
- Kadaya (giving medicinal gum), Gugal, amla, Moosli, Khair, Salai, Modad, Dhavada, Khakhara, Timru are rare flora of this region.

Hill Stations of Aravalli Range

The city of Abu, the only mountain place at Rajasthan, is situated at stage of 1020 Sq. Meter. This has been well-known escape from the warm of Rajasthan and close by Gujarat for hundreds of years. Abu is biggest optimum of the Aravalli Variety of Rajasthan condition of European Indian. It is situated at Sirohi region. Abu is the 58 kms through Palanpur (Gujarat). These mountain types the unique difficult stage 22 kms long through 9 kms extensive. The greatest optimum on mountain is Expert Shikhar, at 1439 Sq. Meter above sea stage.

Abu pond The Abu Creatures Haven was recognized of year 1960 and protects 291 km² of mountain. Mount Abu can be regarded as house to number of the Jain wats. These Dilwara Temples are complicated of wats, designed of white-coloured stone, that were designed between Eleventh and Thirteenth hundreds of years AD. This Achalgarh ft, designed of Fourteenth millennium through Mewar Rana Kumbha, appears close by. Nakki Lake and well-known guest fascination of Abu. This mountain is house to the several Hindu wats, such as Adhar Devi Forehead, designed out of the strong rock; Shri Raghunathji Temple; and shrine and temple of Dattatreya designed on top of Expert Shikhar optimum.

People with good intention just end up planting Neem and Peepal or other easily available trees on a site, irrespective of the soil and climate condition a particular plant needs to thrive. The foremost part of a rewilding exercise is to draft a vision. It is extremely important to know what we need to recreate. The main aim of this rewilding exercise was to bring back the jungles of the Thar desert called 'Roee' which are essentially grasslands and shrublands like you see in the undisturbed sand dune areas in Jaisalmer and Badmer in Rajasthan. "Most of the native grasses and herbaceous plants that we planted in the Kishanbagh sand dunes are ephemeral i.e. they come out in the monsoons and by the end of winter they are gone, following nature's cycle as it is meant to be in the arid desert landscape.

(*Anogeissus pendula*) grows 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.

Observing natural Aravalli forests like the Mangarbani near Gurgaon, Sariska in Rajasthan 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.

III.RESULTS

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. In the semi-arid landscape where the Aravali Biodiversity park is located, plants take time to develop a robust root system and addition of excessive nutrition and irrigation will hamper this natural process. Ecological wisdom is to let the plant become resilient on its own by letting it grow how it would in nature. If you over irrigate or give extra nutrition to the saplings, they will tend to grow faster. Fast growing tall plants in a semi arid or arid landscape will become more of a liability as they tend to break more easily when the winds are strong or during storms. Human connect with the wild is very important. Native trees, shrubs, herbs, grasses of the right ecology should be planted in gardens in individual homes and open spaces in residential, office and institutional complexes to create more biodiversity rich areas in cities. This will not only help in expanding the green lungs and water recharge capacity of our urban areas but also create habitats for native birds, bees, butterflies and other life forms thereby increasing our nature connect. Small forest patches of the Aravallis with native trees, shrubs and grasses were present.

- 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 Vallaris spp, Ichnocarpus spp, Telosma phallida, Watakaka volubilis and many others.[51,52,53]

IV.CONCLUSIONS

The Aravalli Ridge is a gorgeous emerald labyrinth during the wet season, and full of flushes of colour in summer when Palash (*Butea monosperma*), Chamrod (*Ehretia laevis*), Doodhi (*Wrightia tinctoria*), and Amaltas (*Cassia fistula*) bloom within the dry, brown, restless expanse in summers. Its tempers are wide-ranging, with nature weaving her way through the breadth of the seasons. There were Ridge forests fall in the category of "tropical thorn forests", and more precisely as "semiarid open scrub: forests. There are dry deciduous forests represented by Dhau (*Anogeissus pendula*), Palash (*Butea monosperma*), Kaim (*Mitragyna parvifolia*), Jhand (*Prosopis cineraria*), Roheda (*Tecomella undulata*) etc. Besides these a wide range of tropical thorn forest communities such as Hingot (*Balanites aegyptiaca*) and Goya Khair (*Dichrostachys cinerea*) also exist in small patches. Dhau (*Anogeissus pendula*) forests exist almost as pure forests (about 80 to 90 per cent dhau). This micro-habitat is mostly found on steep slopes which are very rocky, dhau being a rocky habitat specialist. Companion species are Ronjh (*Vachellia leucophloea*), Barna (*Craeteva adansonii subsp. odora*), Kakai (*Anogeissus latifolia*), Jhad Ber (*Ziziphus nummularia*), Jungli Karonda (*Carissa spinarum*).[55]

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