

BIODIVERSITY IN ACHANAKMAAR BIOSPHERE RESERVES AREA

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Abstract:

*An important ecological hotspot that has a substantial amount of biodiversity is the Achanakmaar Biosphere Reserve, which can be found in the state of Chhattisgarh, which is located in the middle of India. This reserve covers a wide range of ecosystems, including grasslands, tropical dry deciduous forests, and wet deciduous forests, and it extends over a total area of more than 1,800 square kilometers. A broad variety of flora and wildlife, including approximately 250 species of birds, 40 species of animals, and a large number of reptiles and amphibians, are included in the reserve's rich biodiversity. The reserve is home to a number of important species, including the Bengal tiger (*Panthera tigris tigris*), the Indian leopard (*Panthera pardus fusca*), and the Indian bison (*Bos gaurus*), in addition to a number of rare and vulnerable plant species. The Achanakmaar Biosphere Reserve plays an important role in the conservation of habitats, the preservation of biodiversity, and the provision of ecosystem services, all of which contribute to the reserve's ecological value. On the other hand, the reserve is confronted with issues such as the degradation of its habitat and the conflict between humans and animals. These challenges require continual conservation efforts in order to preserve the biological integrity of the reserve and guarantee the protection of its various species.*

Keywords: Achanakmaar, Biodiversity, biosphere

Introduction:

A key ecological location that is well-known for its abundant biodiversity and diverse ecosystems is the Achanakmaar Biosphere Reserve, which can be found in the state of Chhattisgarh, which is located in the geographical center of India. It is a biosphere reserve that was established in 1983 and includes a huge area of around 1,800 square kilometers. It incorporates the Achanakmaar Wildlife Sanctuary as well as the woods that are located in the surrounding region. There is a wide variety of flora and animals that may be found in this reserve since it is comprised of a mosaic of habitats. These habitats include grasslands, dry deciduous forests, and wet deciduous forests. Achanakmaar is characterized by its physical location, which is characterized by rocky terrain, rolling hills, and various water bodies, all of which contribute to the biological diversity of the territory. The existence of such a wide variety of habitats provides a safe refuge for a great number of species, including a wide variety of bird species, reptiles, amphibians, and huge animals such as the Bengal tiger and the Indian leopard. In addition, the reserve is home to a number of endemic and endangered plant species, which provides further evidence of the value of the reserve in terms of plant conservation. As a vital place for the preservation of habitat, the protection of species, and the upkeep of ecological processes, the Achanakmaar Biosphere Reserve is an essential component in the maintenance of ecological equilibrium in the region. The significance of this topic goes beyond national boundaries, making a contribution to the protection of biodiversity on a worldwide scale. However, the reserve is confronted with

issues such as the fragmentation of habitat, the intrusion of humans, and poaching, all of which require ongoing conservation efforts and management measures in order to protect the ecological integrity and biodiversity of the reserve.

Geological and Ecological Significance:

The Achanakmaar Biosphere Reserve is home to a number of geological formations, one of which being the presence of ancient Gondwana rocks. These rocks provide as a distinctive backdrop for the reserve's different ecosystems. Because of the impact that these rocks have on the types of soil and the patterns of flora, the reserve has a wide diversity of microhabitats. The climate of the region is tropical, consisting of a distinct monsoon season that is responsible for the presence of a wide variety of fauna and lush flora. Alterations in the seasons have a considerable influence on the flora and fauna, as they are responsible for migration patterns and have an effect on breeding cycles.

Flora and Fauna:

The flora of the reserve is comprised of a diverse array of plant species that have adapted to a variety of environmental circumstances. Teak (*Tectona grandis*), sal (*Shorea robusta*), and several varieties of bamboo are those that are considered to be the dominant tree species. There are many different kinds of insects that are supported by the undergrowth, which is comprised of a wide variety of plants and herbs. Additionally essential to the preservation of ecological harmony and the provision of grazing grounds for herbivores are the grasslands that are contained inside the reserve. Achanakmaar is home to a rich collection of flora and wildlife. It is an essential habitat for a number of big species, such as the Bengal tiger, the Indian leopard, and the Indian bison, among others. The chital (*Axis axis*) and the wild pig (*Sus scrofa*) are two examples of smaller animals that are also rather common. There are many different kinds of birds that may be found in the reserve, such as the Indian eagle owl (*Bubo bengalensis*) and a number of other kinds of raptors. The reserve is home to a wide variety of reptiles, including the Indian python (*Python molurus*), as well as a number of different kinds of lizards and snakes. There are also amphibians, such as frogs and toads, which are found in the reserve and contribute to the ecological richness that it possesses.

Conservation Challenges:

There are a number of conservation obstacles that the Achanakmaar Biosphere Reserve must overcome, despite the fact that it is ecologically significant. The extension of agricultural land and the construction of new infrastructure both contribute to the fragmentation of habitat, which poses a substantial risk to wildlife corridors and biodiversity. Poaching and illegal logging are two examples of human-wildlife conflicts that significantly intensify the demands that are already being placed on the reserve's ecosystems. The implementation of anti-poaching measures, the promotion of sustainable land-use practices, and the engagement of local people in conservation activities are all examples of those efforts that are being made to solve these concerns.

Achanakmar - Amarkantak biosphere reserve

It is named after the Achanakmar forest settlement and Amarkantak, which is a sacred location from whence the rivers Narmada, Johilla, and Sone originate. The Achanakmar-Amarkantak biosphere reserve is located in northern India. In accordance with notification number 9/16/99 CS/BR dated March 30, 2005, the Government of India designated the Achanakmar-Amarkantak Biosphere Reserve as a Biosphere Reserve (BR). It has a triangle shape and is stretched out from the Maikal hill ranges to the intersection of the Vindhyan and Satpura hill ranges. It is located between the latitudes 22° 15' and 20° 58' North and the longitudes 81° 25' North and 82° 5' East. The core zone of BR is surrounded by the forest divisions of Bilaspur and Marwahi in the state of Chhattisgarh, as well as Dindori and Anuppur in the state of Madhya Pradesh. There are 3835.51 square kilometers of land that make up the whole of BR (Anon, 2007). Chhattisgarh state is home to the core region of the BR, which accounts for 551.55 square kilometers. It is

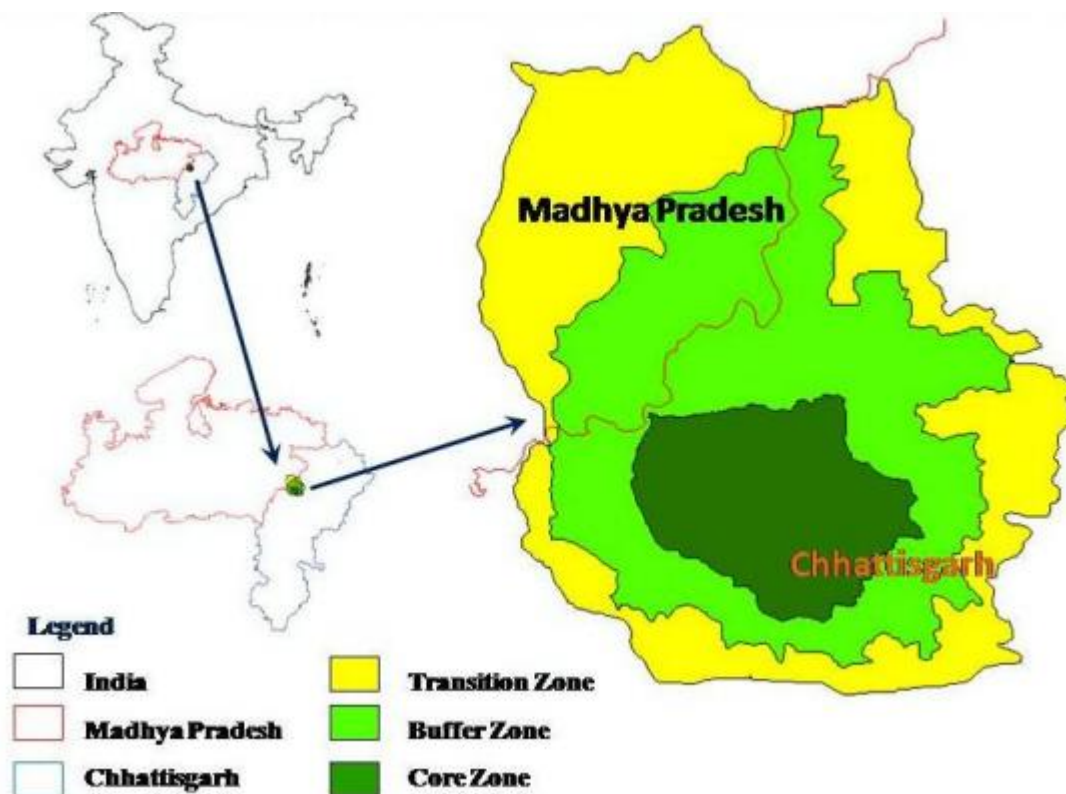


Fig 1: A map illustrating the location of the Achanakmar-Amarkantak biosphere reserve

has a buffer zone and a transition zone that cover an area of 1955.875 square kilometers and 1328.09 square kilometers respectively. Among them, the Bilaspur and Marwahi forest divisions of Chhattisgarh account for 2058.98 square kilometers, while the Dindori and Anuppur forest divisions of Madhya Pradesh are responsible for more than 1,224.98 square kilometers. Its geography is diverse, ranging from the hills of the Maikal mountains of Satpura to the crop fields that can be found in the districts of Bilaspur and Anuppur as well as Dindori. The topography, in combination with perennial streams and valleys has created varied micro-climatic conditions in the area to provide diverse environmental conditions, encouraging luxuriant growth for several species of thallophytes, bryophytes, pteridophytes (ferns), gymnosperms, angiosperms and many species of wild fauna of economic importance. The region is characterized by its distinctive geology, which includes schists and gneisses, as well as granite intrusion rocks, sand stones, shales, limestone, basaltic lava, and bauxite that are all present. It is common for the soils in the Achanakmar - Amarkantak BR to be light brown to brownish yellow in color, and their composition and texture can range from sandy to loamy-clays.

One of the variables that might lead to the development of marshy conditions is the presence of a clay zone that is olive green in color and can reach a thickness of up to five millimeters. Additionally, there are certain locations that have red soils, which are permeable and fertile, and are caused by the presence of iron oxide. Additionally, alluvial soil deposits may be observed on the banks of a number of streams that are located inside the tract. The Achanakmar - Amarkantak Biosphere Reserve contains a significant amount of the black cotton soil in its various regions. A typical monsoon climate can be found in the BR, which consists of three distinct seasons and a brief post-rainy season. The month of April marks the beginning of the summer season, which continues until the middle of June. The rains begin to fall around the middle of June and continue all the way through the end of September. During the month of October, the post-rainy season continues to be present. The winter season, often known as the cold season, begins in November and continues until March. As the seasons change, the average daily maximum temperature may range anywhere from 240 to 390 degrees Celsius, while the average daily lowest temperature can be anywhere from 100 to 250 degrees Celsius.

The most severe temperatures have been reaching their lowest and greatest points in recent years as a direct result of climate changes that have been taking place all over the world including in the United States. Throughout the course of the year, there are often a few rain showers that occur in each season. The rainfall ranges from 1322 millimeters to 1624.3 millimeters on average. Because of the dense flora of sal woodland at higher elevations, the relative humidity is rather high, and the months of June through October are the ones that see the most common rainfall. The amount of precipitation falls to its lowest point of 12.98 millimeters during the month of December. *Anogeissus latifolia*, *Diospyros melanoxylon*, *Kydia calycina*, *Lagerstroemia parviflora*, *Litsea glutinosa*, *Ougenia oojeinensis*, *Terminalia tomentosa*, and other plants are frequently observed to be damaged by frost between the months of December and January in the core zone of the Achanakmar and Lamni forest ranges. *Buchnanania lanzan*, *Embllica officinalis*, *Shorea robusta*, and other plants are found in the buffer zone of Khandoli.

The Achanakmar and the Amarkantak It is a point of origin for rivers like as the Narmada, the Johilla, and the Sone, as well as several rivulets and two dams. BR is endowed with a large number of streams that are reliant on the monsoon season and streams that are permanent. The amount of work that has been put into increasing penetration into soil, controlling excess runoff, and managing and utilizing runoff for beneficial purposes has not been very significant. Some of the most important components of the water bodies include the Old Khudia dam, which is located in the south-western boundary on the Maniary river in the core zone, and the Malhaniya dam, which was constructed on the Malhaniya river in the buffer zone. The seasonal nallahs and streams in BR go dry throughout the summer months, making these dams a very beneficial resource for both people and wild animals that live in the region. The water bodies cover an area that is 33.61 square kilometers in size. There is a significant amount of room for improvement in terms of watershed management due to the fact that the annual rainfall average is around 1624.3 millimeters and is spread out across an average of 71 to 118 wet days. Within the boundaries of Chhattisgarh, the BR is comprised of a total of 418 revenue and forest villages that are currently populated by both tribal and non-tribal groups. A total of 22 villages, with a combined population of 7617 people, are placed inside the core zone of the BR, while the rest communities are located within the buffer and transition zones of the BR. The majority of the people who live there are engaged in agriculture, in addition to the collecting of medicinal plants and other forest products that do not include wood. Additionally, the forest department on occasion employs them as

laborers in its operations. Baiga, Kol, Kanwar, Pradhan, and Gond are the tribes that make up the majority of the population in BR.

Zonation and forest types of Achanakmar Amarkantak biosphere reserve

Eleven ranges in Chhattisgarh and three ranges in Madhya Pradesh correspond to the core, buffer, and transition zones of the BR. These ranges are classified into the following categories. Lamni, Achanakmar, and Game range are all regions that are included in the core zone, which is located in the state of Chhattisgarh. A section of the buffer and transition zone is located in both the state of Chhattisgarh and the state of Madhya Pradesh, with the majority of the zone being located in the state of Chhattisgarh. Those woods that are located in the Lormi Range, the Kota Range, the Khudia Range, the Belgahana Range, the Khodri Range, the Marwahi Range, the Gorela Range, and the Lamni Range (General) in the state of Chhattisgarh, as well as in the states of Madhya Pradesh, Amarkantak, Rajendragram, and East Karanjiya. North Indian Tropical Moist forests and North Indian Moist Deciduous forests make up the forests of BR. These forests are further subdivided into subtypes such as Moist Peninsular sal forests, Moist Mixed deciduous forests, and Northern Dry Mixed Deciduous forests, which are interspersed with rainfed fields and inhabited areas (Figs 1-4).

Floral attributes

The BR is quite abundant, with a great variety of vegetation and a dense population of it. It is made up of 1527 different species of flora that have been documented (Anon, 2010). There are more than 317 species of thallophytes, which comprise seven species of algae, 179 species of fungus, and 130 species of lichen. Additionally, there are 44 species of bryophytes, forty species of ferns, sixteen species of gymnosperms, and more than 1,111 species of angiosperms. In addition to providing food for their own sustenance, they also sell non-timber forest products (NTFPs) in order to supplement their income. In the Northern Tropical Moist Deciduous Forests, sal is the predominant species that may be found in hilly tracts and low-lying parts of the Lamni, Game, Marwahi, and Achanakmar ranges, as well as in the valley of the Khudia range. There are many other kinds of shrubs, climbers, and herbs that belong to this category, as well as sal and its associated plants such as saja, bija, dhaora, kasai, and lendia. The dry mixed deciduous forest consists of dry sal with associates in the top storey like saja, bija, dhaora, kusum, kasai, lendia, jamun, mahua, aonla, achar, baranga, amla, bel, garari, kari, khamer, salai, tendu, tilwan, and a few other thorny species in the middle storey, banrahar, chhind, dhawai, harsingar, kur dai and kalabansa in the undergrowth; chhira, kusum, bhurbhusi, and mushel as grasses and mahul, etc. as common climbers. Different kinds of plants, such as the fern and the lichen *Caloplaca amarkantakana* (family Teloschistaceae),



Fig 1: Moist sal forest



Fig 2: Dry peninsular sal forest



Fig 3: Moist mixed deciduous forest



Fig 4: Northern dry mixed deciduous forest

Isoetes bilaspurensis, which belongs to the members of the family Isoetaceae, and *Bothriochloa grahamii*, which belongs to the family Poaceae, are both indigenous to this location. In accordance with the criteria established by the International Union for Conservation of Nature (IUCN) in the year 2001, twenty-eight species of flora and fifty-five species of fauna belonging to different groups have been recognized and observed to belong to distinct threat categories on a regional and global scale. Certain species of ferns, such as *Lygodium flexuosum* and *Adiantum capillus veneris*, are considered to be in risk of extinction. The angiosperm species known as *Rauwolfia serpentina* is considered to be in a state of critical endangered status in the BR. On the other hand, the species *Clerodendrum serratum*, *Acorus calamus*, and *Eulophia herbacea* are critically endangered both locally and regionally. However, the remaining 22 species have been identified as being vulnerable. The pteridophyte *Ceratopteris thalictroides*, also known as *Acrostichum thalictroides*, *Cheilanthes rufa*, also known as *Aleuritopteris rufa*, *Dryoathyrium boryanum*, also known as *Aspidium boryanum*, *Lastrea boryana*, and *Phegopteris kingie*, *Marginaria macrocarpa*, *Microsorium membranaceum* (syn. *Polypodium membranaceum*, *Pleopeltis membranaceum*), *Polystichum auriculatum* (syn. *Pharpophyllum*), and *Pteris quadriaurita* (also known as *Polypodium membranaceum*, *Pleopeltis membranacea*) were sampled in 1970. Subsequently, some of the taxa were recorded once or twice in the

subsequent thirty years, while others were unable to be recorded and most likely became extinct in the wild. On top of this, there are 518 different flower species that have both culinary and medicinal uses. Pteridophytes make up seven of these species, while flowering plants belonging to dicotyledons and monocotyledons make up the remaining 511 members of this group.

Conclusion:

One of the most spectacular examples of India's natural legacy is the Achanakmaar Biosphere Reserve, which exemplifies the intricate interplay of a wide variety of habitats, an abundance of wildlife, and distinctive geological formations. As a result of its large diversity of habitats, it is home to a diverse collection of flora and animals, including a number of species that are both endangered and endemic, which highlights the value of this environment as an important conservation area. The reserve is confronted with continual problems that endanger both its integrity and the survival of its animals, despite the fact that it is of paramount ecological value. In order to effectively address these difficulties, a holistic approach is required, one that combines strong protection measures, sustainable land management, and active community participation. For the purpose of ensuring the long-term preservation of the reserve's biodiversity, it is vital to make efforts to reduce habitat fragmentation, prevent poaching, and increase conservation awareness. Not only will the ongoing research and monitoring of the Achanakmaar Biosphere Reserve help us gain a better knowledge of the biological dynamics of the reserve, but it will also contribute to the creation of conservation measures that are more successful. By ensuring the protection of this critical ecosystem, we are making a contribution to the overarching objective of preserving the ecological balance and biodiversity of the entire planet. An example of the resiliency of nature and the significance of preserving our natural heritage for the benefit of future generations is provided by the Achanakmaar Biosphere Reserve.

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