Achanakmar-Amarkantak Biosphere Reserve in WNBR

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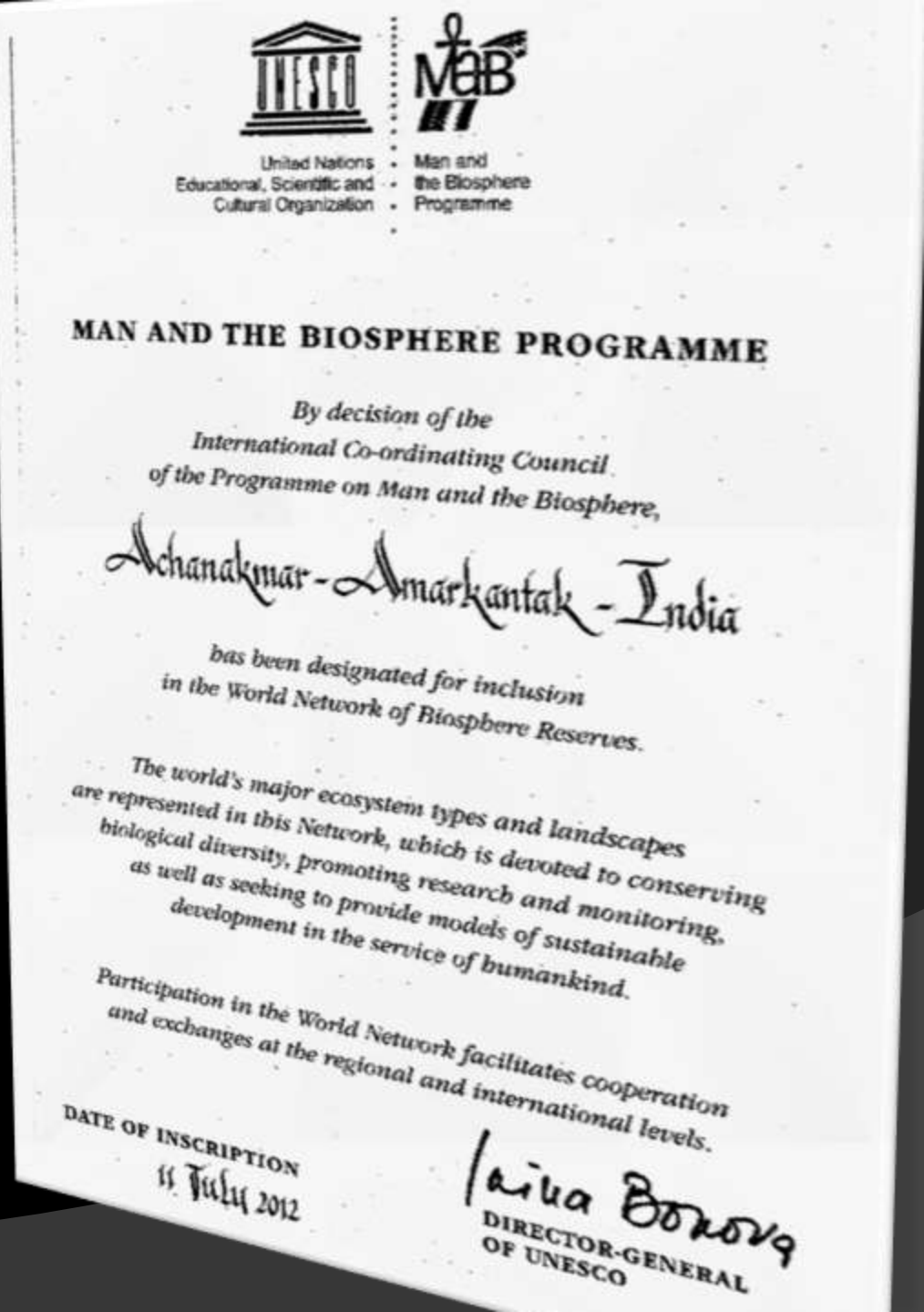
The International Council of UNESCO's Man and the Biosphere Programme (MAB) meeting in Paris from 9-13 July 2012 declared Achanakmar-Amarkantak Biosphere Reserve in the World Network of Biosphere Reserves (WNBR).



United Nations Educational, Scientific and Cultural Organization

Man and the Biosphere Programme

MAN AND THE BIOSPHERE PROGRAMME

By decision of the International Co-ordinating Council of the Programme on Man and the Biosphere,

Achanakmar - Amarkantak - India

has been designated for inclusion in the World Network of Biosphere Reserves.

The world's major ecosystem types and landscapes are represented in this Network, which is devoted to conserving biological diversity, promoting research and monitoring, as well as seeking to provide models of sustainable development in the service of humankind.

Participation in the World Network facilitates cooperation and exchanges at the regional and international levels.

DATE OF INSCRIPTION
11 July 2012

Irina Bokova
DIRECTOR-GENERAL OF UNESCO

World Network of Biosphere Reserves

- The World Network of Biosphere Reserves of the Man and Biosphere Programme consists of a dynamic and interactive net work of sites of excellence.
- It fosters integration of people and nature for sustainable development through participatory dialogue, knowledge sharing, poverty reduction and human well-being improvements, respect for cultural values and society's ability to cope with change, thus contributing to the Millennium Development Goals (MDGs).
- With this recognition from UNESCO, the Achanakmar-Amarkantak Biosphere Reserve enters into new realm of developmental activities in biodiversity conservation and socio-economic improvement of nearby tribals and open-up for exchange of information and international scientific cooperation.

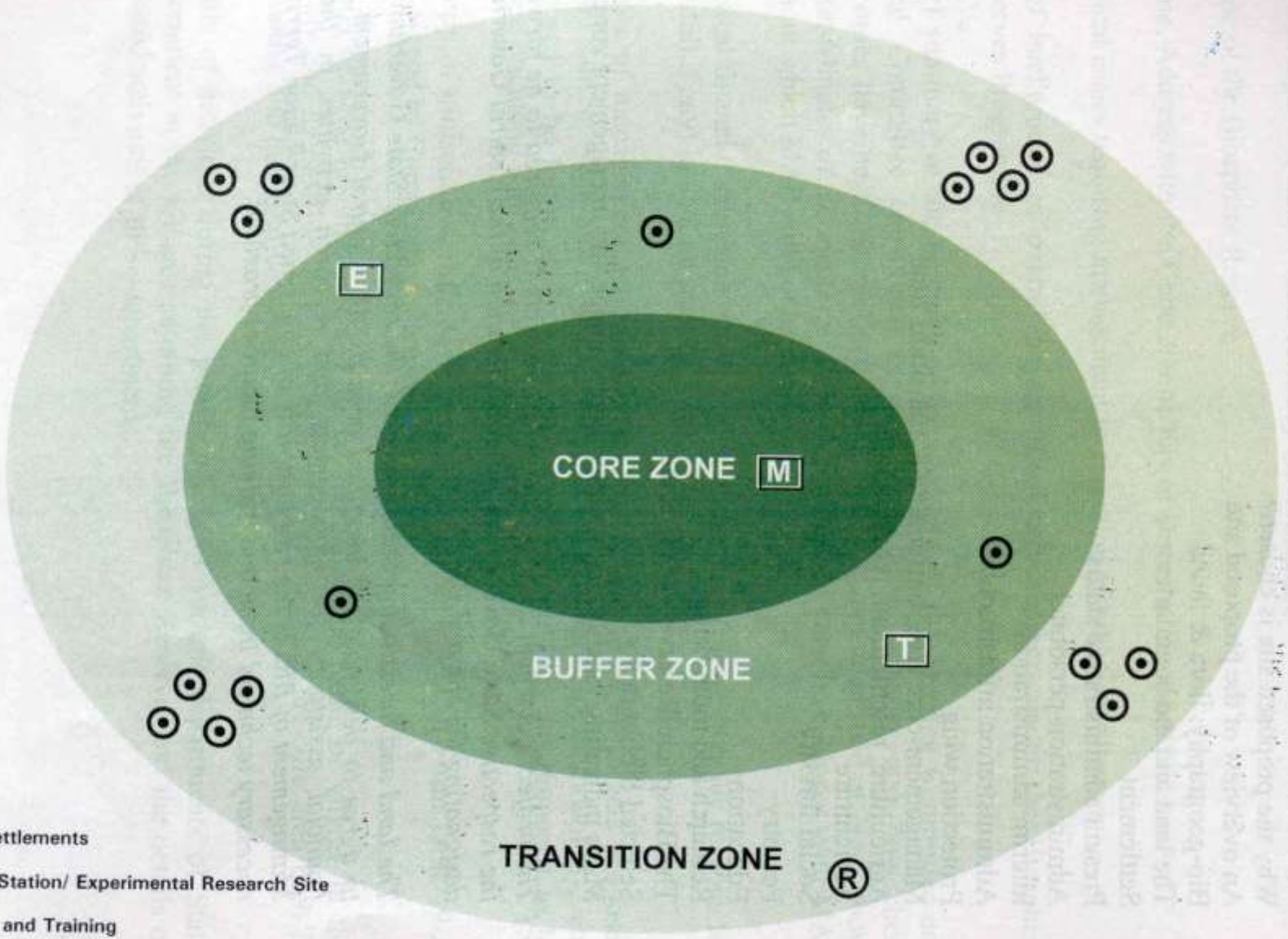
Introduction

- The idea of Biosphere Reserves was mooted by United Nations Educational, Scientific and Cultural Organisation (UNESCO) in 1973 under its Man and Biosphere (MAB) programme for "building scientific and technical capacity for effective management and sustainable use of biodiversity".
- Biosphere reserve (BR) is an international designation coined by UNESCO for representative parts of natural and cultural landscapes extending over terrestrial or coastal/marine ecosystems.
- A biosphere reserve is a unique concept that includes one or more protected areas and surrounding lands that manage to combine both conservation and sustainable use of natural resources.
- The first biosphere reserve of the world was established in 1976, since then the network of biosphere reserves has increased to 631 in 119 countries including 14 transboundary sites in 23 countries across the world (UNESCO, 2012).

Biosphere reserves of the world in the WNBR

UNESCO Region	No. of Biosphere Reserves	Number of Countries
Africa	64	28
Arab States	27	11
Asia and the Pacific	130	23
Europe and North America	290	36
Latin America and the Caribbean	120	21
Total	**631**	**119**

Biosphere Reserve Zonation



- ⊙ Human Settlements
- Ⓡ Research Station/ Experimental Research Site
- E Education and Training
- T Tourism and Recreation
- M Monitoring

Biosphere Reserves in India

- India launched National Biosphere Reserve Programme in 1979 under Indian MAB.
- The Ministry of Environment, Forest and Climate Change (MoEFCC), Government of India, is implementing this programme in the country.
- Currently, there are 18 biosphere reserves operating in India.

Biosphere Reserves in India

S. No.	Year	Name of BR	State
1	1986	Nilgiri	Tamilnadu, Kerala and Karnataka
2	1988	Nandadevi	Uttarakhand
3	1988	Nokrek	Meghalaya
4	1989	Gulf of Mannar	Tamil Nadu
5	1989	Sunderbans	West Bengal
6	1989	Manas	Assam
7	1989	Great Nicobar	Andaman and Nicobar Islands
8	1994	Simlipal	Orissa
9	1997	Dibru-Saikhowa	Assam
10	1998	Dihang-Dibang	Arunachal Pradesh
11	1999	Pachmarhi	Madhya Pradesh
12	2000	Khangchendzonga	Sikkim
13	2001	Agasthyamalai	Kerala, Tamil Nadu
14	2005	Achanakamar-Amarkantak	Madhya Pradesh, Chhattisgarh
15	2008	Great Rann of Kutch	Gujarat
16	2009	Cold Desert	Himachal Pradesh
17	2010	Seshachalam Hills	Andhra Pradesh
18	2011	Panna	Madhya Pradesh

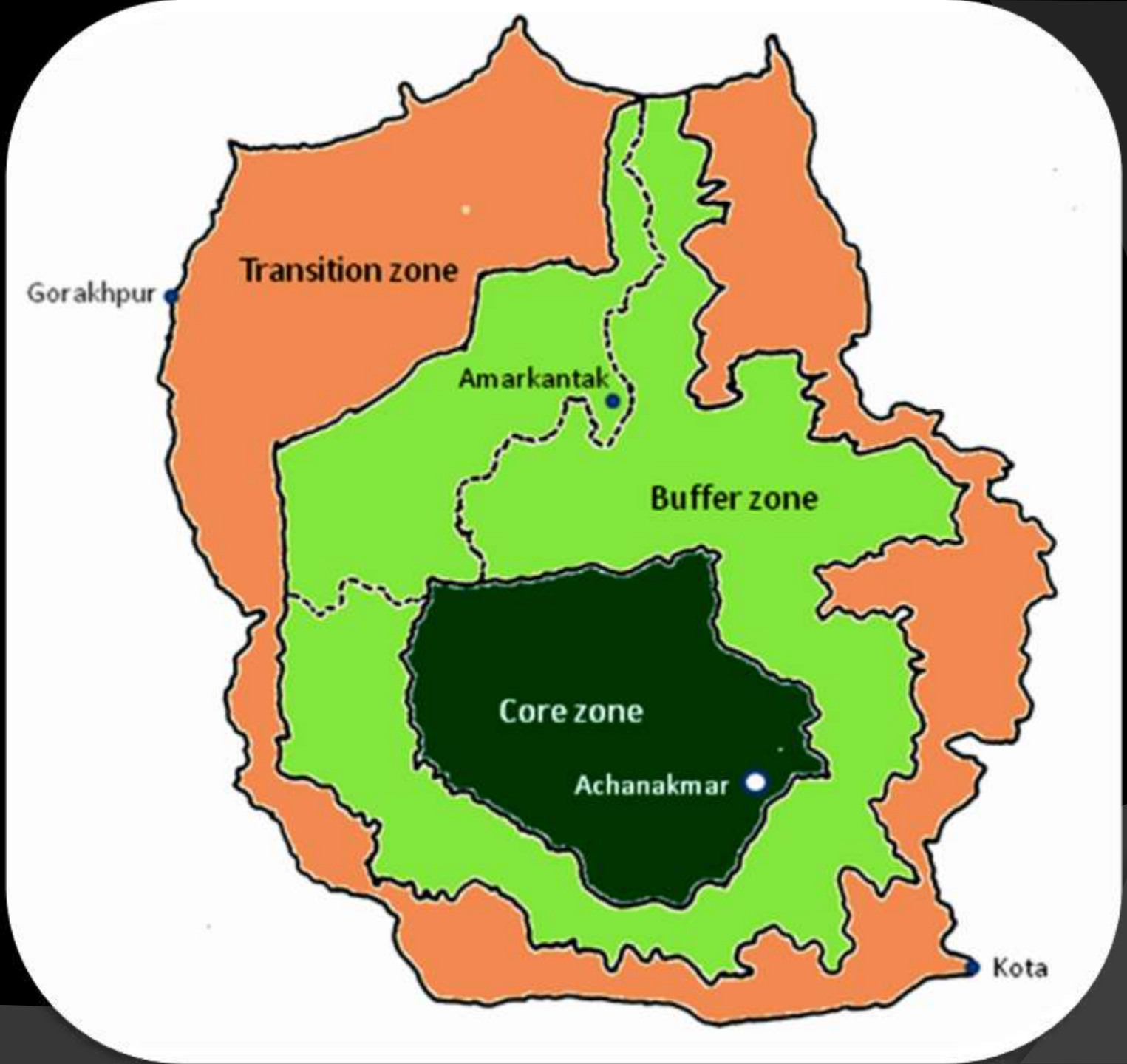
Biosphere Reserves under WNBR by UNSECO MAB programme

S. No.	Year	Name of BR	State	Year of Inclusion in WNBR
1	1986	Nilgiri	Tamil Nadu, Kerala and Karnataka	2000
2	1989	Gulf of Mannar	Tamil Nadu	2001
3	1989	Sunderbans	West Bengal	2001
4	1988	Nandadevi	Uttarakhand	2004
5	1994	Simlipal	Orissa	2009
6	1988	Nokrek	Meghalaya	2009
7	1999	Pachmarhi	Madhya Pradesh	2009
8	2005	Achanakamar-Amarkantak	Chhattisgarh and Madhya Pradesh	2012

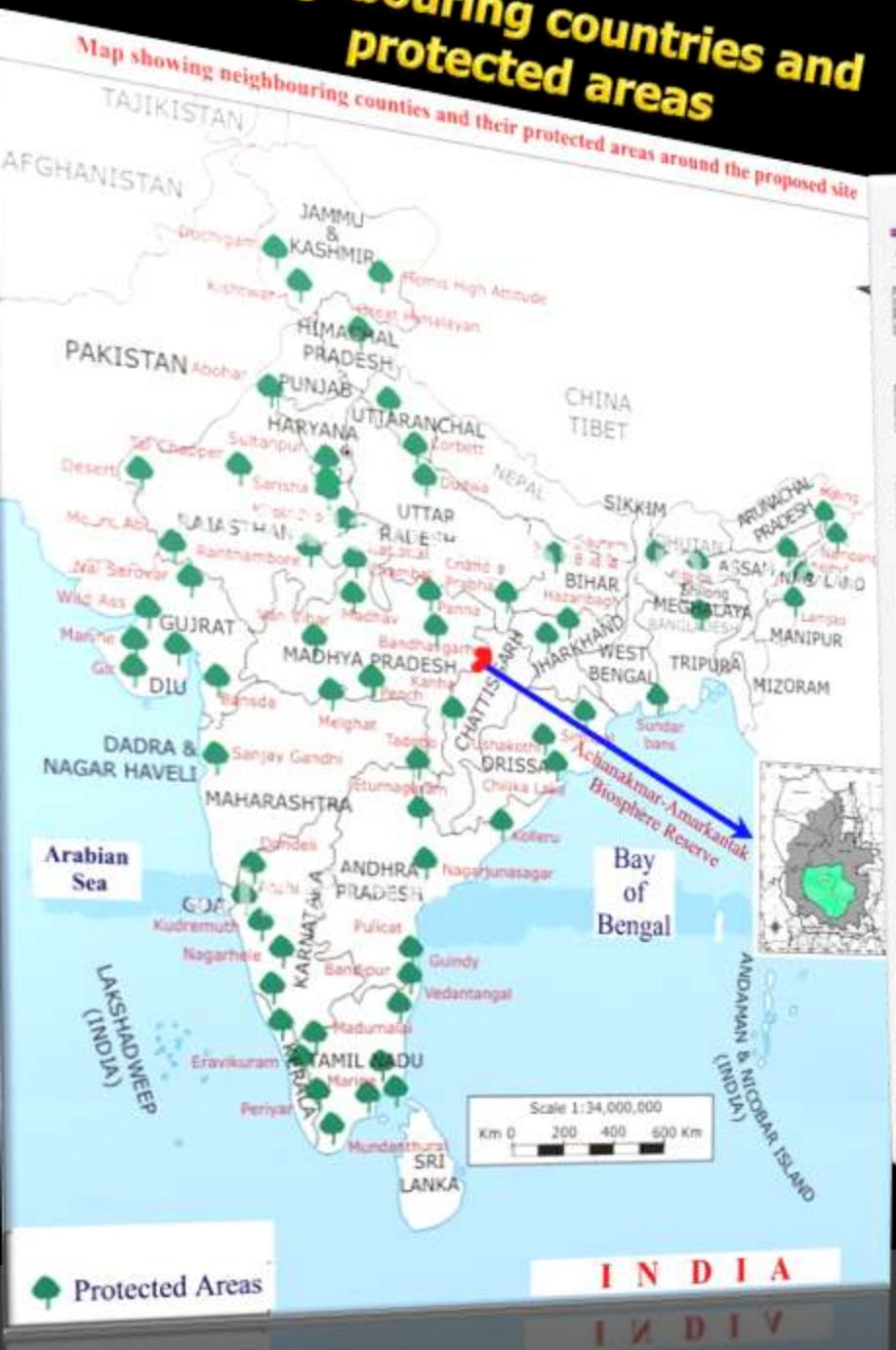
- Of these, “Achanakmar-Amarkanatak Biosphere Reserve” is located in the States of Chhattisgarh and Madhya Pradesh, under the jurisdiction of Tropical Forest Research Institute, Jabalpur, a Lead Institute for this biosphere reserve, recognized by MoEFCC, Govt. of India.
- Achanakmar-Amarkantak Biosphere Reserve is the first biosphere reserve of Chhattisgarh State and 14^{th} biosphere reserve of the country, declared by Government of India during the year 2005 (vide No. 9/16/99 CS/BR dated 30^{th} March 2005).
- It lies between latitude 22^0 15’ N to 20^0 58’ E and longitude 81^0 25’N to 82^0 5’E.

Achanakmar-Amarkantak Biosphere Reserve - special features

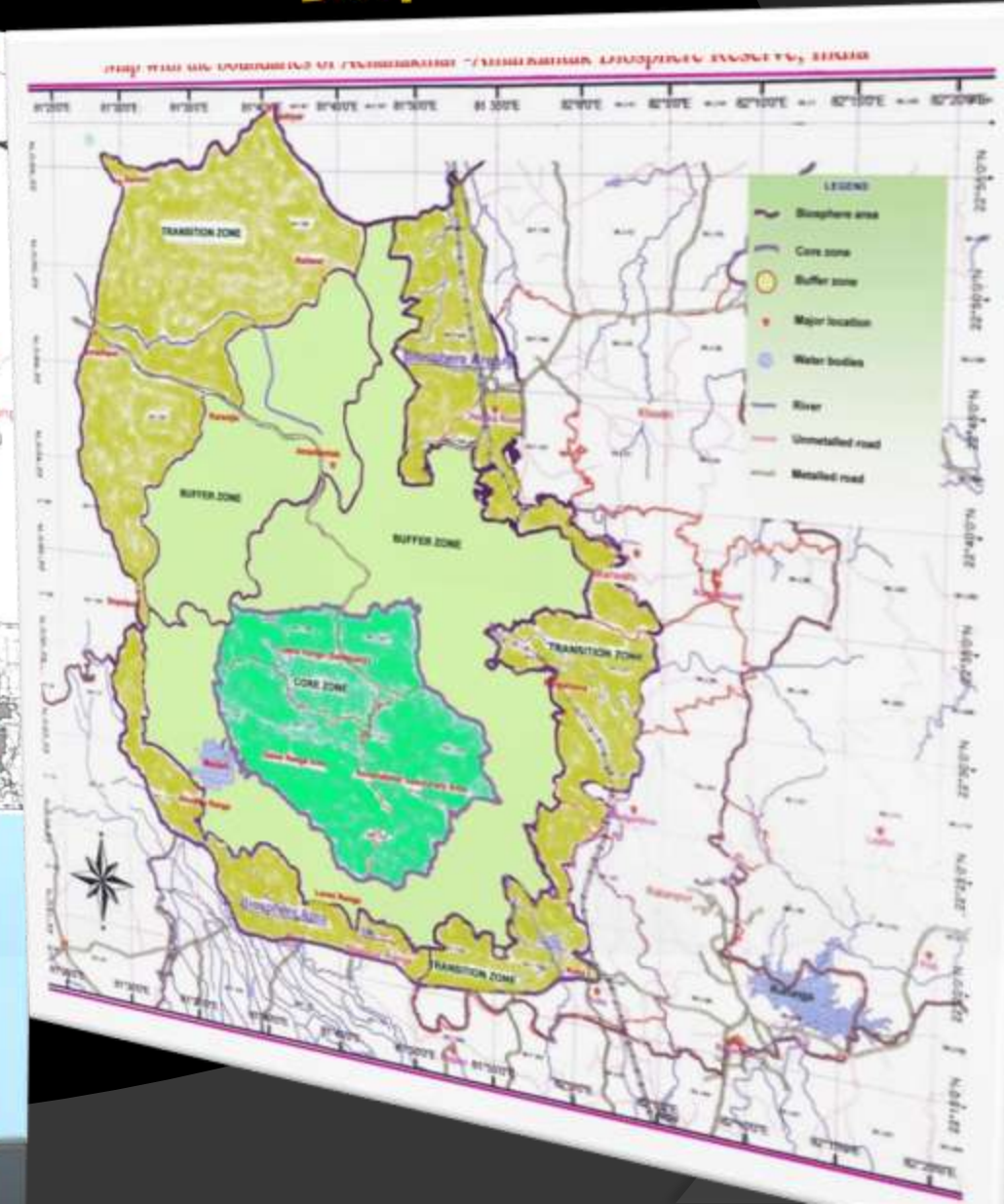
- Achanakmar-Amarkantak Biosphere Reserve is the most dramatic, ecologically diverse, least developed and least disturbed area falls under Deccan Peninsula biogeographic zone of India and spread over in C.G. and M.P. with topography ranging from high mountains, shallow valleys and plains.
- BR is spread from Maikal hill ranges to the junction of Vindhyan and Satpura hill ranges in a triangular shape.
- BR supports three major river systems of central Indian region, viz. Narmada, Sone and Johilla river and their tributaries.
- BR is a paradise of biodiversity with rich floral and faunal attributes.
- Vegetation of BR is dominated by sal and its associates.
- BR harbors diverse, primitive and migrated 27 tribal communities.
- BR is a holy place for Hindu, Jain, Sikh and other communities.
- BR includes notified National Park (ANP) and Tiger Reserve (ATR).


Transition zone
Gorakhpur
Amarkantak
Buffer zone
Core zone
Achanakmar
Kota

Neighbouring countries and protected areas



Boundaries of Achanakmar-Amarkantak Biosphere Reserve



Area

- Spread over - 3835.51 sq km
  (2610.53 sq km in CG and 1224.94 sq km in MP)
- Core zone - 551.55 sq km (Bilaspur Forest Division, CG)
- Buffer Zone - 1955.87 sq km
- Transition zone - 1328.09 sq km
- Buffer and Transition zones - 3283.92 sq km
- (2058.98 sq km in Bilaspur and Marwahi Forest Divisons, CG and 1224.94 sq.km in Anuppur and Dindori Forest Divisions, MP)
- Forest constitutes 63.91% of total geographical area.

Inhabitants

Core zone - 7,617 primitive tribes in 22 villages (6 villages shifted to buffer zone)

Buffer and Transition zones **-** 4,40,404 tribes in 396 villages

- Total - 4,48,021 inhabitants of 27 communities in 418 villages.
- **27 communities of BR** - Baiga, Gond, Dhanwar, Kol, Kanwar, Oraon, Chamar, Sais (Sarthi), Basore, Lonia, Muslim, Sindhi, Brahmin, Rajput, Goswami, Baraith, Kalar, Kumhar, Kewat, Nai, Ahir (Raut), Panka, Sondhiya, Lohar, Maratha, Sonar and Baniya.
- Depends on Agriculture and partially on BR for fuel, fodder, food, medicine, etc.

Inhabitants of Achanakmar-Amarkantak BR

Kapildhara Waterfall

Rakshasakh Waterfall

Sihawal sagar lake

Vegetation Type

1.Northern Tropical Moist Deciduous

Moist sal forest

2.Northern Tropical Dry Deciduous

Dry Peninsular Sal Forest

Moist Mixed deciduous forest

Northern dry Mixed Deciduous forest

FLORA

Achanakmar- Amarkanatk biosphere reserve comprises of 1734 species of identified flora. It has 429 species of thallophytes that includes 7 species of algae, 238 species of fungi and 184 species of lichens, 44 species of bryophytes, 49 species of pteridophytes, 16 species of gymnosperms and 1196 species of angiosperms. They yield spices, food, ayurvedic medicines and timbers.

Around 184 species of plants have been identified for their ethnobotanical and ethnomedicinal uses.

Flora	Year		
	2007	2009	2013
Thallophytes			
Algae	7	7 (0)	7 (0)
Fungi	81	178 (97)	238 (60)
Lichen	37	130 (93)	184 (54)
Bryophyte	16	16 (0)	44 (28)
Pteridophyte	27	40 (13)	49 (9)
Gymnosperm	16	16 (0)	16 (0)
Angiosperm			
Monocot	317	317 (0)	335 (18)
Dicot	794	794 (0)	861 (67)
Total	1295	1498 (203)	1734 (236)

Figure inside parentheses indicate new addition.

Endemic- 3

Lichen *Caloplaca amarkantakana*,

Pteridophyte *Isoetes bilaspurensis*

Angiosperm *Bothrichloa grahamii*

Rare- 282 species

Threatened- 40 species

IUCN categorized species

Critically endangered – 01,

Endangered – 10,

Vulnerable – 19,

Near Threatened - 08

Bothriochloa pertusa

Cyprus rotundus

Dandrocalamus strictus

Eragrostis tenuifolia

Setaria pumila

Thysanolaena maxima

Shorea robusta

Tectona grandis

Pterocarpus marsupium

Dalbergia sissoo

Terminalia tomentosa

Terminalia chebula

Regeneration status of tree species

Data on density of tree species, species richness and their regeneration status in Achanakmar-Amarkantak biosphere reserve

Plot	2006	Year 2011		2012		Status
	Tree /ha	Seedling/ha	Sapling/ha	Seedling/ha	Sapling/ha	
I*	565 (23)	16666 (3)	844 (6)	86300 (6)	9240 (10)	Good
II**	915 (29)	63300 (7)	1380 (5)	216700 (9)	6640 (11)	Good
III**	1025 (29)	26666 (4)	1065 (4)	34000 (6)	5120 (11)	Good
IV**	1263 (26)	33334 (5)	1732 (6)	105000 (5)	9168 (11)	Good
V**	1704 (40)	39999 (6)	1985 (12)	69000 (5)	4280 (18)	Good
VI**	520 (21)	29999 (4)	712 (2)	148700 (5)	3104 (6)	Good
VII*	386 (20)	16665 (5)	1333 (5)	111700 (6)	4988 (7)	Good

*Core zone .**Buffer zone. Figures inside parentheses indicate number of tree species.

Average data on density of tree species, species richness and their regeneration status in core and buffer zones of Achanakmar-Amarkantak biosphere reserve

Zone	2006	Year 2011		2012		Status
	Tree/ha	Seedling/ha	Sapling/ha	Seedling/ha	Sapling/ha	
Core zone	1085 (29)	38660 (5)	1375 (6)	114680 (6)	5662 (11)	Good
Buffer zone	476 (22)	16666 (4)	1089 (6)	99000 (6)	7114 (9)	Good

Figures inside parentheses indicate number of tree species.

Established sample plot in Achanakmar-Amarkantak biosphere reserve

Regeneration of sal seedlings

Regeneration of sal saplings

Status of threatened flora

As per the floral documentation of Achanakmar- Amarkantak biosphere reserve, 28 species are found under various categories of threats.

Threatened flora in Achanakmar-Amarkantak biosphere reserve

Sl. No.	Name of species	Common name	Family	Category
1	Adiantum capillus veneris L.	Hansraj	Adiantaceae	EN
2	Lygodium flexuosum (L.) Sw.	-	Lygodiaceae	EN
3	Andrographis paniculata (Burm.f.) Wall. ex Nees	Kalmegh	Acanthaceae	VU
4	Peucedanum nagpurense Prain	Tejraj	Apiaceae	VU
5	Rauvolfia serpentina (L.) Benth.ex Kurz	Sarpagandha	Apocynaceae	CR
6	Gymnema sylvestre (Retz.) R.Br. ex Schult.	Gurmar	Asclepiadaceae	VU
7	Oroxylum indicum (L.) Vent.	Sheonag	Bignoniaceae	VU
8	Boswellia serrata Roxb.	Salai	Burseraceae	VU
9	Celastrus paniculata Willd.	Malkangni	Celastraceae	VU
10	Terminalia chebula Retz.	Harra	Combretaceae	VU

11	Phyllanthus emblica L. (syn. Emblica officinalis J. Gaertn.)	Aonla	Euphorbiaceae	VU
12	Pterocarpus marsupium Roxb.	Bija	Fabaceae	VU
13	Uraria picta (Jacq.) Desv. ex DC.		Fabaceae	VU
14	Litsea glutinosa (Lour.) CR.Robins	Maida	Lauraceae	VU
15	Piper longum L.	Lendi peper	Piperaceae	VU
16	Plumbago zeylanica DC.	Chitrak	Plumbaginaceae	VU
17	Thalictrum foliolosum DC.	Mameri	Ranunculaceae	VU
18	Sterculia urens Roxb.	Kullu	Sterculiaceae	VU
19	Clerodendrum serratum (L.) Moon.	Bharangi	Verbenaceae	EN
20	Acorus calamus L.	Buch	Araceae	EN
21	Dioscorea bulbifera L.	Ratalu	Dioscoreaceae	VU
22	D. hispida Denn.	Karuakanda	Dioscoreaceae	VU
23	Chlorophytum tuberosum Baker	Safed musali	Liliaceae	VU
24	Drimia indica (Roxb.) I.P. Jessop (syn.Urgenia indica (Roxb.) Kunth)	Jangali Pyaj	Liliaceae	VU
25	Gloriosa superba L.	Kaliyari	Liliaceae	VU
26	Eulophia herbacea Lindl.		Orchidaceae	EN
27	Costus speciosus Sm.	Keokand	Zingiberaceae	VU
28	Curcuma angustifolia Roxb.	Tikhur	Zingiberaceae	VU

CR= Critically endangered. EN=Endangered. VU= Vulnerable

Acorus calamus (EN)

Adiantum capillus veneris (EN)

Celastrus paniculatus(VU)

Costus speciosus (VU)

Lygodium flexuosum (EN)

Rauwolfia serpentina (CR)

FAUNA

In Achanakmar-Amarkantak biosphere reserve, there are 389 identified faunal species consisting of 179 species of invertebrates that include 5 species of centipedes, 66 species of butterflies, 66 species of moths, 41 species of beetles and one species of cricket, and 210 species of vertebrates that include 16 species of pisces, 10 species of amphibians, 15 species of reptiles, 144 species of aves and 27 species of mammals.

Invertebrate	Year		
	2007	2009	2013
Centipede	5	5(0)	5(0)
Butterflies	49	49(0)	66(17)
Moths	35	36(1)	66(30)
Beetles	24	26(2)	41(15)
Cricket	1	1(0)	1(0)
Total	114	117(3)	179(62)

Vertebrate	Year	
	2007	2009-2013
Pisces	16	16(0)
Amphibia	10	10(0)
Reptiles	15	15(0)
Aves	142	142(0)
Mammals	27	27(0)
Total	210	210(0)

Figure inside parentheses indicate new addition.

Threatened Fauna - 55 species.

IUCN categorized species:

Critically endangered – 02

Bush Frog, *Philautus sanctisilvaticus*

Asian white backed Vulture, *Gyps bengalensis*

Endangered – 02

Chital fish, *Notopterus chitala*

Tiger, *Panthera tigris*

Vulnerable – 14

Low Risk – 37

Butterflies collected form Achanakmar-Amarkantak biosphere reserve during rainy, winter and summer seasons, 2010-13

Sl. No.	Name of species	Family	Acc. No.*	Reference
1	Abisara echerius (Stoll)	Ericinidae	419	Singh and Chandra (2006)
2	Acraea violae (Fabricius)**	Nymphalidae	159	New record
3	Amblypodia amantes Hewitson**	Lycaenidae	371	New record
4	Badamia exclamationis Fabricius	Hesperiidae	160	Singh and Chandra (2006)
5	Catopsilia crocale Cramer	Pieridae	38	Singh and Chandra (2006)
6	Catopsilia pomona Fabricius	Pieridae	334	Singh and Chandra (2006)
7	Catopsilia pyranthe (Linnaeus)	Pieridae	346	Singh and Chandra (2006)
8	Danaus chrysippus (Linnaeus)	Danaidae	292	Singh and Chandra (2006)
9	Danaus genutia (Cramer)	Danaidae	295	Singh and Chandra (2006)
10	Danaus limniace (Butler)	Danaidae	355	Singh and Chandra (2006)
11	Delias eucharis (Drury)**	Pieridae	481	New record
12	Ergolis ariadne (Johanssen)**	Nymphalidae	696	New record
13	Euploea core (Cramer)	Danaidae	15	Singh and Chandra (2006)
14	Eurema blanda Boisduval**	Pieridae	40	New record
15	Eurema hacabe Linnaeus**	Pieridae	288	New record
16	Lethe drypetis (Hewitson)**	Satyridae	533	New record
17	Hypolimnas bolina (Linnaeus)	Nymphalidae	386	Singh and Chandra(2006)
18	Hypolimnas misippus (Linnaeus)	Nymphalidae	154	Gupta and Mondal (2005) Singh and Chandra (2006)

19	Jamides celeno Cramer**	Lycaenidae	487	New record
20	Leptosia xiphia Fabricius**	Pieridae	659	New record
21	Melanitis leda (Cramer)	Satyridae	382	Singh and Chandra (2006)
22	Mycaelesis mineus (Linnaeus)	Satyridae	372	Singh and Chandra (2006)
23	Mycaelesis visala Moore**	Satyridae	425	New record
24	Neptis hylas Moore	Nymphalidae	49	Singh and Chandra (2006)
25	Neptis jumbah Moore	Nymphalidae	523	Singh and Chandra (2006)
26	Pantaporia perius Linnaeus**	Nymphalidae	335	New record
27	Pantaporia selenophora Kollar**	Nymphalidae	521	New record
28	Papilio demoleus Linnaeus**	Papilionidae	18	New record
29	Papilio polytes Cramer	Papilionidae	387	Singh and Chandra (2006)
30	Pareronia valeria (Cramer)**	Pieridae	660	New record
31	Phalanta phalantha Drury*	Nymphalidae	45	New record
32	Precis almana (Linnaeus)	Nymphalidae	51	Singh and Chandra (2006)
33	Precis atlites (Linnaeus)	Nymphalidae	50	Singh and Chandra (2006)
34	Precis iphita (Cramer)	Nymphalidae	353	Singh and Chandra (2006)
35	Precis lemonias (Linnaeus)	Nymphalidae	52	Singh and Chandra (2006)
36	Symphaedra nais (Forster)	Nymphalidae	352	Singh and Chandra (2006)
37	Tros aristolochiae Fabricius**	Papilionidae	577	New record
38	Udaspes folus Cramer	Hesperiidae	216	Singh and Chandra (2006)
39	Ypthima avanta Moore**	Satyridae	422	New record

*All insect species maintained under separate Accession numbers and deposited in TFRI Insect Repository, Forest Entomology Division of this Institute. ** New record.

Papilio polytes

Precis lemonias

Euploea core

Danias genutia

Apis dorsata

Neptis hylas

Papilio (Chilasa) clytia

Papilio polytes

Papilio demoleus

Graphium nomius

Anapheis aurota

Catopsilia pyranthe

Catopsilia pomana

Danaus genutia

Danaus chrysippus

Tirumala (Danaus) limniace

Euploea core

Melanitis leda

Mycalesis mineus

Athyma perius

Charaxes solon

Hypolimnas bolina

Hypolimnas misippus

Limenitis (Moduza) procris

Neptis hylas

Neptis jumbah

Neptis (Phaedyma) columella

Junonia atlites

Junonia almanac

Junonia orithya

Junonia hierta

Junonia lemonias

Phalanta phalantha

Moths collected form Achanakmar-Amarkantak biosphere reserve during rainy, winter and summer seasons, 2010-13

Sl. No.	Name of species	Family	Acc. No.*	Reference
1	*Agrotis ipsilon* Hufnagel**	Noctuidae	28	New record
2	*Agrotis segetis* Hübner	Noctuidae	586	New record
3	*Anomis flava* Fabricius**	Noctuidae	230	New record
4	*Antheraea paphia* Linnaeus	Saturniidae	440	Chandra *et al*. (2006)
5	*Ascotis imparata* Walker**	Geometridae	337	New record
6	*Botyodes asialis* Guenee**	Pyralidae	7	New record
7	*Creatonotos gangis* (Linnaeus)**	Arctiidae	60	New record
8	*Creatonotos transiens* Walker**	Arctiidae	61	New record
9	*Cyana peregrine* (Walker)**	Arctiidae	408	New record
10	*Diacrisia obliqua* Walker**	Arctiidae	182	New record
11	*Estigena pardalis* Walker**	Lasiocampidae	403	New record
12	*Euproctis subnotata* Walker**	Lymantriidae	391	New record
13	*Eusemia adulatrix* Kollar**	Agaristidae	388	New record
14	*Eutectona mechaeralis* (Walker)**	Pyralidae	9	New record
15	*Glyphodes bicolor* (Swainson)**	Pyralidae	685	New record
16	*Grammodes mygdon* Cramer**	Noctuidae	566	New record
17	*Hamodes unilinea* Swinhoe**	Noctuidae	428	New record

Sl. No	Name of species	Family	Acc. No.*	Reference
18	*Heliothis armigera* Hubner**	Noctuidae	303	New record
19	*Hyblea puera* Cramer**	Hyblaeidae	1	New record
20	*Hymenia recurvalis* Fabricius**	Pyralidae	657	New record
21	*Hyposidra successaria* Walker**	Geometridae	536	New record
22	*Hyposidra talaca* (Walker)	Geometridae	200	Chandra *et al*. (2006)
23	*Lymantria beatrix* Stoll**	Lymantriidae	571	New record
24	*Metanastria repanda* Walker**	Lasiocampidae	471	New record
25	*Nephele hespera* (Fabricius)**	Sphingidae	484	New record
26	*Pericallia ricini* Fabricius**	Arctiidae	42	New record
27	*Plusia eriosoma* Doubleday**	Noctuidae	420	New record
28	*Plusia orichalcea* (Fabricius)**	Noctuidae	173	New record
29	*Polytela glariosae* Fabricius	Noctuidae	349	Chandra *et al*. (2006)
30	*Psilogramma menephron* (Cramer)	Sphingidae	450	Chandra *et al*. (2006)
31	*Remigia archesia* Cramer**	Noctuidae	379	New record
32	*Semiothisa elconora* Cramer**	Geometridae	491	New record
33	*Spodoptera litura* (Fabricius)**	Noctuidae	35	New record
34	*Trypanophora semihyalina* Kollar**	Zygaenidae	684	New record

*All insect species maintained under separate Accession numbers and deposited in TFRI Insect Repository, Forest Entomology Division of this Institute. ** New record.

Chaerocampa boerhaviae

Creatonotus gangis

Cyana perigrina

Eusemia adlatatrix

Harse convolvuli

Metanastria repanda

Nephele hespera

Pericallia ricini

Polytela gloriosa

Study on newly recorded defoliator, *Botyodes asialis*

Host plant and developmental stages of *Botyodes asialis*

Movement of inhabitants from inhospitable areas

Distribution of population in the core, buffer and transition zones of Achanakmar-Amarkantak biosphere reserve

Zone	State	District	Number of villages	Population
Core zone	Chhattisgarh	Bilaspur	22*	7617*
Buffer zone	Chhattisgarh	Bilaspur Marwahi	55	79913
	Madhya Pradesh	Anuppur	25	22677
		Dindori	13	12121
Total buffer zone			93	114711
Transition zone	Chhattisgarh	Bilaspur Marwahi	170	210108
	Madhya Pradesh	Anuppur	49	32984
		Dindori	84	70708
Total transition zone			303	313800
Grand total of biosphere reserve			418	436128

*Six villages with a total population of 1177 shifted from core zone to buffer zone.

LIVELIHOOD OPTIONS

Tropical Tasar Sericulture and Tribal

Larva of tropical tasar silkworm

Tropical Tasar Silkworm, *Antherea mylitta*

Collection and harvesting of tropical tasar cocoons

Bamboo cottage industry

Lac

Mahul patta

Road side sail of forest products

Sanjeevani

Ecotourism

BIO-INDICATOR OF ENVIRONMENT

BIO-INDICATOR OF ENVIRONMENT

Antheraea paphia

- Though a significant progress has been made towards the understanding of biodiversity of Achanakmar-Amarkantak biosphere reserve, a lot of information still needs to be explored about floral and faunal compositions including forest invasive species, livelihood options, socioeconomic status of forest dwellers, without disturbing the overall activities of natural biome that serve as natural biological laboratory for the benefit of local peoples, scientists, government, decision makers and the world community.

Suggestions for follow-up study

- The gathered information from various sources still appears incomplete, due to lack of identity of many species of algae, and beetles belonging to the different families.
- The information about other group of arthropods like, millipedes and insects like bees, wasps, dragon and mayflies, grasshoppers, crickets, mantids, termites, flies and others like crustaceans, spiders and mites, etc. is still unexplored. No work has been reported so far on ento fauna of biosphere reserve and their host plants relation.
- Similarly, molluscs existing in biosphere reserve are also untouched and provide ample scope for their taxonomical and ecological studies.
- There is a dearth of literature about the occurrence of forest invasive spescies (FIS) that includes both flora and fauna and their impact in biosphere reserve. There is a wide scope to undertake research to prepare inventory and management of major FIS.
- There is an urgent need for the protection of threatened flora and fauna, especially those that belongs to critically endangered and vulnerable category.

Recommendations for Management Action Plan

- Based on the findings of the project of Lead Institution for Achanakmar-Amarkantak biosphere reserve, Phase-I and Phase-II and observations recorded during the tenure of project periods (2006-2009 and 2010-2013), the following suggestions are being made for their possible use in implementation of Management Action Plan (MAP) :
- Conservation of endemic species such as *Bothrichloa grahmii*, threatened economically important plants *Rauvolfia serpentina*, *Adiantum capillus*, *Lygodium flexuosum*, *Clerodendrum serratum*, *Acorus calamus* and *Eulophia herbacea* and their habitats : This can be achieved after short listing localities from collections of herbarium.
- Reclamation of degraded habitats : Native plant species, such as *Terminalia bellirica*, *Terminalia tomentosa*, *Terminalia chebula*, *Ficus bengalensis*, *Syzygium cumini* and *Emblica officinalis* should be specifically raised in nurseries by collecting seeds from BR itself. This can be done in gaps and thinly covered areas like Kota, Lormi and Pendra ranges.

- Bamboo plantation : The tribal communities in 6-8 villages in core zone of biosphere reserve, the ‘basod’ the artisans of bamboo, draw their livelihood from bamboo. Their occupation is largely dependent on bamboo, thus forming bamboo an integral part of their lives. Therefore, plantation of indigenous bamboo, Dendrocalamus strictus in buffer zone of BR like Kota and other places may be taken up.
- Providing training of bamboo artifacts : While bamboo artisans have been making traditional items, training from other artists to prepare market driven decoration and urban utility items will give more value for their products and assistance for marketing.
- Mahul patta collection : Sustainable collection of Mahul patta can be promoted in Gourela range in buffer zone of BR. Installation of plate making machine can be done for preparing value added product for better price.
- Tikhur plantation : Tikhur atta (starch flour of *Curcuma angustifolia*) is a medicinal product especially processed by Baiga population along Maniari river. There is need to train them to collect sustainably and by non-destructive methods and replenishment in that area.

- Tasar culture as an approach for enhancement of livelihood : Rearing of tasar silkworm on host plants like Terminalia sp. has a vast potential in buffer zone of BR like Lormi (Chatterjee *et al*., 2007 published in Research Needs for Achanakmar-Amarkantak Biosphere Reserve).
- Lac culture as another livelihood option : BR buffer zone has multiple species of *Flemengia* which can be tested for potential as Lac insect host.
- Training : There is need to train villagers in buffer zone in Gourela and Lormi range in collection of medicinal plants and increase number of units preparing ayurvedic preparations like Ataria. Proper collection time, grading, drying and processing will fetch more value for their produce even as raw material to larger local companies like in Bilaspur and Raipur.
- Interpretation centre : Establishment of interpretation center in entry points of core zone with visual as well as specimen and documentary models, photographs, posters and audio-visual aids will attract and create awareness about BR, its importance and role in conservation (web site Sunderban BR). In addition, road side boards indicating clearly core, buffer and transition zones of BR are necessary for demarcation and better protection of BR.

Achanakmar-Amarkantak biosphere reserve

Web site: http://tfri.icfre.gov.in /AABR/index.html


THANK YOU

Map with the boundaries of Achanakmar -Amarkantak Biosphere Reserve, India