National Parks
Tiger Reserves
WLS and Biodiversity

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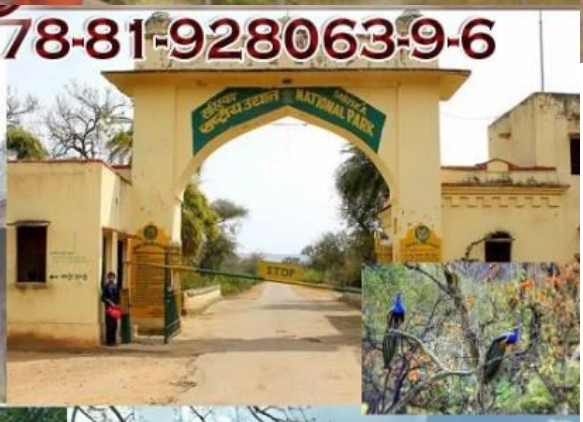

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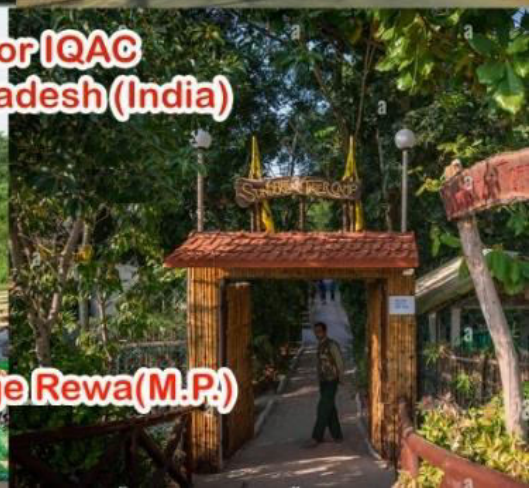

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Preface

The present Book is the compilation of papers and deliberations presented by renowned guest speakers and subject matter specialist in the field of **"Protected Areas, National Parks, Tiger Reserves, Wildlife Sanctuaries, Wildlife and Biodiversity"**, organized at Govt. Madhav Sadashivrao Golvalkar College Rewa (M.P.) India. The webinars conducted during, 2021, 2022 sponsored by RUSA and World Bank.

Book includes 54 articles related to Tiger, White Tiger, Malayan Tiger, Lion, Elephants, Leopards, Crocodile, aquatic and avian fauna their preservation, protected area network, human wildlife interaction strategies etc. further, the areas like north, south, central, north-east India, Andaman and Nepal, Pakistan, Bangladesh, Malaysia have been included for 24 National Parks, 6 Tiger Reserves, 6 Wildlife Sanctuaries their wild lives, zoological varieties their preservation and management.

The book also includes the suggestions, recommendations made by chairpersons during valedictory sessions of webinar series. The college expresses sincere thanks to all contributors including RUSA & World Bank, National Academy of Science India-Bhopal Chapter, MP Govt. Higher Education Department and integrated efforts made by the college staff including Janbhagidari Committee.

Believe the book prove a boon to researchers in different field of the subjects and helpful for conservation and management of protected areas and their flora and fauna.

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52. History of Wildlife in Mewar (Southern Rajasthan, India) From Early Stages of Life in Precambrian Era to Recent History

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Introduction:

The evolution of life on the earth and distribution of species in different parts of the globe has been predominantly determined by the different geographical realms that the earth had. With the changes in the geographical and climatological conditions on the earth, tectonic activities and other atmospheric and environmental changes, the distribution of species and further evolution has also undergone continuous changes. Still the unending evolutionary process is continued in its natural way, however now it is gravely affected by anthropogenic factors.

The Indian subcontinent has also undergone a long evolutionary process since from its beginning of detachment from the Africa during Middle Jurassic (around 165 to 150 Ma ago) and final splitting from Madagascar (approximately 100 Ma ago) and began of collision with Asian landmass (around 55 Ma ago) plate and then subsequent collide motion and resultant topographical changes. The introduction and evolution of species in the Indian subcontinent continued after its connections established with Afro-Eurasian and East & South-East Asian landmass.

The western part of Indian subcontinent had Aravalli mountain ranges that began to form in Precambrian era around 1800 Ma ago with the development of the oceanic basin. Before that the formation of stromatolites (microbial mats of algae and bacteria turned into fossils) had already happened in the shallow marine basin. The Aravlli mountain ranges are oldest in the Indian subcontinent and have been a major geographical factor in delimiting migration and distribution of species from west to east and vice versa and their evolution. The orientation and distribution of the Aravallis in Southern Rajasthan has been a major geographical factor that determined the evolution of species in Mewar region (including districts of Udaipur, Rajsamand, Chittorgarh, Pratapgarh and Bhilwara).

Before the Holocene Epoch (i.e. around 12000 years before present) the fertile river basin that existed in present day's Thar Desert was once connected with the rivers having cold water originating from the Himalayas and the fish fauna found in cold water zones of the Himalayas was also having movement with water from Himalayan cold water zones to the tributaries of rivers flowing in the southern Rajasthan. During Holocene period the rapid uplift in the Aravallis occurred and as a result the fertile river basin successively disappeared and turned into hot dry desert due to change in climatic conditions. Although the surface flow got disconnected but recent discovery of live Schizothoracine fish species (Snow trout) proves that the subterranean flows of cold, fresh water are still connected.

During prehistoric period the development of ancient human civilizations took place chiefly in the river valleys in various parts of Indian subcontinent. One of them was Ahar culture (also known as Banas culture) that lasted from 3000 to 1500 BCE and was distributed in the river valleys of Banas and its tributaries namely Berach and Ahar. The artifacts recovered from excavations from Ahar culture provide important information about the wildlife existing in the Mewar region.

The references of wildlife existing during recent history in the Mewar region are found in 'Veer Vinod' (Ojha, 1886), 'Udaipur Rajya ka Itihas' (Ojha, 1928), 'Shikari Aur Shikar' (Tanwar, 1956) etc

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that have record of plants and animal species existing in Mewar region dating back to more than 300 years. Besides that some wildlife experts who have ancestral knowledge about the wildlife existing during their forefathers' time are also important source of information about occurrence of wildlife in Mewar during recent past.

This paper describes the evidences of evolutionary history of wildlife that occurred in Mewar region in five stages, dating back successively from Precambrian era to the recent history.

I. Ancient Aravali Mountain Ranges as Determinant of Ecological Features and Distribution & Occurrence of Wildlife in Rajasthan (including Mewar region):

The Aravalli mountain ranges began to form in Precambrian era around 1800 Ma ago with the development of the oceanic basin. These are oldest mountains in the Indian subcontinent and extend from Haryana and Delhi in the north to Palanpur, Gujarat in south through Rajasthan forming North-East to South-West shape. These ranges have been a major geographical factor in delimiting migration and distribution of species from western side to eastern side and vice versa. Thus the orientation and distribution of the Aravallis in Southern Rajasthan has been a major geographical factor that determined the evolution of species in Mewar region (including districts of Udaipur, Rajsamand, Chittorgarh, Pratapgarh and Bhilwara).

Oscar Drude (1890, 1913) described a geographical line that run along the Aravallis and extends southwards to the Gulf of Cambay. He named this line - The Drude's Line. The Drude's Line is the limit of the distribution of plant elements from western (Perso-Arabian) continental landscapes and eastern (Indo-Malayan) continental landscapes. The western element included the species belonging to Mediterranean region, North Africa, Middle-East, Gulf and Europe whereas the eastern species belonging to South and South-East Asia and southern parts of East Asia. Thus the Aravalli Mountains play an important role as an Ecotone of eastern and western geographical realms. Later on after development of desert in the western side they acted as a barrier in keeping the densely forested areas in the eastern side from spreading to the western arid side. Other experts like Blatter and Hallberg (1918), Saxton and Sedwick (1918), Biswas and Rao (1953), Blatter, Mc cann and Sabnis (1929), Maheshwari (1963), Bhandari (1978) while describing the phytogeography (distribution of plants in relation to geography) also confirmed Drude's Line between the Indo-Malayan flora and Perso-Arabian flora from the Gulf of Cambay northwards along the Aravallis.

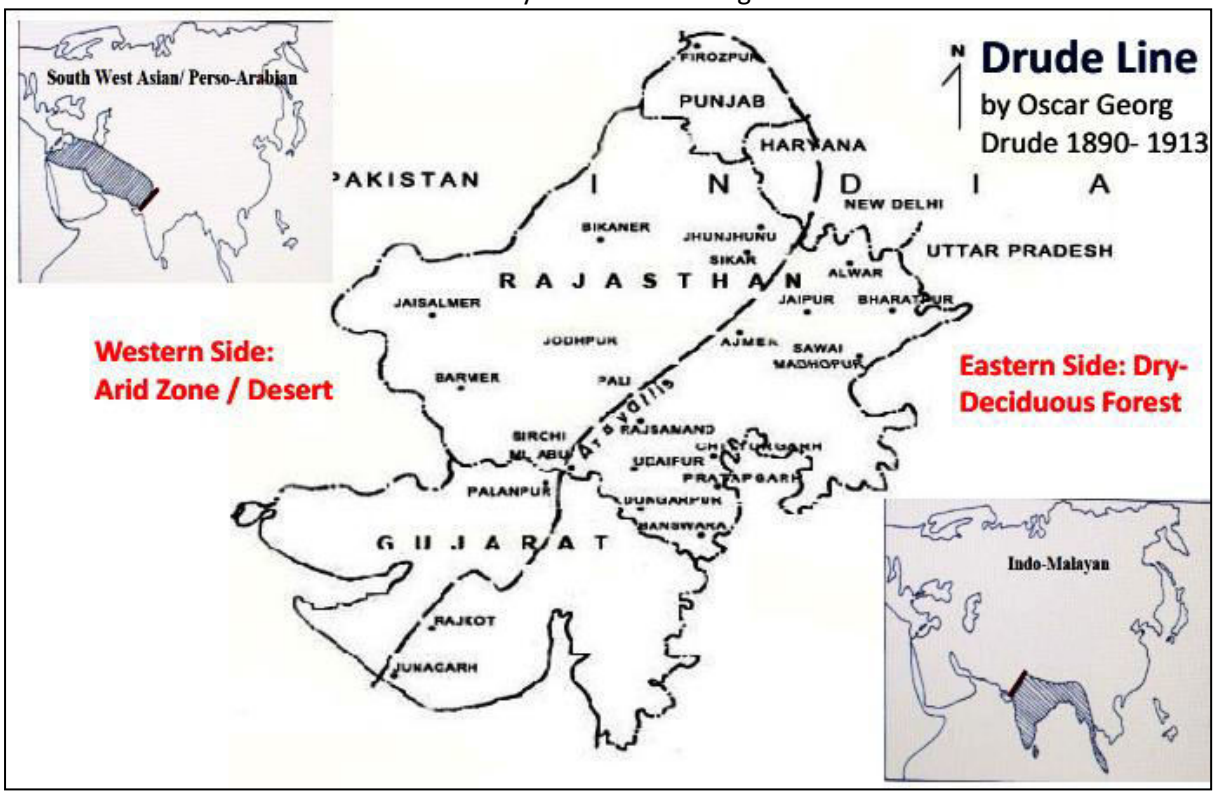

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Figure-1: The Ancient Aravali Mountain Range and the Drude line as Determinant of Ecological Features and Distribution & Occurrence of Wildlife between Eastern and Western Ecological Realms.

II. Stromatolites: Evidences of Evolutionary Stages of Life (Blue-green Algae and Bacteria Communities) Dating Back to Precambrian time, that Developed and Existed in today's Mewar region

Stromatolites are fossil rocks that were formed from trapping of blue-green algal assemblages and bacteria preying upon them in sediment deposits in shallow marine basin, resulting into mound-shaped fossilized mats of microorganisms. The blue-green algae flourishing in shallow marine basin is said to be primarily responsible for formation of stromatolitic structures under suitable temperature and pH conditions (7.1-7.8) in the photosynthetic zone of shallow marine area. Through their filaments the algae used to attract and bond carbonate particles forming a mat. The algal assemblage and bacteria praying upon them got trapped in sediments and turned into fossils. Stromatolites are evidence of the occurrence of early evolutionary stages of life (Algae and Bacteria & their interactions) that developed and existed (as oxygen producing life forms in carbon-di-oxide rich environment) during Precambrian era (from 3500 to 600 million years ago). Thus they can be termed as Earth's oldest fossils.

Figure-2: Stromatolite Fossil rocks found at Jhamar Kotra, Udaipur and Bojunda, Chittorgarh.

There are three stromatolites fossil sites identified in Mewar region namely, Jhamar Kotra (Udaipur district), Bojunda (Chittorgarh district) and Bhagwanpura (Chittorgarh district). These are locally they are also called 'Magarmachh Bhata i.e. crocodile rocks (resembling in texture like crocodile's skin). These stromatolites sites were discovered during 1970s. The Stromatolite site, Bojunda and the Stromatolite site, Jhamarkotra were declared as National Geological Monuments (NGM) in 1976 and 1978 respectively by the Geological Survey of India (GSI). These sites are listed among the 34 Geo Heritage / National Geological Monument sites of India. The Indian National Trust for Art and

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Cultural Heritage (INTACH, 2016) has also documented both Bojunda and Jhamarkotra stromatolites sites in its geoheritage monograph.

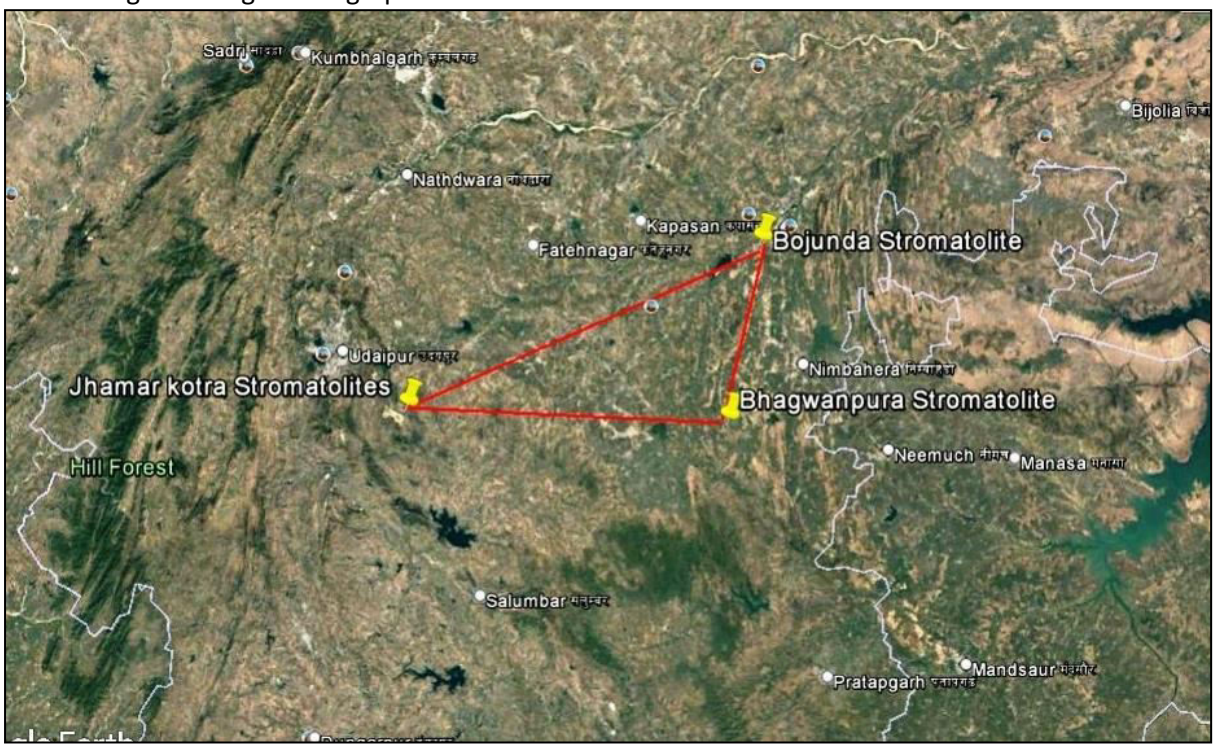

Figure-3: Location of Stromatolite Fossil sites in Southern Rajasthan.

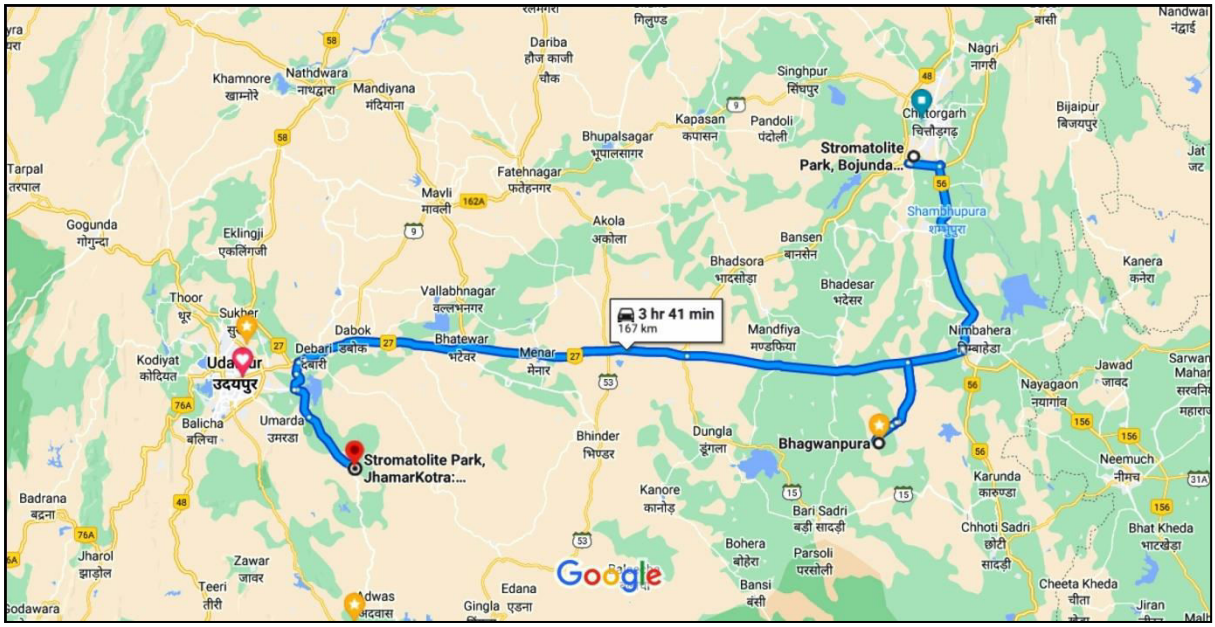

Figure-4: Location and Distance of Stromatolite Sites in Southern Rajasthan.

The unique phosphatic algal stromatolite fossils of Jhamar Kotra are embedded in the Aravalli dolomitic limestone and are proof of life dating back to about 1800 Ma. The Bojunda stromatolites are evidences of life dating back to around 900 million years. The occurrence of diverse varieties, shapes, & sizes of stromatolites (that flourished during the Proterozoic Eon (2500 Ma. to 541 Ma.) at these sites is the indisputable proof that early stages of life comprising both unicellular and

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multicellular organisms like bacteria and blue-green algae existed in these Precambrian rocks of (Mewar) Rajasthan.

III. Schizothoracine Fish (Snow Trout) – First Live Biological Evidence of Connection of Subterranean Rivers/Streams in Mewar with Himalayan Cold Water

During May, 1987 while doing an ecological exploration in a mining area of the Arvalli hills near Udaipur city, Dr. Raza H. Tehsin (Tehsin *et al.*, 1988) noticed a vertical cave which was about 50 feet deep and was also horizontally bored in the base. The cave was an ancient time mining shaft that was once under used for underground excavation of minerals like copper etc. The horizontal bore of the cave was having a subterranean water channel flowing along side. While exploring any life form existing in that subterranean channel Dr. Tehsin found a live fish that was identified as belonging to subfamily Schizothoracinae. At the time of capture of the fish in May, 1987, the cave's water had a temperature of 18°C.

Figure-5: The Schizothoracine fish (Snow trout) that was captured alive from the Subterranean Channel. Photo credit - Dr. Raza Tehsin.

Schizothoracine Fish (commonly called Snow Trouts) inhabit hill streams and lakes in the Himalayan and sub-Himalayan region extending to China (Day, 1958). Jayaram (1981) gives their distribution as Kashmir, Punjab, Afghanistan, Pakistan, Tibet and Nepal.

The occurrence of a Schizothoracine fish in the region south of Aravalli hills in Rajasthan is intriguing. Presently, there is no river or seasonal stream in this region connecting the drainage of the sub-Himalayan region of Punjab and Jammu-Kashmir. Since the cave was not receiving any surface drainage, the presence of a Schizothoracine fish in the cave could be a case of geographical isolation. It is almost certain that the rivers and streams of Rajasthan had Himalayan connections in former days. There could also be an underground drainage of the sub-Himalayan watershed connecting the streams and rivers of the region south of Aravalli ranges. Obviously, the water of this drainage would be cold. Peculiar assemblage of different generic characters in the specimen studied could be the sequel of interbreeding and long isolation, thereby inducing speciation.

Ahmed (1986) while describing the geological evidence bearing on the origin of the desert in Rajasthan, pointed out that rapid uplift in the Aravallis that extended to the Delhi area in the north and the Cutch area in the south, occurred during Holocene Epoch (around 12000 years ago from present. Based on the historical and archaeological evidences on the uplift and on the sequence of geological events it is evident that the uplift led the shifting of the rivers Drishadvati and Saraswati in the north, The Saraswati, the Sutlaj and the Beas in the west, The Saraswati and the Indus (Sindhu) in the south-west, and the Luni in parts of the central region, that led to conversion of a fertile basin into desertic conditions. The Saraswati was formed of a number of tributaries that were fed by streams arising from the Himalayas.

Therefore the finding of live snow trout fish in present time in the subterranean channel in the southern Aravallis was the first live biological evidence of centauries old connection (dating back to

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12000 years before present) with rivers originating from the Himalayas that still exist. The surface flow of cold-water stream or tributary of Saraswati that would have flowed through the Indus–Yamuna interflow was possibly very close to the Aravali hill ranges and had connection with local rivers/streams. Although now the surface flow has disappeared due to geological changes but the finding of live Schizothoracine fish in subterranean channels suggest that the connection still exist.

IV. The Ahar Culture – Evidences of Flora and Fauna Existing in Mewar Region from Copper Age to Iron Age

During prehistoric period the development of ancient human civilizations took place chiefly in the river valleys in various parts of Indian subcontinent. One of them was Ahar culture (also known as Banas culture) that lasted from 3000 to 1500 BCE. The Ahar culture was distributed in the river valleys of Banas and its tributaries namely Berach and Ahar in the Mewar region of Rajasthan.

The Ahar culture is one of the chalcolithic (the age between the Neolithic and the Bronze Age, the Copper Age) cultures that have been found in different part of India. Approximately 106 sites of Ahar culture have been identified. One of them, a major site is situated in Udaipur city near river Ahar. The Udaipur Ahar culture dates back to more than 2000 BC.

The Ahar culture was a sedentary farming community in which everyone required food, clothing, housing etc and to get access to necessary resources they used to do organised productive activities (Sarkar, 2011). The activities included hunting, farming, livestock rearing, cultivation, access to forest resources, use of animal products etc and many of these activities are evident from the artifacts that were recovered from excavations from Ahar culture. The remains of Ahar civilization at Ahar River also reflect that the people were efficient in metallurgy and making metallic items of Copper, Iron, Bronze and other alloys. The time period of Ahar culture is contemporary of the Copper Age.

First excavation of Ahar culture started in 1950s, then comprehensively excavated in 1961-62 (Sankalia *et al.* 1969). Various terracotta toys, horns, antlers, items made of bones & horns etc were excavated from the remains of Ahar civilization at Dhoolkot (Mud mound) adjoining Ahad River (also termed as Ayad / Ahar). The excavated artifacts are manifests of the faunal species and the related agriculture crops and forest types existed that time. During historic time Ahad civilization was a prosperous town having trade links with south and north India. Being enriched in processing and use of copper the civilization also got its name 'Tambawati' and other names like Aghatpur, Ahad etc.

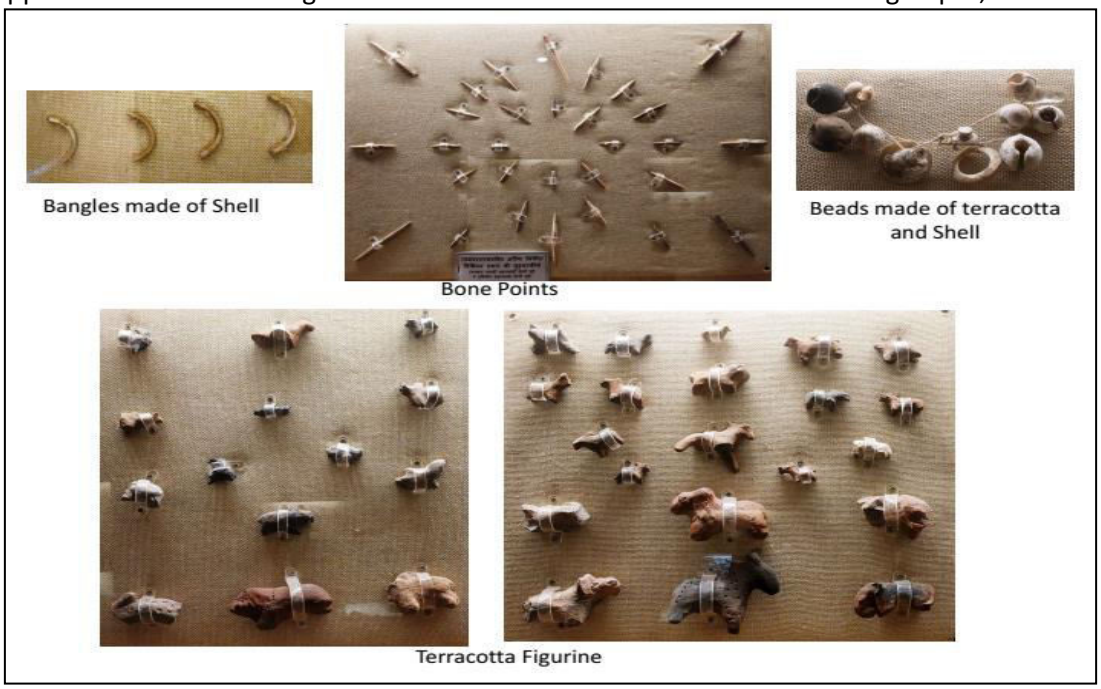

Figure-6: Artifacts and Figurine made of Terracotta, Bones, Shells etc found in Excavation of Ahar culture (Tambawati), Udaipur.

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Tehsin (2004) in a study examined the excavated items of Ahar culture (Tambawati) that are kept at the museum and ascertained their relation to faunal species existing that time. From the study it was concluded that rice was the main agriculture crop for food. This means that the precipitation was high and the area had marshy land that gradually vanished. The animal identified from the excavated remains and related literature included Elephant, Rhinoceros, Indian Wolf, Black Buck, Wild Boar, Gaur (Bison), Barasingha (Swamp Deer), Mongoose, Parakeets, wild fowls and fishes (including Bony Fishes). The domestic species included Domestic Ass, Cattle (Cow & Bull), Goat, Sheep, Dog and Fowl (domestic poultry). Inference about the natural habitat based upon faunal evidences is that the area had hilly and ravine forest with dense undergrowth, consisting of vast stretches of grassland and marshy land which is confirmed from the geography of the area. The long ridgelines of Aravallis were surrounding the site of Ahar civilization in a valley like form (the Girwa valley). The fertile valley floor at the eastern flank was fed by two perennial rivers Ayad and Sisarma which merge further downstream to form Bedach River. The current presence of thick bamboo dominated dry-deciduous forest on the western side of Girwa valley substantiates the possibility of the presence of Gaur (Bison) in this area. On the other hand evidences of rice cropping also suggest that the swampy/marshy conditions existed that were suitable habitat for Barasingha (Swamp Deer). The evidences of Wild Fowl are also confirmed because their distribution coincides with distribution of Swamp Deer. Although the swamp deer has disappeared from the region but wild fowls including Grey Jungle Fowl and Red Jungle Fowl are still found in Mewar region. The Red Jungle Fowl is the ancestor of the domestic fowl thus the presence of domestic poultry during Ahar culture is also confirmed.

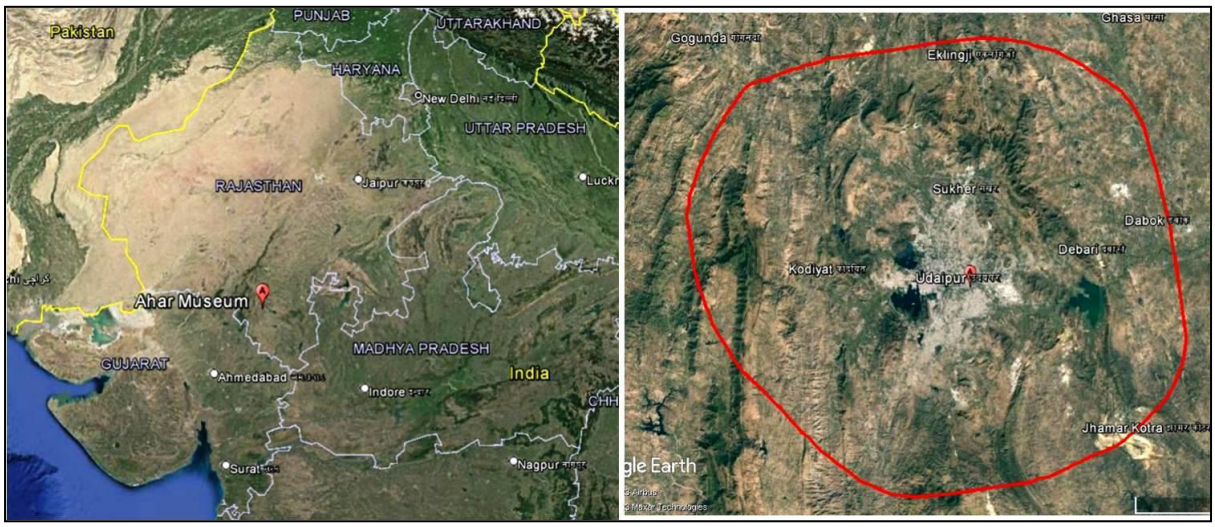

Figure-7: Girwa Valley and Ahad River Provided Dense Forests, Grasslands, Ravine Forest and Marshy Habitat.

The faunal study from the site of Ahar done by other scholars (Sankalia et al. 1969), Balathal (Thomas and Joglekar 1996, Tetso 2007) also uncovers the presence of Cattle, Buffalos, Goats, Sheep, Domestic Pigs and Dogs among the domesticated species and Elephants, Gaurs, Blue Bull (Nilgai), Black Bucks, Four-horned Antelopes, Chitals, Sambhars, Wild Boars, Hares, Mongooses, Rats, Pea Fowls, Wild Fowls, Tortoises, fresh water fish and nine species of Molluscs including Marine Cowrie Shells among the wild species (Sarkar, 2014).

Samel (2022) in his description has mentioned that Archaeobotanical remains of Ahar culture have given evidence of Wheat, Barley, Rice, Mustard, Pea, Lentils, Millets, Black Gram, Green Gram among others. Remains of domesticated animals like Cattle, Sheep, Goats and Buffalo were found. The people practiced a mixed economy of farming and animal husbandry. Hunting continued as is evident from the remains of wild animals like Blue Bull (Nilgai), Black Buck, Four-horned Antelope

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and Elephant among others. Turtle, Fish and Molluscs remains were present. Fishing was also practiced.

V. Records of Wildlife in the Recent History of Mewar

The records of flora and fauna existed in Mewar region during recent history (Dating back to more than 500 years) can be best sourced from *Veer Vinod* written by Shyamal Das Ojha (1886) and *Udaipur Rajya Ka Itihaas* written by Gaurishankar Heerachand Ojha (1928). Veer Vinod is in fact the earliest known comprehensive history of Mewar that also had record of forest and wildlife existing in the region. The record of animals mentioned in both books include carnivores (Tiger, Lion, Cheetah, Leopard, Wolf, Wild Dog, Caracal, Hyena and Jackal); Herbivores (Bear, Sambhar, Four-horned antelope, Black Buck, Chinkara, Cheetal, Wild Boar, Blue bull, Hanuman Langur); Birds (Vultures, Eagle, Kite, shikra, Crow, Alexandrine Parakeet & other Parakeets, Pigeon, Jungle Fowl, Koel, Cuckoo, Partridge, Quail, Green Pigeon, Egrets, Sarus Crane, Lapwing, Swan, Ducks, Water Fowl, Cormorants etc.); Aquatic animals (Crocodile, Otter, Frogs, Turtle, Crabes, Water Snake, Goonch Fish and other varieties of fishes).

Burke (1928) in his book '*The Indian Field Shikaar Book*' had also mentioned the distribution of Lion and Cheetah in the Mewar region. According to him the Asiatic Lion existed in the area till late 1920s.

Dhaybhai Tulsinath Singh Tanwar (1956) who had served three generations of Maharanas of Mewar, Maharana Fateh Singh, Maharana Bhupal Singh and Maharana Bhagwat Singh respectively and accompanied them in hunting expeditions in landscapes of Mewar and other districts of S. Rajasthan described his observations of wildlife in his book *'Shikari Aur Shikar'.* The wild animal species mentioned in his book include Tiger (Sher), Leopard (Panther, Adhbesra), Bear (Bhaloo), Wolf (Varagda), Wild Dog (Karu), Wild Boar (Suar), Sambhar Deer, Spotted Deer (Cheetal), Blue Bull (Neelgai), Black Buck (Kala Hiran), Chinkara (Chhinkhla Hiran), Porcupine (Sehi/Heli), Hare (Khargosh), Four-horned antelope (Chousinga, Bhedal, Butar), Flying Squirrel (Udni Billi), Crocodile, Otter, Fishes (Mahseer, Sanwal, Rohu, Lanchi, Goonch), Gangetic Dolphin, Birds (Partridge, Quail, Green Pigeon, Jungle Fowl, Water Hen), and Migratory birds (Ducks, Bar-headed Geese, Bustard, Demoiselle Crane etc).

Picture-1: Dhaybhai Tulsinath Singh Tanwar had served three generations of Maharana of Mewar, Maharana Fateh Singh, Maharana Bhupal Singh and Maharana Bhagwat Singh and accompanied them in hunting expeditions in landscapes of Mewar and other districts of S. Rajasthan.

Prior to independence, the Jaisamand forest area (approximately 50 km south of Udaipur city) was managed by the erstwhile rulers of Mewar, they used it as a 'Shikargah' (hunting ground). The area at that time was immensely rich in faunal wealth and tiger was the apex species. Large numbers of palaces, hunting enclosures, and shooting boxes, remains of which still exist are evidences of Jaisamand being rich in faunal diversity, especially the mega fauna (i.e. large animals) and thus was rulers' choice for hunting expeditions.

The Jaisamand forest also served as a wildlife corridor linking the south-western Rajasthan and northern Gujarat to the eastern Madhya Pradesh. Migratory animals like Tiger and Wild dog used to migrate from the forests of Kamlighat and Goramghat of Pali district to Madhya Pradesh, passing

through Jaisamand and Sitamata forest areas of Southern Rajasthan. Another migratory route was from Gujarat to Kotra forest area through Mount Abu to Panarva forest to Saru and Sisa Magra to Jaisamand to Madhya Pradesh. The Jaisamand forest had plenty of herbivore fauna which served good pray base for wild dogs that move in large groups and require a large amount of prey base to sustain upon. During 1923 a group of wild dogs was seen hunting a Cheetal (Spotted deer) in the Jaisamand forest area (Tehsin, 1986). The District Gazetteer of Udaipur (Agarwal, 1979) also has description of floral and faunal diversity of Udaipur including that of Jaisamand wildlife sanctuary.

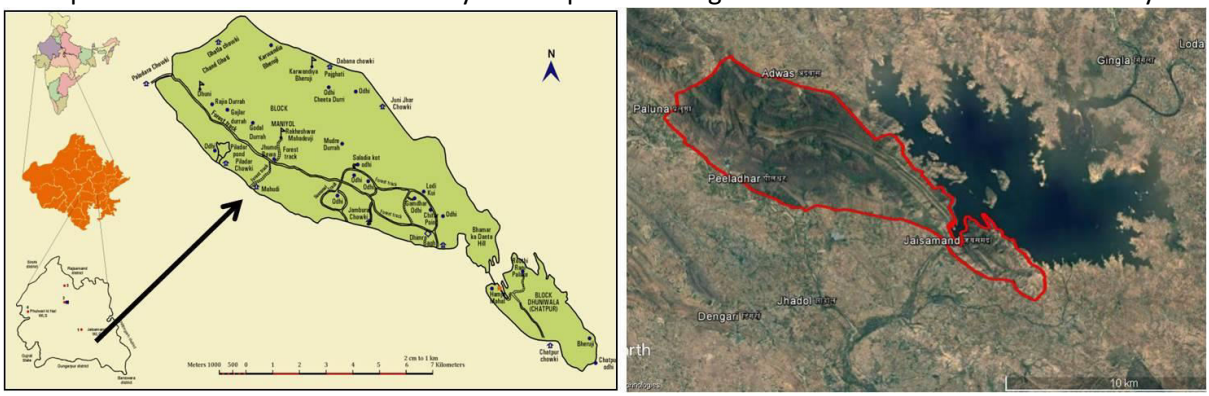

Figure-8: Location of Jaisamand Forest Area and Extent of Jaisamand Wildlife Sanctuary in the broader forest landscape.

Besides the ancient and historical evidences and records some wildlife experts who have ancestral knowledge about the wildlife existing during their forefathers' time are also important source of information about occurrence of wildlife in Mewar during recent past. Tehsin (1980, 1986, 1987) has described historical record and ooccurrence of Large Brown Flying Squirrel, Mouse Deer, Wild Dogs and Wolf in Mewar region.

End Remarks:

It is explicitly clear that the history of wildlife in Mewar has been always rich from the early stages of life till the recent past. The peculiar tectonic developments, topography and landscape morphology rendered it of global importance in terms of ecology, phytogeography, zoogeography, geology and the distribution and occurrence of species. Currently many species have become locally extinct due to anthropogenic causes, many of them are hard to rejuvenate because of irreversible disturbances and alterations in the natural habitats whereas remaining are also under immense pressure and needs to be protected with efficient measures.

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