



Received on 19 December 2024; received in revised form, 28 December 2024; accepted, 29 December 2024; published 31 December 2024

EXPLORING THE BIODIVERSITY TREASURE OF ACHANAKMAR-AMARKANTAK BIOSPHERE RESERVE

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Keywords:

Biodiversity, Flora and fauna, Bio-conservation, Madhya Pradesh and Chhattisgarh

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ABSTRACT: The *Achanakmar-Amarkantak* Biosphere Reserve is a remarkable biodiversity hotspot situated in the heart of India, straddling the states of Madhya Pradesh and Chhattisgarh. Geographically, this biosphere reserve is located in the Deccan Peninsula and the Central Highland Plains region, capturing a diverse array of flora and fauna. The region is renowned for its innumerable natural vegetation and zoological wonders, which have long captivated the attention of biologists and researchers. Beyond the northern Himalayan valleys, this biosphere reserve represents the second-largest expanse of biodiversity in India, with a wealth of species that have been documented in various Vedic and botanical literature. Interestingly, many of the plants and herbs found in this region possess valuable ethno-medicinal and pharmacological properties, some of which are yet to be fully explored and understood. The local communities and indigenous tribes have a deep, symbiotic relationship with the biosphere, utilizing its natural resources for food, fodder, medicine, and economic sustenance. This review delves into the biodiversity, biogeographical features, and the ethnobotanical significance of the *Achanakmar-Amarkantak* Biosphere Reserve, highlighting its critical role in maintaining ecological balance and supporting the livelihoods of the local populations.

INTRODUCTION: The *Achanakmar-Amarkantak* Biosphere Reserve is a well-established, naturally-formed biosphere located in the central region of India, spanning the states of Madhya Pradesh and Chhattisgarh covering an area of approximately 383,552 hectares. This biosphere reserve is named after the Achanakmar forest village and the Amarkantak region, both of which hold significant cultural and ecological importance.

Amarkantak is renowned as a major Hindu pilgrimage site, being the origin of the Narmada and Sone rivers, and also a part of the Ramvangama path, the journey taken by Lord Ram during his 14 year exile in the forest as described in the epic Ramayana.

Geographically, the biosphere reserve is situated between the Vindhya and Satpura mountain ranges, at an altitude of 1,065 meters above sea level, with coordinates ranging from 22°44' N to 81°54' E. The region is characterized by various holy ponds, elevated hills, waterfalls, and a rich biodiversity. On the other hand, Achanakmar is a lush green forest area that is home to local tribal communities and villages, situated on a plateau at latitudes between 22°15' to 22°58' N and longitudes 81°25'

	<p>QUICK RESPONSE CODE</p> <p>DOI: 10.13040/IJPSR.0975-8232.IJP.11(12).675-80</p>
	<p>Article can be accessed online on: www.ijpjournal.com</p>
<p>DOI link: https://doi.org/10.13040/IJPSR.0975-8232.IJP.11(12).675-80</p>	

to 82°5' E, with an average altitude ranging from 400 to 1,100 meters above sea level. The *Achanakmar-Amarkantak* Biosphere Reserve is located in the northern part of the biogeographic zone 6, the Deccan Peninsula, and the central highland plain. The reserve encompasses 68.2% of the Bilaspur and Pendra road districts in Chhattisgarh, and the remaining 16.20% and 15.70% in the Anuppur and Dindori districts of Madhya Pradesh, respectively. The *Achanakmar-Amarkantak* Biosphere Reserve was declared as a biosphere reserve by the Government of India in 1999¹.

Geographical and Environmental Characteristics of the *Achanakmar-Amarkantak* Biosphere Reserve: The *Achanakmar-Amarkantak* biosphere reserve region is characterized by a range of geographical features, from low-lying rice fields to the rugged Maikal hills and Satpura valleys.

The biosphere reserve is divided into core, buffer, and transition zones, with the core zone covering an area of 551.55 km² in Chhattisgarh and encompassing the Amarkantak wildlife sanctuary. The buffer zone extends across both Chhattisgarh and Madhya Pradesh, covering 1225.98 km² and 2058.38 km² respectively. The diverse topography of the region includes low-lying rice fields in Bilaspur and Annupur as well as wheat fields in Dindori, nestled within the Maikal range of the Satpura valleys. The region is also rich in natural resources, with deposits of iron ore and bauxite

found in the Amarkantak plateau. The biosphere reserve is traversed by numerous water streams and canals that are part of the Narmada and Sone river systems, which play a crucial role in maintaining the ecosystem balance and providing irrigation for local agricultural practices¹. Notably, the region is considered a major watershed divide, separating the rivers flowing into the Arabian Sea from those draining into the Bay of Bengal.

The climate of the *Achanakmar-Amarkantak* biosphere is typical of the monsoon climate in the region, with a hot and dry summer, a rainy monsoon season, and a cooler winter. Temperatures can reach as high as 40-55°C during the hot summer months of May and June, while the coolest months are December and January.

The ecological and economic significance of the *Achanakmar-Amarkantak* biosphere has been recognized by the Government of India, which declared it as the 14th biosphere reserve in the country. The region has also been designated as a UNESCO World Heritage site due to its rich biodiversity. However, the biosphere is facing increasing threats from human activities, such as overexploitation of natural resources, deforestation, mining, and infrastructure development, leading to habitat fragmentation and biodiversity loss. Therefore, sustainable management and conservation efforts are crucial to preserving the unique natural and cultural heritage of the *Achanakmar-Amarkantak* biosphere^{2,3}.

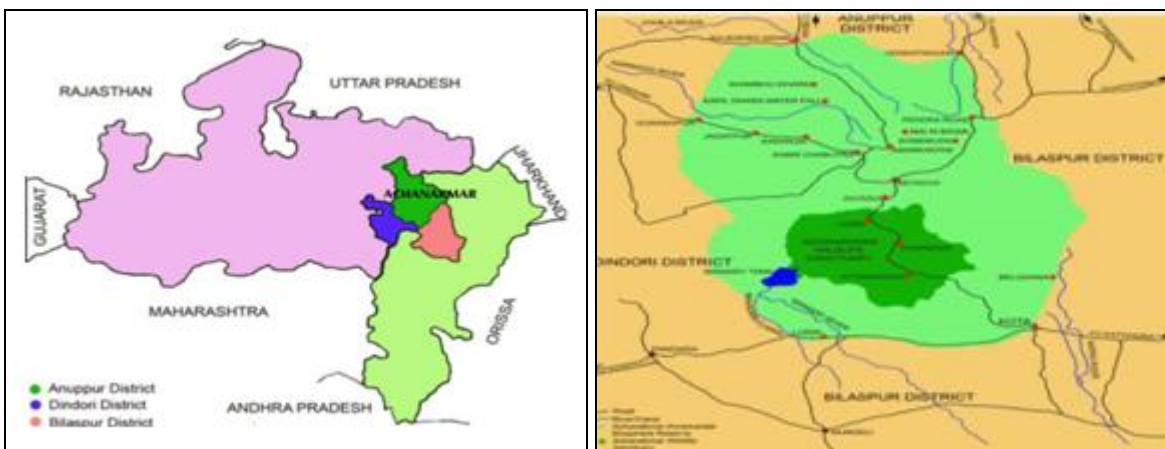


FIG. 1: GEOGRAPHICAL LAYOUT OF ACHANAKMAR-AMARKANTAK BIOSPHERE RESERVE SHOWING LOCATION AND LANDMARK BETWEEN MADHYA PRADESH AND CHHATTISGARH

Biodiversity and Ecosystem Dynamics in the *Achanakmar-Amarkantak* Biosphere Reserve: The *Achanakmar-Amarkantak* Biosphere Reserve

is a protected area in central India that boasts a rich and diverse array of wildlife and biodiversity. According to census data from 2004, the sanctuary

is home to a significant population of large predators such as 26 tigers, 46 Indian leopards, and 28 sloth bears, as well as a variety of other mammals including axis deer, sambar, Indian muntjac, and gaur. The reserve also provides habitat for numerous species of birds, reptiles, and amphibians, with over 170 bird species, 15 reptile species, and several frog and toad species documented in the area. The diverse natural vegetation of the reserve includes both northern tropical moist deciduous and southern dry mixed deciduous forests, supporting a rich diversity of plant life with over 1,500 species representing 151 families. The conservation and management of this biosphere reserve is critical not only for preserving its ecological value, but also for sustaining the livelihoods and well-being of the local indigenous communities that rely on the reserve's natural resources.

The tropical forests of central and eastern India, including the *Achanakmar-Amarkantak* region, have faced significant threats in recent decades due to factors such as deforestation, habitat fragmentation, and over-exploitation of natural resources⁴. These environmental degradations have placed severe pressure on the biological resources of the area, leading to a loss of biodiversity that can be difficult to reverse. Efforts to establish protected areas like the *Achanakmar-Amarkantak* Biosphere Reserve have proven to be a successful strategy for conserving wild animals and plants, but challenges remain in managing issues such as poaching, human-wildlife conflicts, and sustainable resource use^{1, 5}. Continued research and effective management strategies will be essential for ensuring the long-term preservation of the *Achanakmar-Amarkantak* Biosphere Reserve and its unique and valuable ecosystems.



FIG. 2: WILDLIFE AND VEGETATION FEATURES OF ACHANAKMAR-AMARKANTAKBIORESERVE

Biodiversity and Vegetation of the *Achanakmar-Amarkantak* Biosphere Reserve: The *Achanakmar-Amarkantak* biosphere reserve in central India is home to a diverse array of plant life. The natural vegetation within the reserve varies across the forest area, with both northern tropical moist deciduous and southern dry mixed deciduous forests present. This region is characterized by a rich diversity of plant species, including a variety of thallophytes, bryophytes, pteridophytes, gymnosperms, and angiosperms. The reserve is estimated to contain over 1,500 plant species from more than 151 different families. The angiosperm plants are particularly abundant, with numerous important species found in the reserve such as *Thalictrum* sp., *Dillenia pentagyna*, *Cocculus*

hirsutus, *Flacourtia indica*, *Talinium portulacifolium*, *Tamarix ericoides*, *Hibiscus subdariffa*, *Corchorus fascicularis*, *Gerwaria rothii*, and *Dioscre* sp. In addition, the reserve is home to a variety of gymnosperm species that have adapted to the local environmental conditions, including *Cupressus torulosa*, *Araucaria bidwillii*, *Pinus patula*, *Pinus caribae*, *Pinus elliottii*, *Pinus oocarpa*, *Pinus srotina*, *Cedrus dodara*, and *Taxodium* sp. The reserve also contains a significant number of wild medicinal herbs, with over 107 species present, more than 20 of which are considered rare. The diversity of plant life in the *Achanakmar-Amarkantak* biosphere reserve is under threat from various anthropogenic factors, such as overexploitation of natural resources,

deforestation, mining, and infrastructure development ¹. These activities are leading to habitat fragmentation and degradation, which can result in the irreversible loss of biodiversity.

Medicinal and Aromatic Plants in the Achanakmar-Amarkantak Bioreserve: The Achanakmar-Amarkantak bioreserve is home to a diverse array of medicinal and aromatic plant species. Studies and surveys have identified over 130 plant species from 61 families and 115 genera that are traditionally used by the local population for various medicinal purposes. These herbal remedies are effective in treating a wide range of ailments, including cuts and wounds, fever, joint pain, gastrointestinal disorders, eye and cataract issues, inflammation, hepatic illnesses, anemia, mental disorders, abdominal pain, and paralysis. Some of the commonly used plant species include *Adiantum philippense*, *Asparagus racemosus*, *Pueraria tuberosa*, *Costus speciosus*, and *Terminalia chebula*, which are used to treat leprosy, while *Eryngium foetidum* and *Antidesma*

zeylanicum are utilized for snake bites and poisoning.

The survey findings reveal that the tribal and local inhabitants of the bioreserve have a substantial knowledge of the medicinal properties and uses of the available plant species. However, this traditional knowledge is not widely shared or explored, as the tribal communities tend to keep this information within their own communities, passing it down through generations.

This review provides a brief account of the pharmaceutical, therapeutic, and safety aspects of the documented medicinal and aromatic plant species, including information on toxicity studies and contraindications. The prevalence of traditional medicinal practices using native flora is also observed in other tribal communities across India, such as in the Kachcha region and Arunachal Pradesh, where traditional herbal remedies are widely used for treating various ailments ⁶⁻⁹.

TABLE 1: ETHNO-MEDICINAL IMPORTANCE OF SPECIES IN AABR (ACHANAKMAR-AMARKANTAK BIORESERVE) OF SELECTED MEDICINAL PLANTS

S. no.	Botanical Name	Local Name	Family	Pharmacological importance
1.	<i>Abelmoschus chusmoschatus</i>	Kasturibhindi	Malvaceae	Wound healing, aromatherapy, anxiety and depression,
2.	<i>Abrus precatorius</i> Linn	Ghumchi	Fabaceae	Seed use in cellulites, gangrene, ulcer, typhoid, cholera
3.	<i>Acanthospermum hispidum</i> D.C	Gokharu	Asterceae	Skin disease, relieve from fever pain, diuretic's
4	<i>Allium cardifolia</i>	Haldu	Rubiaceae	Malaria fever, abdominal infection and inflammation
5	<i>Adiantum philippense</i> Linn	Hansraj	Adiantaceae	Asthma, fever treatment, bronchitis, leprosy,ulcer, antidote
6	<i>Alternanthera sessilis</i> Linn	Gudari shank	Amaranthaceae	Burning sensation, diarrhea, skin disease
7	<i>Amaranthus spinosus</i>	Chaulal	Amaranthaceae	Scorpion and snake bite treatment
8	<i>Ammomum aromaticum</i> Roxb	Kali eliachi	zingiberraceae	Oral hygiene, abdominal pain, rectal disorder
9	<i>Ampelocissus tomentosa</i>	Ulatbel	vintaceae	Dysentery, fever, fitula and tuberculosis
10	<i>Anti desmazeylanicum</i> linn	Amti	Euphorbiaceae	Anti dotes for snake bites
11	<i>Aresaema tortuosum</i>	Ban makka	Areaceae	Cold and cough
12	<i>Basella rubra</i> Linn	Poi	Basellaceae	Dysentery and leprosy
13	<i>Belamcanda chinensis</i>	Tiger lily	Iridaceae	Acute tonsillitis, oedema, hepatoprotective
14	<i>Boerhavia procumbens</i>	Bishkhapra	Nyctaginaceae	Menstrual flow regulation
15	<i>Bridelia Montana</i> willd.	Ekdhaniya	Euphorbiaceae	Worm infection & bone fracture
16	<i>Bridelia retusa</i> Linn	Kasai, jamalvati	phyllanthaceae	Anti diabetes and artheritis treatment
17	<i>Carissa opacastapf</i>	Jangali, karaunda	Apocynaceae	Use cardio-tonic and Angina pectoris treatment

18	<i>Casuarina equisetifolia</i>	Banyasuru	Casuarinaceae	Treatment of beri-beri, cough, diarrhea, dysentery Headache, anti -inflammation
19	<i>Cayratia auriculata</i>	Jangaliangoor	Vitaceae	Intestinal worm and antihelminthese
20	<i>Celtis australis</i> Linn	Khirk	Ulmaceae	Anti-protozoal, use in intra-menstrual bleeding
21	<i>Ceiba pentandra</i> Linn	Mandukparni	Bombacaceae	Multiple uses.
22	<i>Chlorophytum aurndinaceum</i>	Safedmusli	Liliaceae	Antidiabetes, spermaturia and steroids
23	<i>Clematis smilacifolia</i> wall	Gajprasrni	Ranunculaceae	Use in cold fever
24	<i>Clerodendrum serratum</i> Linn	Bhrangraj	Verbenaceae	Anti-inflammation, dyspepsia, bronchitis.
25	<i>Coleus forskohlii</i> Briq	Garmar	Lamineaceae	Fever, burn sensation, muscle spasm treatment.
26	<i>Commelina diffusa</i>	Kanchat	commelineaceae	Anti inflammatory and headache.

CONCLUSION: The present review study and documentation provides an overview of the diverse medicinal and aromatic plants, referred to as "ethnomedicines," found within the *Achanakmar-Amarkantak Bioreserve*¹⁰. The region is home to a wide variety of angiosperm and gymnosperm plants that possess significant pharmacological activities and biological importance, serving as valuable resources for the local tribes and communities.

Ayurveda, the traditional Indian system of medicine, has long recognized the *Achanakmar-Amarkantak Bioreserve* as a dynamic bio-conservation zone for ethnomedicines, comparable to the northern Himalayan valleys of Uttarakhand, Himachal Pradesh, and the northeastern regions of India. The bioreserve is not only a hub for botanical and zoological research, but also an unexplored treasure trove for pharmacognosy experts and naturopathy specialists seeking new drug discoveries^{11, 12}.

Previous research has documented the use of approximately 150 plant species in various pharmacotherapy, treatment procedures, and traditional remedies by the local tribes and herbal or phytopharmaceutical industries¹¹. However, the knowledge of these medicinal plants is at risk of disappearing due to the lack of written documentation and the reliance on oral transmission between generations.

This review highlights the urgent need for further documentation and conservation efforts to preserve the ethnomedicinal knowledge and biodiversity of the *Achanakmar-Amarkantak Bioreserve*. The region's medicinal plant resources face threats from

deforestation, industrialization, overgrazing, and other anthropogenic factors, underscoring the importance of a holistic approach to sustainable management and utilization of these natural assets¹²⁻¹⁵.

ACKNOWLEDGEMENT: Nil

CONFLICT OF INTEREST: Nil

REFERENCES:

1. Thakur, Kumar, Tarun, Gaurav Kumar Padwar, Digvesh Kumar Patel and Arvind Bijalwan: "Monitoring land use, species composition and diversity of moist tropical environ in Achanakmar Amarkantak Biosphere reserve, India using satellite data" *MedCrave Group* 2019; 3(4): 162-172. <https://doi.org/10.15406/bij.2019.03.00141>.
2. Bhuarya, Kumar, Hemant ASRAS. Sastri SK. Chandrawanshi, Pandhurang Bobade and Deepak Kaushik: "Agro-Climatic Characterization for Agro-Climatic Zone of Chhattisgarh" *Excellent Publishers* 2018; 7(08): 108-117. <https://doi.org/10.20546/ijcmas.2018.708.013>.
3. Tiwari, Anupam, Rajendra H. Mehta and Kamal Kumar Sen: "Traditional Health Practices among the Tribal Belt of Chhattisgarh, India: An Indigenous Knowledge from Indigenous Peoples" 2022; 11(4): 95-106. <https://doi.org/10.51847/31v4c4x4at>.
4. Darro, Harischandra SL. Swamy, Tarun Kumar Thakur, and Alka Mishra: "Floristic composition, structure, diversity and conservation strategies for rehabilitation of dry tropical forests in buffer zone of *Achanakmar-Amarkantak Biosphere Reserve* (AABR), India" *Excellent Publishers* 2020; 9(4): 650-663. <https://doi.org/10.20546/ijcmas.2020.904.079>.
5. Kumar, Abhishek, Rajni Yadav, Meenu Patil, Pardeep Kumar, Ling Zhang, Amandeep Kaur, Sheenu Sharma, Sabir Hussain, Diksha Tokas, and Anand Narain Singh: "Sustainable Management of National Parks and Protected Areas for Conserving Biodiversity in India" *IntechOpen* 2020. <https://doi.org/10.5772/intechopen.92435>.
6. Joshi EB, Jain BK, Joshi PN & Soni HB: Prevalence of traditional medications through native floral elements among tribal communities of Kachhh Arid Ecosystem, Gujarat, India. *Progressive Sustainable Developers Nepal*, 2013; 2(1): 184-201. <https://doi.org/10.3126/ije.v2i1.9221>.

7. Kumar A, Patil M, Kumar P, Bhatti RC, Kaur R, Sharma NK & Singh AN: *Mallotus philippensis* (Lam.) Müll. Arg.: A review on its pharmacology and phytochemistry. Shahrekord University of Medical Sciences 2020; 10(1): 31-50. <https://doi.org/10.34172/jhp.2021.03>.
8. Mandal M, Mandal M, Tangjang S & Mandal SC: Ethnobotany of the Monpa ethnic group at Arunachal Pradesh, India. BioMed Central 2011; 7(1). <https://doi.org/10.1186/1746-4269-7-31>
9. Saikia S, Begum RA & Buragohain A: Comprehensive list of anti-malarial plants used by different communities of Assam and Arunachal Pradesh, India. Innovative Journal Solutions 2021; 8(2): 63-69. <https://doi.org/10.22271/23487941.2021.v8.i2a.540>
10. Enyew, Abiyu, Zemedede Asfaw, Ensermu Kelbessa and Getnet Ayalew: "Ethnobotanical Study of Traditional Medicinal Plants in and Around Fiche District, Central Ethiopia"2014; 6(4): 154-167. <https://doi.org/10.19026/crjbs.6.5515>.
11. Nithyadevi J and Sivakumar R: "Documentation of Traditional Knowledge of Herbal Plant in Kalvarayan Hills, Vallupuram District, Tamil Nadu" SciPress Ltd. 2014; 12: 21-28. <https://doi.org/10.18052/www.scipress.com/ilns.12.21>.
12. Kala, Prakash, Chandra, Pitamber Prasad Dhyani and Bikram Singh Sajwan: "Developing the medicinal plants sector in northern India: challenges and opportunities" BioMed Central 2006; 2(1). <https://doi.org/10.1186/1746-4269-2-32>.
13. Goyal, Shaily, Jaya Arora and Ramawat KG: "Biotechnological Approaches to Medicinal Plants of Aravalli Hills: Conservation and Scientific Validation of Biological Activities" Springer Intern Publishing 2014; 203-245. https://doi.org/10.1007/978-3-319-09381-9_11.
14. Kar A, Ran SM, Chanu T and Ngangbam P: "Phlogacanthus - An important medicinal plant of North East India: A review" Academic Journals 2014; 9(26): 2068-2072. <https://doi.org/10.5897/ajar2013.8134>.
15. Saikia, Jyoti, Ankur and Vipin Parkash: "Traditional Remedies for Ailments Prevalent Amongst the Thengal-Kacharis of Lakhimpur District, Assam, India" University of Agricultural Sciences and Veterinary Medicine of Cluj-Napoca 2016; 8(4): 401-407. <https://doi.org/10.15835/nsb849847>.

How to cite this article:

Bali S, Sahu KK, Masih P, Meshram RM and Masih M: Exploring the biodiversity treasure of *Achanakmar-Amarkantak* biosphere reserve. Int J Pharmacognosy 2024; 11(12): 675-80. doi link: [http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.11\(12\).675-80](http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.11(12).675-80).

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