ACHANAKMAR-AMARKANTAK BIOSPHERE RESERVE

COMPENDIUM

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PREFACE

Preparation of a "Compendium" on Achanakmar-Amarkantak Biosphere Reserve is one of the objectives of the project to be fulfilled by Tropical Forest Research Institute, Jabalpur. Meetings were held with the Conservator of Forests, Bilaspur Circle, Bilaspur, Conservator of Forests, Working Plan Circle and Director of Achanakmar - Amarkantak Biosphere Reserve, Deputy Conservator of Forests, Bilaspur Forest Division, Superintendent of Achanakmar - Amarkantak Biosphere Reserve, Range Managers of Kota, Achanakmar and Lamni ranges of Achanakmar - Amarkantak Biosphere Reserve, to collect information about the geographical area, topography, zonation, climate, watershed catchment areas, inhabitants, their population status, number of villages, Government efforts to uplift their economic status, legal status, etc. The information about micro- and macro flora and fauna, were collected from the literature published in the form of project reports, research articles, short notes, etc. in scientific journals/ reports. In all, 3 project reports, different issues published in 10 reputed scientific research journals, 3 research bulletins, 2 proceedings of National Seminars in which information on Achanakmar-Amarkantak areas published, were consulted besides the working plan of Bilaspur Forest Division.

Achanakmar- Amarkantak Biosphere Reserve (AABR) has 238 forest and revenue villages in Chhattisgarh state. Most of them are situated in buffer and transition zones and a few in core zone. The villagers depend on AABR for fuel, fodder, food and non wood forest produce (NWFPs) besides cultivating small quantity of paddy, maize, and oil seeds. The socio-economic survey of few families conducted during June-August 2006 by DR. K.C. Joshi, Scientist F and Head, Forest Entomology Division and his team of researchers. However, the information incorporated in this compendium is based on literature published in various scientific journals.

To encourage the scientists from reputed institutes and universities of national and international repute for studying various aspects of floral and faunal composition, development of various techniques for sustainable management, the AABR authorities have initiated several steps like establishment of a research station within the periphery of AABR, initiation of meteriological records, establishment of sample plots, etc.

The draft of the present compendium is prepared by Dr. K.C. Joshi of this institute and checked by Dr. P.K. Shukla, IFS, Director, State Forest Research Institute, Jabalpur. I am greatly thankful to Dr. Shukla, IFS, for providing some of the information about the AABR and critically going through the draft of the manuscript. Thanks are due to Shri Shailendra Kumar Singh, IFS, Conservator and Director, Achanakmar-Amarkantak Biosphere Reserve, Bilaspur for helping in collection of data on various aspects.

Hope, this compendium will act as a basis for further scientific investigations on various aspects of AABR.

Director
Tropical Forest Research Institute
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INTRODUCTION

Biosphere Reserve is an international designation made for respective parts of natural and cultural landscapes extending over large areas of an ecosystem. The idea of Biosphere Reserve (BR) was coined by the United Nations Educational, Scientific and Cultural Organization (UNESCO) under its Man and Biosphere (MAB) programme aimed to develop a basis for the rational use and conservation of the resources of the biosphere. United Nations Environment Programme (UNEP) and UNESCO published an action plan for biosphere reserves in 1984 and invited governments and international organizations to undertake activities to improve and expand the international biosphere reserve network to develop basic knowledge for conserving ecosystem and biological diversity, and to make BRs more effective in linking conservation and development for fulfilling the broad objectives of MAB programme.

The key ingredients of MAB were involvement of local people in research projects with other researchers in social, biological and physical science besides the conservation of natural areas and the genetic biodiversity. Thus, Biosphere Reserves (BRs) are the reserves of the genetic resources, especially wild crop relatives, forest species ancestors and close relatives of domestic stock. Further, BRs are protected areas of land and/ or coastal environments wherein all the organisms including people are interdependent and integral part of the system. The BRs are used to:

i. Collect background data of biological and physical variables.

ii. Conduct research in basic ecological processes, which might be utilized for the better management of BR.

iii. Monitor the result and effectiveness of management.

iv. Gather traditional knowledge about use of species and land.

v. Make knowledge gained readily available.

The International Union for Conservation of Nature and Natural Resources considered BR to be a useful concept in planning due to its link with

sustainable development. The Biosphere Reserves should have the following characteristics:

1. They are protected areas representative of terrestrial and coastal environment, and internationally recognized for their value in conservation to support and in providing the scientific knowledge, skills, and human values to support sustainable development.
2. They are large enough to be an effective conservation unit and have value for measurements of long-term changes in the biosphere.
3. They serve as important field centres for the education and training and provide opportunities for ecological research, education and training of scientists, resource managers, protected area administrators, visitors, and local people.
4. Their status provides a framework for improving co-operation at the local / regional and international levels. These are open systems with areas of undisturbed natural landscapes called core zone, surrounded by areas of sympathetic and compatible use called buffer and transition zones.
5. Being secured, they have areas of sufficiently large size, with inclusion of areas free from significant human impact, providing typically ideal sites for monitoring changes in physical and biological components of biosphere. Thus, they act as attractive sites for gathering scientific information.
6. People are considered as part of a biosphere reserve.
7. They encourage interdisciplinary research programmes involving natural and social sciences to develop models for sustainable conservation of a large natural region.
8. They are representative examples of natural and minimally disturbed landscapes with endemism and genetic richness and examples of harmony resulting from traditional patterns of land use or areas of suitable experimental manipulation to develop, assess and demonstrate the methods of sustainable development.

9. BRs are united to form a world wide network that facilitates information sharing relevant to conservation, management and a framework for comparative studies of similar problems in different parts of the world for testing, standardizing and transferring new methodologies and for coordinating the development of information management systems.
10. All BRs provide a framework for communications within and among bio-geographic regions. They share the technology, information and development of coordinated monitoring and research projects to provide better information on problems of common interest.

Looking on these aspects, Government of India identified areas rich in biodiversity by declaring them as "Biosphere Reserves". Presently, there are 14 biosphere reserves. The area of each BR and their dates of establishment are as given below in Table – 1.

Table 1: List of Biosphere Reserves of India

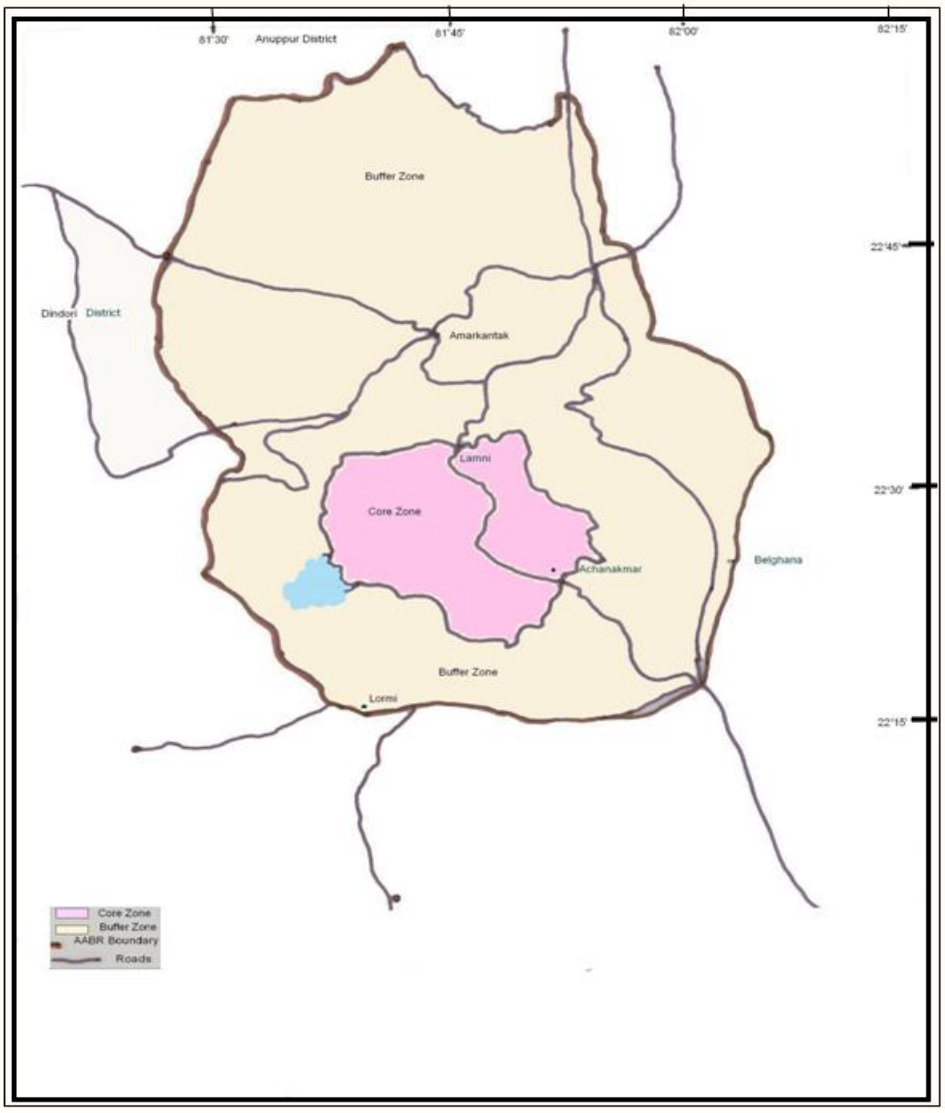
S. No.	Name of Biosphere Reserves	Geographical Area in sq. km.	Date of establishment
1.	Nilgiri	5,520.00	01-09-1986
2.	Nanda Devi	5,860.69	18-01-1988
3.	Nokrek	80.00	01.01.1988
4.	Great Nicobar Island	885.00	06.01.1989
5.	Gulf of Mannar	10,500.00	18.02.1989
6.	Manas	2,837.00	14.03.1989
7.	Sunderban	9,630.00	29.03.1989
8.	Simlipal	4,374.00	22.06.1994
9.	Dibru-Saikhowa	765.00	28.07.1997
10.	Dehang-Debang	5,111.50	02.09.1998
11.	Pachmarhi	4926.00	03.09.1999
12.	Khangchendzonga	2,619.92	07.02.2000
13.	Agasthyamali	1,701.00	12.11.2001
14.	Achanakmar-Amarkantak	3,835.51	30.03.2005

ACHANAKMAR- AMARKANTAK BIOSPHERE RESERVE:

Achanakmar-Amarkantak Biosphere Reserve is named after Achanakmar forest village and Amarkantak, a holy place from where the Narmada and Sone rivers emerge. Achanakmar-Amarkantak Biosphere Reserve was declared as Biosphere Reserve (BR) by Government of India vide notification no. 9/16/99 CS/BR dated 30th March 2005. It lies between lat. 22^0 15' to 20^0 58' N & long. 81^0 25'N to 82^0 5'E and is spread from Maikal hill ranges to the junction of Vindhyan and Satpura hill ranges in a triangular shape. Bilaspur and Marwahi forest divisions of the Chhattisgarh state, Dindori and Anuppur forest divisions of Madhya Pradesh state (Map 1) surround the core zone of BR. The total geographical area of BR is 3835.51 sq. km. The core area of the BR is 551.55 sq. km., which was previously known as Achanakmar sanctuary, falls in Chhattisgarh state. It is surrounded by buffer and transition zone area of 3283.96 sq. km., out of which 2058.98 sq. km. falls in Bilaspur and Marwahi forest divisions of Chhattisgarh and 1,224.98 sq. km in Dindori and Anuppur forest divisions of Madhya Pradesh.

The topography is varied from rice fields in Bilaspur and Anuppur, and wheat fields in Dindori to the hills of Maikal ranges of Satpura. The topography, in combination with perennial streams and valleys has created micro-climatic conditions in the area to provide diverse environmental conditions, encouraging luxuriant growth for several species of thallophytes, bryophytes, pteriodophytes (ferns), gymnosperms, angiosperms and many species of wild fauna of economic importance.

The geology of the area is unique, varied from schists and gneisses with granite intrusion rocks, sand stones, shales, limestone, basaltic lava and bauxite. The soils of the AABR vary in composition and texture from sandy to loamy-clays, generally light brown to brownish yellow in colour. An olive green clay zone upto 5 mm sometimes exists at some places where marshy conditions develop due to poor seepage in these areas. Red soils (due to presence of iron oxide) also occur in some places. Deposits of alluvial soils are also seen on the



Map 1 – Achanakmar-Amarkantak Biosphere Reserve and its boundaries

banks of numerous streams in the tract. The black cotton soil exists in many areas of AABR. The BR is divided into following ranges:

A. Core zone: (Map 1, Photo. 1)

1. Lamni Range: A part of Lamni range i.e. 203.769 sq. km. is situated in the core zone. It is rich in floristic composition. There are about 38 species of flora of multipurpose use. The density of trees varies from 750 trees / ha to nearly 1527 trees / ha. The regeneration is very high.

2. Achanakmar Range: An area of 169.133 sq. km. is under this range. There are nearly 52 species known. The compartmentwise density of trees varies from 1334 trees / ha to 1764 trees / ha. It may have only 180 trees / ha in plateau. The ground vegetation consists of shrubs and tree seedlings. It has up to 511987 shrubs and tree seedlings per ha in plateau. Some of them have medicinal values also.

3. Game Range: It consists of 178.65 sq. km. area and lies on the western side of Achanakmar range. It is also very rich in floristic composition. There are nearly 1266 trees / ha.The main species are *Shorea robusta, Cleistanthus collinus, Diospyros melanoxylon, Terminalia tomentosa*, etc.

B. Buffer and transition zones: (Map 1, Photo 2)

1. Lormi Range: It has an area of 242.134 sq. km. There are 44 species in this range. *Cleistanthus collinus* and *Shorea robusta* are the dominant species. The density of the trees is about 1912 trees / ha.

2. Kota Range: There are about 51 species of plants in forest areas of the plains of this range besides teak plantations in some plots. The density of trees is 934 trees / ha in plateau to 1912 trees / ha in plain. The regeneration is better in plains having the highest number of herbs, shrubs, and trees of multipurpose uses.

3. Khudia Range: The number of species varies from 40 to 47 in this range. The density of trees varies from 282 to 853 trees / ha.

Photo 1 - View of Core Zone of Achanakmar
Amarkantak Biosphere Reserve

Photo 2 – View of Buffer Zone of Achanakmar
Amarkantak Biosphere Reserve

4. Belgehana Range: There are a maximum of 41 species in this range. The density of trees varies from 782 trees / ha in plateau to 1051 trees / ha in plains. The density of seedlings / saplings is high in plains. The ground vegetation is also rich.

5. Khodri Range: Most of the area in this range is occupied by plateau. There is a maximum of 26 species of the flora. The density of the trees varies from 602 trees / ha in plains to 1201 trees / ha in plateau.

6. Marwahi Range: The range has a maximum of 22 species. The density of the trees is nearly the same as that in Khodri and Gorela ranges.

7. Gorela Range: The range has a maximum of 22 species. The density of trees varies from 588 trees / ha in plateau to 1159 trees / ha in plains. The ground vegetation is very rich.

8. Lamni Range (General): It has an area of 111.298 sq. km. The area is very much similar to Lamni core zone in floristic composition. The density of the trees was recorded as nearly 750 trees / ha. The regeneration is profuse.

OBJECTIVES OF ACHANAKMAR- AMARKANTAK BIOSPHERE RESERVE:

1. To conserve biodiversity of flora and fauna within natural ecosystem.
2. To safeguard genetic diversity of the species.
3. To ensure sustainable use of the natural resources.
4. To provide logistic support to the people, including scientists and academicians, to undertake research activities and share knowledge generated on conservation and exchange of information at national and global levels.
5. To educate and provide training to local inhabitants for their sustainable socioeconomic upliftment.

NATURAL RESOURCES:

Naturally available abiotic and biotic or biological things, which can be used for the betterment and keeping the balance between environment and

man are considered as “Resources”. The abiotic resources may be climate, soil, water, etc.

A. Climate:

Achanakmar-Amarkantak BR has typical monsoon climate with three distinctly defined seasons and a short post rainy season. The summer season begins from April and lasts upto the middle of June. The rains commence from middle of June and continue till the end of the September. Post rainy season remains during the month of October. The winter or cold season begins from November and lasts upto March. The mean daily maximum temperature ranges from 24^0 to 39^0 C and mean daily minimum temperature ranges from 10^0 to 25^0 C depending upon season. A few showers of rain generally occur in every season throughout the year. The average rainfall is 1322 mm to 1624.3 mm. The relative humidity is fairly high due to thick vegetation of sal forest at higher elevations and frequent showers of rain are between June-October. The rainfall decreases to the lowest of 12.98 mm in the month of December. Frost between December-January is often observed to damage *Anogeissus latifolia, Diospyros melanoxylon, Kydia calycina, Lagerstroemia parviflora, Litsea glutinosa, Ougenia oojeinensis, Terminalia tomentosa* etc. in Achanakmar and Lamni forest ranges in core zone and *Buchnania lanzan, Emblica officinalis, Shorea robusta* etc. at Khandoli in buffer zone (Prasad and Pandey, 1987b).

B. Soil:

The uppermost layer of the earth’s crust, which is loose, fragmented and useful for plants, is called soil. Soil of AABR varies in composition and texture. It is alluvial, sandy to loamy-clay; generally light brown to brownish yellow in colour near the banks of streams and rivers. Red soils are formed in areas of igneous, metamorphic rocks and often found on the plateau. Its red colour is due to the presence of iron. It is highly porous and fertile. The black cotton soil is also observed at some localities of the BR.

C. Water:

As we know, water is essential for the existence of the life. Harvesting local rain-water and reusing it for life- saving irrigation is not a new concept in

India. AABR is blessed with many seasonal monsoon dependent and permanent streams, rivers, rivulets and two dams.

D. Watershed management:

A watershed is all the land and water area which contributes runoff to a common point. Watershed management implies the wise use of soil and water resources within a given geographical area so as to enable sustainable production and to minimize floods. Numerous streams and *nallahs*, many of which are perennial, flow in AABR besides three major rivers *viz.* the Narmada, the Johilla and the Sone. Not much effort has been made to increase infiltration into soil, control excess runoff and to manage and utilize runoff for useful purposes. Except the old Khudia dam situated in the south-western boundary on Maniary river in the core zone and Malhaniya dam built on Malhaniya river in the buffer zone are the main constituents of the water bodies. These dams are very useful for men and wild animals living in AABR particularly during summers when the seasonal *nallah*s and streams dry up. The water bodies comprise of 33.61 sq. km. areas (Bargaiya and Singh, 2006). The average annual rainfall is about 1624.3 mm distributed on an average over 71 to 118 rainy days in a year, providing ample scope for the watershed management.

The biotic or biological resources may be flora and fauna. Achanakmar-Amarkantak BR is very rich in biological resources due to its appropriate vegetation and faunal spectrum. It comprises of:

1. Flora:

The forest vegetation in the BR is “Tropical Deciduous type” and is classified into “Northern Tropical Moist Deciduous” and “Southern Dry Mixed Deciduous” forests (Champion and Seth, 1968). Northern Tropical Moist Deciduous type, which occurs mainly in the core area and a few ranges of buffer zone, predominates over the southern dry mixed deciduous forests around the

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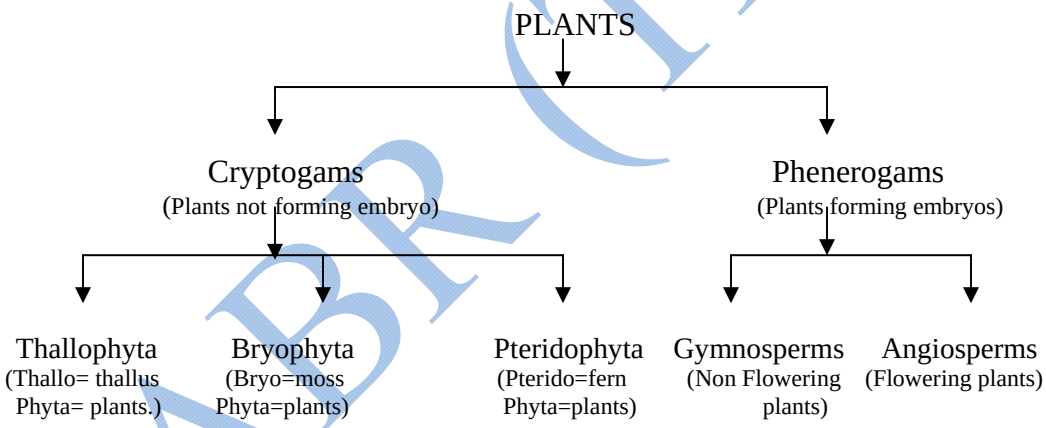
Bargaiya, S.D. and Singh, K. S. 2006. Achanakmar - Amarkantak Biosphere Reserve Project Report, Guidelines for Protection, Research and Development of Biosphre Reserve and special features of Achanakmar - Amarkantak Biosphere Reserve, 161 pp.

periphery of the BR. Sal is the dominant species occurring in hilly tracts and low level areas of Lamni, Game, Marwahi and Achanakmar ranges as well as in the valley in Khudia range. Sal and its associates like *saja*, *bija*, *dhaora*, *kasai*, *lendia*, etc. and many species of shrubs, climbers and herbs exist in this type. 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, gorri, kari, khamer, salai, tendu, tilwan,* and a few other thorny species in the middle storey, *banrahar, chhind, dhawai, harsingar, kurdai,* and *kalabansa* in the undergrowth; *chhira, kusum, bhurbhusi,* and *mushel* as grasses and *mahul,* etc. as common climbers and many species of cryptogams. More than thousand species spread over 151 families have been reported from the BR. The vegetation spectrum of BR can be classified as per the key given below:



Achanakmar-Amarkantak Biosphere Reserve has a large number of species of the group thallophyta, which is characterized, by plant species that cannot be differentiated into root, stem, and leaves. They may be algae, fungi and lichens. The thallophyta identified from BR are:

Champion, H.G. and Seth, S.K. 1968. Forest types of India, Government of India Publication, Delhi, 511 pp.

Table 2. Thallophytes reported from Achanakmar- Amarkantak BR:

S. No.	Plant species	Status
(I) Division: Algae		
1.	*Batrachospermum* sp.	Common
2.	*Coleochaete* sp.	Common
3.	*Chara* sp.	Common
4.	*Ulothrix* sp.	Common
5.	*Volvox* sp.	Common
6.	*Voucheria* sp.	Common
7.	*Zygnema* sp.	Common
(II) Division: Fungi		
1.	*Absidia butleri*	Common Soil fungus
2.	*Acremonium alabamensa*	Common Soil fungus
3.	*Agaricus* sp.	Common
4.	*Amellophyrogomia coonoorensis*	Present on *Saccharum munja*
5.	*Aspergillus candidus*	Common Soil fungus
6.	*Aspergillus fumigatus*	Common Soil fungus
7.	*Aspergillus niger*	Common Soil fungus
8.	*Aspergillus versicolor*	Common Soil fungus
9.	*Astreaus hygrometricus*	Common
10.	*Bartilinia robillardioides*	Common Soil fungus
11.	*Blakeslea* sp.	Common Soil fungus
12.	*Cephalosporium curtipes*	Common Soil fungus
13.	*Cercospora baliospermi*	Only found on leaves of *Baliospermum montanum*
14.	*Cercospora pini-densiflorae*	Parasitic on *Pinus roxburghii*
15.	*Cercospora timoriensia*	Common
16.	*Cercosporidium helicteri*	Parasitic on *Helicteres isora*
17.	*Clitocybe cerussata*	Common
18.	*Coprinus* sp.	Common
19.	*Cryptosphaeria sessilis*	Dead wood of *Shorea robusta*
20.	*Cyathus limbatus*	Common
21.	*Cytospora* sp.	Parasitic on *Grevillea pteridifolia*
22.	*Eriocercopora moghaniae*	Leaf spot disease on *Dioscorea bulbifera*
23.	*Fomes tricolor*	Common
24.	*Fusarium oxyspoum*	Common
25.	*Geastrum sp.*	Common
26.	*Inonotus* (*Polystictus*) *tabacinus*	Common
27.	*Lepiota procera*	Common

28.	*Leucophellinus hobsoni* (Syn.*Trametes straminea*)	Common
29.	*Lycoperdon pusillum*	Common
30.	*Macrolepiota dolichaula*	Common
31.	*Macrophomina phaseolina*	Parasitic on *Grevillea pteridifolia*
32.	*Microporus xanthopus*	Common
33.	*Mycenastrum corium*	Common
34.	*Mycoleptodiscus indicus*	Common
35.	*Nitschkia conanii*	Common
36.	*Peniophora* sp.	Common
37.	*Pestalotiopsis* sp.	Parasitic on *Grevillea pteridifolia*
38.	*Phallus inpudicus*	Common
39.	*Phellinus caryophylli* (Syn.*Fomes caryophylli*)	Common
40.	*Phellinus pachyphloeus* (Syn.*Fomes pachyphloeus*)	Common
41.	*Phoma glomerata*	Parasitic on *Grevillea pteridifolia*
42.	*Phoma sorghina*	Parasitic on *Grevillea pteridifolia*
43.	*Pleurotus flabellatus*	Common
44.	*Podabrella microcarpa*	Common
45.	*Polyporus arcularius*	Common
46.	*Polyporus ostreiformis*	Common
47.	*Polyporus secernibilis*	Common
48.	*Polystictus* sp.	Common
49.	*Polystictus steinheilianus*	Common
50.	*Poria* sp.	Common
51.	*Russula* sp.	Common
52.	*Sarcinella indica*	Common
53.	*Scleroderma bovista* (Syn. *S. texens*)	Common edible mushroom
54.	*Scleroderma radicans*	Common
55.	*Sclerotium rolfsii*	Common
56.	*Stereum* sp.	Common
57.	*Termetomyces* sp.	Common edible mushroom
58.	*Thelephora* sp.	Common
59.	*Trametes leoninus* (Syn.*Polystictus leoninus*)	Common
60.	*Trametes cubensis*	Common
61.	*Trametes inerta*	Common
62.	*Trametes meyenii*	Common
63.	*Trametes versatilis*	Common
64.	*Trichaptum bioforme* (Syn. *Polystictus longatus*)	Common
65.	*Tripospermum acaciae*	Common
66.	*Tripospermum juglandis*	Common

67.	*Xerocomus* sp.	Common
68.	*Xylaria polymorpha*	Common
69.	*Zygosporium minus*	Common
(III) Division Lichens		
1.	*Lecidea platycarpa*	Common
2.	*Pramelia flavicens*	Common
3.	*Usnea* sp.	Common

In addition to this, there are 64 various species and 6 other strains of soil fungi identified from Achanakmar and Lamni sal forests by Chakraborty *et al.* (1991). These fungi are responsible to improve the physicochemical properties of soil resulting in overall improvement in soil fertility. These are the phycomycetes like *Absidia corymbifera, A. ramosa, A. spinosa, Circinella muscae, Cunnighamella echinulata, Mucor pusillus, Mycelium sterilia, Pythium aphanidermatum, Pythium* sp., *Rhizopus nigricans, R. stolonifer* and ascomycetes like *Aspergillus candidus* Strain I, *A. fischeri, A. flavipes, A. flavus, A. flavus* Strain I, *A. fumigatus* Strain I, *A. nidulans, A. nidulans* Strain I,, *A. niger* Strain I, *A. oryzae, A. ochreaeous, A. terreus, Chaetomium globosum, C. gracil, Paecilomyces fusispora, P. variati, Penicillium citrinum, P. javanicum, Phoma medicaginis, Phoma* sp., *Neocosmospora* sp., *Scopulariopsis* sp., *Thelavia terricola* and the deuteromycetes *viz. Acremonium* sp., *Acrophyllophora* sp., *Alternaria humicola, A. tenuis, Alternaria* sp., *Botryotis* sp., *Cephalopnora tropica, Chrysosporium keratinophilum, C. tropicum, Cladosporium acaciae, C. herbarum, C. wernecki, Curvularia tunata, C. tunata* Strain I, *Fusarium chlamydosporium, F. compactum, F. flacciferum, Fusarium* sp., *Geotrichum candida, Humicola grisea, H. indica, Leptosphaerulina trifoli, Metarhizium anisopliae, Sepadonium maheswarianum, Septofusidium* sp., *Sporotrichum* sp., *Sytalidium* sp. *Trichoderma viride, Verticillium* sp., *Volutella lini and Mycelia sterilia.* Jamalluddin and Chandra (1997) have also identified some new species like *Acaulospora scrobieulata, A. delicata, A.longula, Glomus aggregatum, G. intraradics, Gigaspora marginata* and *Scatellospora* as VAM fungi from bauxite mine overburden of AABR.

Photo 3a - *Riccia* sp.

Photo 3b - Moss, *Anthoceros* sp

Among lichens, three species are reported by State Forest Research Institute, Jabalpur from the BR (Tiwari *et al.*, 1995).

The above information indicates that there is a lot of scope to identify many unknown species of algae and lichens as compared to many known species of fungi.

The bryophytes (Photo 3a, b) consist of green multicelluar species like liverworts (e.g. *Riccia* and *Marchantia*) and mosses (e.g. *Anthoceros* spp.). Achanakmar-Amarkantak Biosphere Reserve has the following 15 identified species of the bryophytes:

Table 3. Bryophytes known from the BR.

S. No.	**Plant species known**	**Status**
(1.) Class: Hepaticopsida		
Family: Porellaceae		
1.	*Porella* sp.	Common
Family: Ricciaceae		
2.	*Riccia billardieri*	Common
3.	*Riccia gangetica*	Common
4.	*Riccia* sp.	Common
Family: Marchanticeae		
5.	*Marchantia nepalensis*	Common
6.	*Marchantia* sp.	Common
Family: Targioniaceae		
7.	*Cyathodium* sp.	Common
8.	*Targionia* sp.	Common
Family: Fossombroniaceae		
9.	*Fossombronia himalayensis*	Common
Family: Riccardiaceae		
10.	*Riccardia* sp.	Common
Family: Anthocerotaceae		

11.	*Anthoceros erectus*	Common
12.	*Anthoceros* sp.	Common
13.	*Notothylus* sp.	Common
(2.) Class: Bryopsida		
Family:Funariaceae		
14.	*Funaria hygrometrica*	Common
Family: Polytrichaceae		
15.	*Polytrichum* sp.	Common

The above species are taxonomically identified upto genus level and need to be described and studied upto species level. Further, there may be few more species to be discovered from this region and hence, there is still lot of scope left for the detailed study on the bryophytes.

The group pteridophyta belongs to the plant species that can be divided into root, stem and leaves e.g. ferns. They do not bear flowers, fruits and seeds. Over 24 species of pteridophyte have been reported from the AABR area (Tiwari *et al*., 1995). Most of them are terrestial and grow deep inside the ravines in the sal forest. The species identified from BR are as below:

Table 4. Species of ferns reported from Achanakmar- Amarkantak BR.

S.No.	**Name of the species**	**Status**
Family:Aspidiaceae		
1.	*Pronephrium nudatum*	Common
2.	*Athyrium falcatum*	Common
3.	*Cyclosorus parasiticus*	Common
4.	*Dryopteris cochleata*	Common
5.	*Dryopteris sparsa*	Common
6.	*Polystichum auriculatum*	Common
Family: Aspleniaceae		
7.	*Asplenium cheilosorum*	Common
Family: Blechnaceae		
8.	*Blechnum orientale*	Common
Family: Equisetaceae		

9.	Horse tail, *Equisetum debile*	Common
Family: Schizaeaceae		
10.	*Lygodium flexuosum*	Common
Family:Marsileaceae		
11.	Aquatic fern, *Marsilea minuta*	Common
Family: Ophioglossaceae		
12.	*Ophioglossum reticulatum*	Rare
Family: Osmundaceae		
13.	*Osmunda sp.*	Common
Family: Polypodiaceae		
14.	*Microsorium membranaceum*	Rare
15.	*Paraleptochilus decurrens*	Common
Family: Pteriadaceae		
16.	*Adiantum capillus veneris*	Common
17.	*Adiantum philippense*	Common
18.	*Cheilanthes farinosa*	Common
19.	*Pteris quadriaurita*	Common
Family: Parkeriaceae		
20.	*Ceratopteris thalictroides*	Common
Family: Selaginellaceae		
21.	*Selaginella ciliaris*	Common
22.	*Selaginella indica*	Common
Family:Thelypteridaceae		
23.	*Cyclosorus parasitica*	Common
24.	*Tectaria polymorpha*	Common

Excepting the existence of the above species of ferns, no detailed study has been initiated on the ferns and hence, there is an ample scope for the further knowledge on these species.

Some species belonging to gymnosperms (cone bearers), characterized by naked seeds, have been introduced and are growing well in the Biosphere Reserve. Suitability of growth of *Pinus caribaea*, *P. patula*, *P. oocarpa*, and *P. kesiya* (Chaturvedi, 1982) and *P. roxburghii* (Prasad and Danayak, 1992) in

Amarkantak has been reported. In all, 15 species of gymnosperms identified by State Forest Research Institute, Jabalpur are listed here as under (Tiwari *et al.*, 1995):

Table 5. Species of gymnosperms available in BR.

Family: Pinaceae		
1.	*Araucaria bidwilli*	Common
2.	*Cedrus deodara*	Planted
3.	*Juniperus* sp.	Common
4.	*Pinus caribaea*	Plantation
5.	*Pinus elliotti*	Plantation
6.	*Pinus gregaii*	Common
7.	*Pinus kesiya*	Plantation
8.	*Pinus mountzumae*	Common
9.	*Pinus oocarpa*	Plantation
10.	*Pinus patula*	Plantation
11.	*Pinus ponderosa*	Common
12.	*Pinus pseudostrobus*	Plantation
13.	*Pinus roxburghii*	Plantation
14.	*Pinus serotina*	Common
15.	*Taxodium* sp.	Planted

The group of angiosperm consists of flower / seed bearing plants. This group has 567 species belonging to 395 genera covering 93 families of dicotyledons and 223 species belonging to 110 genera covering 20 families of monocotyledons have been identified (Saxena, 1970; Prasad and Pandey, 1993; Tiwari *et al*., 1995). They yield timber and ayurvedic medicines. In BR, the following species are identified till date.

Table 6. List of Angiosperms reported from the BR.

Trees

S. No.	**Name of the species**	**Family**	**Status**
1.	*Acacia auriculiformis*	Mimosaceae	Common

2.	*Acacia catechu*	Mimosaceae	Common
3.	*Aegle marmelos*	Anacardiaceae	Common
4.	*Alangium salvifolium*	Alangiaceae	Common
5.	*Albizia amara*	Mimosaceae	Common
6.	*Albizia lebbek*	Mimosaceae	Common
7.	*Albizia odoratissima*	Mimosaceae	Common
8.	*Albizia procera*	Mimosaceae	Common
9.	*Ailanthus excelsa*	Meliaceae	Common
10.	*Anacardium occidentale*	Anacardiaceae	Common
11.	*Annona squamosa*	Annonaceae	Common
12.	*Anogeissus latifolia*	Combretaceae	Common
13.	*Azadirachta indica*	Meliaceae	Common
14.	*Bauhinia variegata*	Caesalpiniaceae	Common
15.	*Bombax ceiba*	Bombacaceae	Common
16.	*Boswellia serrata*	Burseraceae	Vulnerable
17.	*Bridelia retusa*	Euphorbiaceae	Common
18.	*Buchanania lanzan*	Anacardiaceae	Near threatened
19.	*Bursera serrata*	Mimosaceae	Common
20.	*Butea monosperma*	Fabaceae	Common
21.	*Careya arborea*	Myrtaceae	Common
22.	*Casearia graveolens*	Samydaceae	Common
23.	*Casearia elliptica*	Samydaceae	Common
24.	*Cassia fistula*	Mimosaceae	Common
25.	*Casurina equsetifolia*	Casurinaceae	Common
26.	*Celtis tetrandra*	Ulmaceae	Common
27.	*Cochlospermum religiosum*	Cochlospermaceae	Vulnerable
28.	*Dalbergia lanceolaria*	Fabaceae	Common
29.	*Dalbergia paniculata*	Fabaceae	Common
30.	*Dillenia pentagyna*	Dilleniaceae	Common
31.	*Diospyros melanoxylon*	Ebenaceae	Common
32.	*Diospyros sylvatica*	Ebenaceae	Common
33.	*Elaeodendron roxburghii* (Syn. *Elaeodendron glaucum*)	Celastraceae	Common
34.	*Eucalyptus camaldulensis*	Myrtaceae	Planted
35.	*Eucalyptus citriodora*	Myrtaceae	Planted
36.	*Ficus arontiana*	Moraceae	Common
37.	*Ficus benghalensis*	Moraceae	Common
38.	*Ficus cunia*	Moraceae	Common
39.	*Ficus racemosa*	Moraceae	Common

40.	*Ficus religiosa*	Moraceae	Common
41.	*Ficus semicordata*	Moraceae	Common
42.	*Garuga pinnata*	Burseraceae	Common
43.	*Gmelina arborea*	Verbenaceae	Common
44.	*Grevillea pteridifolia*	Proteaceae	Common
45.	*Grevillea robusta*	Proteaceae	Common
46.	*Grewia subinaequalis*	Tiliaceae	Common
47.	*Grewia tiliaefolia*	Tiliaceae	Common
48.	*Haldina cordifolia*	Rubiaceae	Common
49.	*Holarrhena antidysenterica*	Apocynaceae	Common
50.	*Hymenodictyon excelsum*	Rubiaceae	Common
51.	*Kydia calycina*	Malvaceae	Common
52.	*Lagerstroemia indica*	Lythraceae	Common
53.	*Lagerstroemia parviflora*	Lythraceae	Common
54.	*Lagerstroemia speciosa*	Lythraceae	Common
55.	*Lannea coromandelica* (Syn.*L. grandis*)	Anacardiaceae	Common
56.	*Litchi chinensis*	Sapindaceae	Common
57.	*Litsea glutinosa*	Louraceae	Planted
58.	*Litsea monopetala*	Louraceae	Vulnerable
59.	*Madhuca indica*	Sapotaceae	Common
60.	*Mallotus philippensis*	Euphorbiaceae	Common
61.	*Mangifera indica*	Anacardiaceae	Common
62.	*Manilkara sapota*	Sapotaceae	Common
63.	*Melia azadarach*	Meliaceae	Common
64.	*Mitragyna parviflora*	Rubiaceae	Common
65.	*Miliusa tomentosa* (Syn.*Saccopetalum tomentosum*)	Euphorbiaceae	Common
66.	*Ougeinia oojeinensis*	Fabaceae	Common
67.	*Pavetta indica*	Rubiaceae	Common
68.	*Pistacia khinjuk*	Anacardiaceae	Common
69.	*Polyalthia longifolia*	Annonaceae	Common
70.	*Polyalthia pendula*	Annonaceae	Common
71.	*Pongamia pinnata*	Fabaceae	Common
72.	*Pterocarpus marsupium*	Fabaceae	Vulnerable
73.	*Radermachera xylocarpa*	Bignoniaceae	Common
74.	*Sapindus laurifolius*	Sapindaceae	Common
75.	*Schleichera oleosa*	Sapindaceae	Common
76.	*Schrebera swietenioides*	Oleaceae	Common

77.	*Semecarpus anacardium*	Anacardiaceae	Common
78.	*Shorea robusta*	Dipterocarpaceae	Common
79.	*Sterculia urens*	Sterculiaceae	Vulnerable
80.	*Sterculia villosa*	Sterculiaceae	Common
81.	*Stereospermum colais*	Bignoniaceae	Near threatened
82.	*Stereospermum suaveolens*	Bignoniaceae	Common
83.	*Swietenia mahogoni*	Meliaceae	Common
84.	*Syzygium cumini*	Myrtaceae	Common
85.	*Syzygium jambos*	Myrtaceae	Common
86.	*Terminalia arjuna*	Combretaceae	Near threatened
87.	*Terminalia bellerica*	Combretaceae	Common
88.	*Terminalia chebula*	Combretaceae	Vulnerable
89.	*Terminalia crenulata*	Combretaceae	Common
90.	*Terminalia indica*	Combretaceae	Common
91.	*Terminalia alata* (Syn. *T. tomentosa*)	Combretaceae	Common
92.	*Toona ciliata*	Meliaceae	Common

Small Trees

1.	*Acacia concinna*	Mimosaceae	Common
2.	*Acacia torta*	Mimosaceae	Common
3.	*Antidesma acidum*	Euphorbiaceae	Common
4.	*Bauhinia malabarica*	Fabaceae	Common
5.	*Bauhinia purpurea*	Fabaceae	Common, grows sparingly
6.	*Bauhinia racemosa*	Fabaceae	Common
7.	*Bauhinia retusa*	Fabaceae	Common
8.	*Bixa orellana*	Bixaceae	Common
9.	*Butea parviflora*	Fabaceae	Common
10.	*Callistemon citrinus*	Myrtaceae	Common
11.	*Callistemon lanceolatum*	Myrtaceae	Common
12.	*Carica papaya*	Caricaeae	Common
13.	*Citrus aurantium*	Rutaceae	Common
14.	*Citrus medica*	Rutaceae	Planted
15.	*Cleistanthus collinus*	Euphorbiaceae	Planted
16.	*Dolichandrone atrovirens*	Bignoniaceae	Common
17.	*Embelia basal* (Syn.*E. tsjeriam cottam*)	Myrsinaceae	Near Threatened
18.	*Embelia ribes*	Myrsinaceae	Common
19.	*Eriolaena candollei*	Sterculiaceae	Rare
20.	*Ficus cairica*	Moraceae	Common
21.	*Ficus hispida*	Moraceae	Common
22.	*Ficus microcarpa*	Moraceae	Common

23.	*Flacourtia indica*	Flacourtiaceae	Common
24.	*Gardenia gummifera*	Rubiaceae	Common
25.	*Gardenia latifolia*	Rubiaceae	Common
26.	*Glochidion velutinum*	Euphorbiaceae	Common
27.	*Grewia serrulata*	Tiliaceae	Common
28.	*Helicteres isora*	Sterculiaceae	Common / Rare
29.	*Murraya koenigii*	Rutaceae	Common
30.	*Morus australis*	Moraceae	Common
31.	*Nyctanthes arbortristis*	Nyctanthaceae	Occasional
32.	*Oroxylum indicum*	Bignoniaceae	Vulnerable
33.	*Phyllanthus emblica* (Syn.*Emblica officinalis*)	Euphorbiaceae	Vulnerable
34.	*Prunus persica*	Rosaceae	Planted
35.	*Psidium guajava*	Myrtaceae	Planted
36.	*Salix tetrasperma*	Salicaceae	Common
37.	*Sesbania bispinosa*	Fabaceae	Common
38.	*Trema orientalis*	Euphorbiaceae	Common
39.	*Wendlandia heynei*	Rubiaceae	Common
40.	*Catunaregum spinosa*	Rubiaceae	Common

Shrubs

1.	*Abelmoschus esculentus*	Malvaceae	Common
2.	*Abroma augusta*	Sterculiaceae	Common / Rare
3.	*Agave americana*	Agavaceae	Planted
4.	*Ardisia solanacea*	Myrsinaceae	Common
5.	*Bytteneri herbacea*	Sterculiaceae	Common
6.	*Calotropis procera*	Asclepiadaceae	Common
7.	*Carissa opaca*	Apocynaceae	Common
8.	*Carissa spinarum*	Apocynaceae	Common
9.	*Cestrum nocturnum*	Solanaceae	Common
10.	*Clerodendrum indicum*	Verbenaceae	Common
11.	*Clerodendrum japonicum*	Verbenaceae	Common
12.	*Clerodendrum serratum*	Verbenaceae	Endangered
13.	*Coffea arabica*	Rubiaceae	Planted
14.	*Combretum nanum*	Combretaceae	Common
15.	*Cylista scariosa*	Fabaceae	Common
16.	*Datura metel*	Solanaceae	Common / Rare
17.	*Datura stramonium*	Solanaceae	Common
18.	*Dodonia viscosa*	Sapindaceae	Common
19.	*Eriolaena hookeriana*	Celastraceae	Common
20.	*Grewia hirsuta*	Tiliaceae	Common
21.	*Helinus lanceolatus*	Rhamnaceae	Common
22.	*Hibiscus lampus*	Malvaceae	Common
23.	*Hibiscus rosa sinensis*	Malvaceae	Common
24.	*Hyoscyamus niger*	Solanaceae	Common

25.	*Ixora arborea*	Rubiaceae	Common
26.	*Ixora parviflora*	Rubiaceae	Common
27.	*Jatropha curcas*	Euphorbiaceae	Common
28.	*Leea bracteata*	Leeaceae	Common
29.	*Leea cripsa*	Leeaceae	Common
30.	*Leea edgeworthii*	Leeaceae	Common
31.	*Murraya paniculata*	Rutaceae	Common
32.	*Nerium indicum*	Apocynaceae	Common
33.	*Opuntia elatior*	Cactaceae	Common
34.	*Opuntia vulgaris*	Cactaceae	Common
35.	*Plumbago zeylanica*	Plubaginaceae	Vulnerable / Rare
36.	*Plumeria rubra*	Apocynaceae	Common
37.	*Primula candida* subsp. *obovata*	Primulaceae	Common
38.	*Primula umbellata*	Primulaceae	Common
39.	*Punica granatum*	Rosaceae	Common
40.	*Reinwardtia indica*	Linaceae	Common
41.	*Rhamnus wightii*	Rhamnaceae	Common
42.	*Rosa indica*	Rosaceae	Common
43.	*Spermadictyon suaveolens*	Rubiaceae	Common
44.	*Tabernaemontana divaricata*	Apocynaceae	Common
45.	*Talinium portulacifolium*	Rhamnaceae	Common
46.	*Thevetia peruviana*	Apocynaceae	Common
47.	*Woodfordia fruticosa*	Lythraceae	Common
48.	*Ziziphus mauritiana*	Rhamnaceae	Common
49.	*Ziziphus oenoplia*	Rhamnaceae	Common
50.	*Ziziphus rugosa*	Rhamnaceae	Common

Under Shrub

1.	*Baliospermum montanum*	Euphorbiaceae	Near Threatened
2.	*Boehmeria macrophylla*	Urticaceae	Common
3.	*Buddleja asiatica*	Loganiaceae	Common
4.	*Carvia callosa*	Acanthaceae	Common
5.	*Cassia mimosoides*	Caesalpiniaceae	Common
6.	*Cassia occidentalis*	Caesalpiniaceae	Common
7.	*Cassia tora*	Caesalpiniaceae	Common
8.	*Crotolaria alata*	Fabaceae	Common
9.	*Crotolaria calycina*	Fabaceae	Common
10.	*Crotolaria humifusa*	Fabaceae	Rare
11.	*Crotolaria medicaginea*	Fabaceae	Common
12.	*Crotolaria nana*	Fabaceae	Common
13.	*Crotalaria prostrata*	Fabaceae	Common
14.	*Crotolaria sessilifolia*	Fabaceae	Common

15.	*Desmodium gangeticum*	Fabaceae	Common
16.	*Dipterocanthus beddomei*	Acanthaceae	Common
17.	*Dipterocanthus tuberose*	Acanthaceae	Common
18.	*Flemingia bracteata*	Fabaceae	Common
19.	*Flemingia macrophylla*	Fabaceae	Common
20.	*Flemingia semialata*	Fabaceae	Common
21.	*Jasminum arobrescens*	Oleaceae	Common
22.	*Jasminum brevipetiolatum*	Oleaceae	Common
23.	*Jasminum grandiflorum*	Oleaceae	Common
24.	*Jasminum multiflorum*	Oleaceae	Common
25.	*Jasminum officianale*	Oleaceae	Common
26.	*Jasminum sambac*	Oleaceae	Common
27.	*Leonotis nepetifolia*	Lamiaceae	Common
28.	*Mimosa pudica*	Mimosaceae	Common
29.	*Mirabilis jalapa*	Nyctaginaceae	Common
30.	*Nicotiana plumbaginifolia*	Solanaceae	Common
31.	*Perilepta auriculata*	Acanthaceae	Common
32.	*Perilepta edgeworthiana*	Acanthaceae	Common
33.	*Petalidium barlerioides*	Acanthaceae	Common
34.	*Phoenix acaulis*	Arecaceae	Common
35.	*Phoenix sylvestris*	Arecaceae	Common
36.	*Pogostemon benghalense*	Lamiaceae	Common
37.	*Pogostemon cruciata*	Lamiaceae	Common
38.	*Polygonum barbatum*	Polygonaceae	Common
39.	*Polygonum dichotomum*	Polygonaceae	Common
40.	*Primula stellata*	Primulaceae	Common
41.	*Solanum incanum*	Solanaceae	Common
42.	*Solanum melongena*	Solanaceae	Common
43.	*Triumfetta rhomboidea*	Tiliaceae	Common
44.	*Uraria alopecuroides*	Fabaceae	Common
45.	*Urena lobata*	Malvaceae	Common
46.	*Urena repanda*	Malvaceae	Rare
47.	*Vernonia divergens*	Verbenaceae	Common
48.	*Vitex negundo*	Verbenaceae	Common

Creepers/ Climbers

1.	*Abrus precatorius*	Fabaceae	Near threatened
2.	*Ampelocissus latifolia*	Vitidaceae	Common
3.	*Ampelocissus tomentosa*	Vitidaceae	Common
4.	*Argyreia strigosa*	Convolvulaceae	Rare
5.	*Aristolochia bracteolata*	Aristolochiaceae	Common
6.	*Asparagus gracilus*	Liliaceae	Common
7.	*Asparagus racemosus*	Liliaceae	Near threatened

8.	*Asparagus royleanus*	Liliaceae	Common
9.	*Bauhinia vahlii*	Fabaceae	Common
10.	*Bougainvillea glabra*	Amaranthaceae	Common
11.	*Bougainvillea spectabilis*	Amaranthaceae	Common
12.	*Butea parviflora*	Fabaceae	Common
13.	*Butea superba*	Fabaceae	Common
14.	*Caesalpinia bonduc*	Caesalpiniaceae	Common
15.	*Cayratia pedata*	Fabaceae	Common
16.	*Celastrus paniculatus*	Celastraceae	Vulnerable
17.	*Ceropegia hirsuta*	Asclepiadaceae	Common
18.	*Cissampelos pariera*	Menispernacae	Common
19.	*Clematis smilacifolia*	Caesalpinaceae	Common
20.	*Clematis triloba*	Caesalpinaceae	Common
21.	*Clitoria ternatea*	Fabaceae	Common
22.	*Coculus hirsutus*	Menispernacae	Common
23.	*Combretum roxburghii*	Combretaceae	Common
24.	*Cryptolepis buchnanii*	Apocynaceae	Common
25.	*Cucumis melo*	Cucurbitaceae	Common
26.	*Cucumis melo* var. *agrestis*	Cucurbitaceae	Common
27.	*Cucumis sativus*	Cucurbitaceae	Common
28.	*Cuscuta campestris*	Convolvulaceae	Common
29.	*Cuscuta hyaline*	Convolvulaceae	Common
30.	*Cuscuta reflexa*	Convolvulaceae	Common
31.	*Dioscorea belophylla*	Dioscoreaceae	Common
32.	*Dioscorea bulbifera*	Dioscoreaceae	Vulnerable
33.	*Dioscorea hispida*	Dioscoreaceae	Vulnerable
34.	*Dioscorea oppositifolia*	Dioscoreaceae	Common
35.	*Dioscorea pentaphylla*	Dioscoreaceae	Common
36.	*Dioscorea puber*	Dioscoreaceae	Common
37.	*Dioscorea wightii*	Dioscoreaceae	Common
38.	*Evolvulus alisinoides*	Convolvulaceae	Common
39.	*Gloriosa superba*	Liliaceae	Vulnerable
40.	*Gymnema sylvestre*	Asclepiadaceae	Vulnerable
41.	*Hemidesmus indicus*	Asclepiadaceae	Common/Rare
42.	*Ichnocarpus frutescens*	Apocynaceae	Common
43.	*Ipomoea aqutica*	Convolvulaceae	Common
44.	*Ipomoea cairica*	Convolvulaceae	Common
45.	*Ipomoea carnea*	Convolvulaceae	Common
46.	*Ipomoea eriocarpa*	Convolvulaceae	Common
47.	*Ipomoea hederifolia*	Convolvulaceae	Common
48.	*Ipomoea nil*	Convolvulaceae	Common
49.	*Ipomoea quamoclit*	Convolvulaceae	Common
50.	*Leea asiatica*	Leeaceae	Common

51.	*Marsdenia tenacissima*	Asclepiadaceae	Common
52.	*Melothria maderaspatana*	Cucurbitaceae	Common
53.	*Melothria heterophylla*	Cucurbitaceae	Common
54.	*Momordica charantia*	Cucurbitaceae	Common
55.	*Momordica dioica*	Cucurbitaceae	Common
56.	*Mucuna pruriens*	Fabaceae	Near threatened
57.	*Passiflora foetida*	Passifloraceae	Common
58.	*Pergularia daemia*	Asclepiadaceae	Common
59.	*Phaseolus sublobatus*	Fabaceae	Common
60.	*Piper longum*	Piperaceae	Vulnerable
61.	*Porana paniculata*	Convolvulaceae	Common
62.	*Porana racemosa*	Convolvulaceae	Rare
63.	*Quisqualis indica*	Combretaceae	Common
64.	*Rhaphidospora calophyllum*	Acanthaceae	Common
65.	*Rubia manjith* (Syn. *Rubia cordifolia*)	Rubiaceae	Vulnerable
66.	*Schefflera venulosa*		Common
67.	*Smilax perfoliata*	Smilacaceae	Common
68.	*Smilax zeylanica*	Smilacaceae	Common
69.	*Tetrastigma lanceolarium*	Vitaceae	Common
70.	*Trichosanthes bracteata*	Cucurbitaceae	Common
71.	*Trichosanthes cordata*	Cucurbitaceae	Common
72.	*Trichosanthes cucmerina*	Cucurbitaceae	Common
73.	*Ventilago denticulata*	Rhamnaceae	Common
74.	*Vitis vinifera*	Vitidaceae	Common

Herbs

1.	*Abelmoschus crinitus*	Malvaceae	Common
2.	*Abelmoschus ficulneus*	Malvaceae	Common
3.	*Abelmoschus manihot*	Malvaceae	Common
4.	*Abutilon polyandrum*	Malvaceae	Common
5.	*Acampe praemorsa*	Orchidaceae	Common
6.	*Acanthospermum hispidum*	Asteraceae	Common
7.	*Achyranthus aspera*	Nyctaginaceae	Common
8.	*Achyranthus bidentata*	Nyctaginaceae	Common
9.	*Acorus calamus*	Araceae	Endangered
10.	*Acrocephalus hispidus*	Lamiaceae	Common
11.	*Adenostemma angustifolium*	Asteraceae	Common
12.	*Adenostemma lavenia*	Asteraceae	Common
13.	*Aeginetia indica*	Orobranchaceae	Common
14.	*Aerides multiflorum*	Orchidaceae	Common
15.	*Aerva lanata*	Amaranthaceae	Common
16.	*Aerva sanguinolenta*	Amaranthaceae	Common

17.	*Ageratum conyzoides*	Asteraceae	Common
18.	*Ageratum houstonianum*	Asteraceae	Common
19.	*Alectra sessiliflora*	Scrophulariaceae	Common
20.	*Allium cepa*	Liliaceae	Common
21.	*Aloe barbadensis*	Liliaceae	Common
22.	*Alternanthera pungens*	Amaranthaceae	Common
23.	*Alternanthera sessilis*	Amaranthaceae	Common
24.	*Alysicarpus bupleurifolius*	Fabaceae	Common
25.	*Amaranthus caudatus*	Amaranthaceae	Common
26.	*Amaranthus hybridus*	Amaranthaceae	Common
27.	*Amaranthus spinosus*	Amaranthaceae	Common
28.	*Amaranthus tricolor*	Amaranthaceae	Common
29.	*Amaranthus viridis*	Amaranthaceae	Common
30.	*Ammania baccifera*	Lythraceae	Common
31.	*Ammania multiflora*	Lythraceae	Common
32.	*Amorphophallus bulbifer*	Araceae	Common
33.	*Anaphalis sp.*	Asteraceae	Common
34.	*Andrographis paniculata*	Acanthaceae	Vulnerable
35.	*Anisochilus carnosus*	Lamiaceae	Common
36.	*Anisochilus eriocephalus*	Lamiaceae	Common
37.	*Anisomeles indica*	Lamiaceae	Common
38.	*Argemone mexicana*	Papeveraceae	Common
39.	*Arisaema tortuosum*	Araceae	Common
40.	*Artemisia parviflora*	Asteraceae	Common
41.	*Bacopa procumbens*	Scrophulariaceae	Common
42.	*Barleria cristata*	Acanthaceae	Common
43.	*Barleria gibsoni*	Acanthaceae	Common
44.	*Barleria strigosa*	Acanthaceae	Common
45.	*Begonia picta*	Begoniaceae	Common
46.	*Bidens biternata*	Asteraceae	Common
47.	*Bidens pilosa*	Asteraceae	Common
48.	*Biophytum petersianum*	Oxalidaceae	Common
49.	*Biophytum reinwardtii*	Oxalidaceae	Common
50.	*Biophytum sensitivum*	Oxalidaceae	Common
51.	*Blainvillea acmella*	Asteraceae	Common
52.	*Blepharis madaraspatensis*	Acanthaceae	Common
53.	*Blumea bifoliata*	Asteraceae	Common
54.	*Blumea lacera*	Asteraceae	Common
55.	*Blumea laciniata*	Asteraceae	Common
56.	*Blumea oxydonta*	Asteraceae	Common
57.	*Blumea virens*	Asteraceae	Common
58.	*Blumeopsis flava*	Asteraceae	Common
59.	*Boerhavia diffusa*	Nyctaginaceae	Common
60.	*Brassica compestris*	Brassicaceae	Common
61.	*Brassica juncea*	Brassicaceae	Common

62.	*Brassica napus*	Brassicaceae	Common
63.	*Bupleurum wightii*	Apiaceae	Common
64.	*Caesulia axillaris*	Asteraceae	Common
65.	*Campanula wallichii*	Campanulaceae	Common
66.	*Canna coccinia*	Cannaceae	Common
67.	*Carthamus oxycantha*	Asteraceae	Common
68.	*Cassia auriculata*	Caesalpiniaceae	Common
69.	*Cassia pumila*	Caesalpiniaceae	Common
70.	*Celosia argentea*	Amaranthaceae	Common
71.	*Centella asiatica*	Apiaceae	Common / Rare
72.	*Centipeda minima*	Asteraceae	Common
73.	*Centrantherum anthelminticum*	Verbenaceae	Common
74.	*Centranthera nepalensis*	Scrophulariaceae	Common
75.	*Chenopodium album*	Chenopodiaceae	Common
76.	*Chlorophytum tuberosum*	Liliaceae	Vulnerable
77.	*Chlorophytum arundinaceum*	Liliaceae	Common
78.	*Chrysanthellum americanum*	Asteraceae	Common
79.	*Clinopodium umbrosum*	Lamiaceae	Common
80.	*Coleus barbatus*	Lamiaceae	Common
81.	*Colocasia esculenta*	Arecaceae	Common
82.	*Commelina benghalensis*	Commelinaceae	Common
83.	*Commelina diffusa*	Commelinaceae	Common
84.	*Commelina erecta*	Commelinaceae	Common
85.	*Commelina hasskarlii*	Commelinaceae	Common
86.	*Commelina paludosa*	Commelinaceae	Common
87.	*Commelina suffruticosa*	Commelinaceae	Common
88.	*Conyza bonariensis*	Asteraceae	Common
89.	*Conyza canadensis*	Asteraceae	Common
90.	*Conyza japonica*	Asteraceae	Common
91.	*Conyza stricta*	Asteraceae	Common
92.	*Conyza viscidula*	Asteraceae	Rare
93.	*Corchorus aestuans*	Tiliaceae	Common
94.	*Corchorus fasicularis*	Tiliaceae	Common
95.	*Cosmos bipinnatus*	Asteraceae	Common
96.	*Cosmos sulphurens*	Asteraceae	Common
97.	*Costus speciosus*	Costaceae	Vulnerable
98.	*Crassocephalum crepidioides*	Asteraceae	Common
99.	*Crinum latifolium*	Amarylidiaceae	Rare
100.	*Curculigo orchioides*	Hypoxidaceae	Common
101.	*Curcuma amada*	Zingiberaceae	Common
102.	*Curcuma angustifolia*	Zingiberaceae	Vulnerable

103.	*Curcuma aromatica*	Zingiberaceae	Common
104.	*Curcuma caesia*	Zingiberaceae	Common
105.	*Curcuma longa*	Zingiberaceae	Common
106.	*Cyanotis cristata*	Commelinaceae	Common
107.	*Cyathocline purpurea*	Asteraceae	Common
108.	*Cynoglossum lanceolatum*	Boraginaceae	Common
109.	*Delphinium ajacis*	Ranunculaceae	Common
110.	*Dendrophthoe falcata*	Loranthaceae	Common
111.	*Desmodium polycarpum*	Fabaceae	Common
112.	*Dicrocephala integrifolia*	Asteraceae	Common
113.	*Drimia indica* (Syn. *Urgenia indica*)	Liliaceae	Vulnerable
114.	*Drosera burmanii*	Droseraceae	Common
115.	*Drosera indica*	Droseraceae	Common
116.	*Eclipta prostrata*	Asteraceae	Common
117.	*Elepthantopus scaber*	Asteraceae	Common
118.	*Emilia sonchifolia*	Asteraceae	Common
119.	*Ensete superbum*	Musaceae	Common
120.	*Epipogon roseum*	Orchidaceae	Common
121.	*Eranthemum purpurascens*	Acanthaceae	Common
122.	*Erigeron bonariensis*	Asteraceae	Common
123.	*Eryngium foetidum*	Apiaceae	Common
124.	*Eupatorium coelistinum*	Asteraceae	Common
125.	*Eulophia herbaea*	Orchidaceae	Endangered
126.	*Eulophia nuda*	Orchidaceae	Common
127.	*Euphorbia heterophylla*	Euphorbiaceae	Common
128.	*Euphorbia hirta*	Euphorbiaceae	Common
129.	*Euphorbia neriifolia*	Euphorbiaceae	Common
130.	*Euphorbia paniculata*	Euphorbiaceae	Common
131.	*Euphorbia prostrata*	Euphorbiaceae	Common
132.	*Euphorbia rosea*	Euphorbiaceae	Common
133.	*Euphorbia thymifolia*	Euphorbiaceae	Common
134.	*Exacum pedunculatum*	Gentiaceae	Common
135.	*Exacum petiolare*	Gentiaceae	Common
136.	*Exacum tetragonum*	Gentiaceae	Common
137.	*Floscopa scandens*	Commelinaceae	Common
138.	*Galinsoga parviflora*	Asteraceae	Common
139.	*Geranium masatense*	Geraniaceae	Common
140.	*Girardinia diversifolia*	Urticaceae	Common
141.	*Globba bulbifera*	Zingiberaceae	Common
142.	*Globba marantina*	Zingiberaceae	Common
143.	*Globba racemosa*	Zingiberaceae	Common
144.	*Glossogyne bidens*	Asteraceae	Common
145.	*Gnaphalium affine*	Asteraceae	Common
146.	*Gnaphalium indicum*	Asteraceae	Common

147.	*Gnaphalium purpureum*	Asteraceae	Common
148.	*Gomphrena celosiodes*	Asteraceae	Common
149.	*Guizotia abyssynica*	Asteraceae	Common
150.	*Gynura lycopersicifolia*	Orchidaceae	Common
151.	*Habenaria commelinifolia*	Asteraceae	Common
152.	*Habenaria frucifera*	Asteraceae	Common
153.	*Habenaria marginata*	Asteraceae	Common
154.	*Hedychium coronarium*	Zingiberaceae	Common / Threatened
155.	*Hemigraphis latebrosa*	Acanthaceae	Common
156.	*Hoppea dichotoma*	Gentiaceae	Common
157.	*Hibiscus lobatus*	Malvaceae	Common
158.	*Hibiscus subdariffa*	Malvaceae	Common
159.	*Hydrocotyle sibthorpioides*	Apiaceae	Common
160.	*Hygrophylla auriculata*	Acanthaceae	Common
161.	*Hygrophylla balsamica*	Acanthaceae	Common
162.	*Hygrophylla polysperma*	Acanthaceae	Common
163.	*Hypericum japonicum*	Hypericeae	Common
164.	*Impatiens balsamina*	Balsaminaceae	Common
165.	*Indigofera linifolia*	Fabaceae	Common
166.	*Indigofera prostata*	Fabaceae	Common
167.	*Juncus prismatocarpus*	Juncaceae	Common
168.	*Justicia betonica*	Acanthaceae	Common
169.	*Justicia diffusa*	Acanthaceae	Common
170.	*Justicia quinqueangularis*	Acanthaceae	Common
171.	*Justicia simplex*	Acanthaceae	Common
172.	*Kohautia gracilis*	Acanthaceae	Common
173.	*Lagascea mollis*	Asteraceae	Common
174.	*Laggera pterodonta*	Asteraceae	Common
175.	*Launaea acaulis*	Asteraceae	Common
176.	*Lavandula bipinnata*	Lamiaceae	Common
177.	*Lecanthus peduncularis*	Ulmaceae	Common
178.	*Lepidagathis cristata*	Acanthaceae	Common
179.	*Lepidagathis incurva*	Acanthaceae	Common
180.	*Leucas mollissima*	Lamiaceae	Common
181.	*Limnophila aromatica*	Scrophulariaceae	Common
182.	*Limnophila connata*	Scrophulariaceae	Common
183.	*Limnophila indica*	Scrophulariaceae	Common
184.	*Lindenbergia indica*	Scrophulariaceae	Common
185.	*Lindernia anagallis*	Scrophulariaceae	Common
186.	*Lindernia ciliata*	Scrophulariaceae	Common
187.	*Lindernia crustacea*	Scrophulariaceae	Common
188.	*Lindernia hookeri*	Scrophulariaceae	Common
189.	*Lindernia nummularifolia*	Scrophulariaceae	Common
190.	*Lindernia oppositifolia*	Scrophulariaceae	Common
191.	*Lindernia procumbens*	Scrophulariaceae	Common

192.	*Lindernia sessiliflora*	Scrophulariaceae	Common
193.	*Linum usitatissimum*	Linaceae	Common
194.	*Lobelia heyneana*	Campanulaceae	Common
195.	*Loranthus cordifolia*	Loranthaceae	Common
196.	*Ludwigia adscendens*	Lythraceae	Common
197.	*Ludwigia octovalvis*	Lythraceae	Common
198.	*Ludwigia perennis*	Lythraceae	Common
199.	*Ludwigia prostrata*	Lythraceae	Common
200.	*Luisia trichorhiza*	Orchidaceae	Common
201.	*Luisia zeylanica*	Orchidaceae	Common
202.	*Malaxis mackinnonii*	Orchidaceae	Common
203.	*Martynia annua*	Pedaliaceae	Common
204.	*Mazus delavayi*	Scrophulariaceae	Common
205.	*Mazus pumilus*	Scrophulariaceae	Common
206.	*Melilotus alba*	Fabaceae	Common
207.	*Melilotus indica*	Fabaceae	Common
208.	*Mentha piperata*	Lamiaceae	Common
209.	*Micromeria biflora*	Lamiaceae	Common
210.	*Mimulus strictus*	Scrophulariaceae	Common
211.	*Monochoria vaginalis*	Pontederaceae	Common
212.	*Mullugo pentaphylla*	Molluginaceae	Common
213.	*Murdannia edulis*	Commelinaceae	Common
214.	*Murdannia spirata*	Commelinaceae	Common
215.	*Murdannia vaginata*	Commelinaceae	Common
216.	*Musa paradisica*	Musaceae	Common
217.	*Musa rosacea*	Musaceae	Common
218.	*Nelsonia canescens*	Acanthaceae	Common
219.	*Nepeta hindostana*	Lamiaceae	Common
220.	*Nicandra physalodes*	Solanaceae	Common
221.	*Nymphoides hydrophylla*	Menyanthaceae	Common
222.	*Oberonia ensiformis*	Orchidaceae	Common
223.	*Oberonia falconeri*	Orchidaceae	Common
224.	*Ocimum basilicum*	Lamiaceae	Common
225.	*Ocimum canum*	Lamiaceae	Common
226.	*Ocimum gratissimum*	Lamiaceae	Common
227.	*Ocimum tenuiflorum*	Lamiaceae	Common
228.	*Oenanthe stolonifera*	Apiaceae	Common
229.	*Oldenlandia affinis*	Rubiaceae	Common
230.	*Oldenlandia corymbosa*	Rubiaceae	Common
231.	*Orthosiphon pallidus*	Lamiaceae	Common
232.	*Orthosiphon rubicundus*	Lamiaceae	Common
233.	*Orthosiphon thymiflorus*	Lamiaceae	Common
234.	*Osbeckia chinensis*	Melastomceae	Common
235.	*Osbeckia muralis*	Melastomceae	Common
236.	*Oxalis corniculata*	Oxalidaceae	Common

237.	*Oxalis richardiana*	Oxalidaceae	Common
238.	*Pavonia procumbens*	Malvaceae	Common
239.	*Pavonia repanda*	Malvaceae	Common
240.	*Pentanema cernua*	Verbenaceae	Common
241.	*Pentanema indica*	Verbenaceae	Common
242.	*Peristylus constrictus*	Orchidaceae	Common
243.	*Peristylus stocksii*	Orchidaceae	Common
244.	*Petunia alba*	Solanaceae	Common
245.	*Peucedanum dhana* var. *dalzellii*	Apiaceae	Rare
246.	*Peucedanum nagpurense*	Apiaceae	Vulnerable
247.	*Phaseolus radiatus*	Fabaceae	Common
248.	*Phaseolus aureus*	Fabaceae	Common
249.	*Phyllanthus airy-shawii*	Euphorbiaceae	Common
250.	*Phyllanthus amarus*	Euphorbiaceae	Common
251.	*Phyllanthus reticulata*	Euphorbiaceae	Common
252.	*Phyllanthus urinaria*	Euphorbiaceae	Common
253.	*Physalis minima*	Solanaceae	Common
254.	*Pimpinella bracteata*	Apiaceae	Common
255.	*Pimpinella diversifolia*	Apiaceae	Common
256.	*Pimpinella heyneana*	Apiaceae	Common
257.	*Pimpinella wallichiana*	Apiaceae	Common
258.	*Pistia stratiotes*	Araceae	Common
259.	*Platanthera susannae*	Orchidaceae	Common
260.	*Plectranthus mollis*	Lamiaceae	Common
261.	*Plectranthus rugosus*	Lamiaceae	Common
262.	*Plesmonium margaritiferum*	Araceae	Common
263.	*Polygala crotalarioides*	Polygalaceae	Common
264.	*Polygala furcata*	Polygalaceae	Common
265.	*Polygala persicariaefolia*	Polygalaceae	Common
266.	*Polygonum glabrum*	Polygonaceae	Common
267.	*Polygonum hydropiper* subsp. *microcarpum*	Polygonaceae	Common
268.	*Polygonum lapathifolium* var. *lanatum*	Polygonaceae	Common
269.	*Polygonum plebeium*	Polygonaceae	Common
270.	*Polygonum serrulatum*	Polygonaceae	Common
271.	*Polygonum strigosum*	Polygonaceae	Common
272.	*Potamogeton octandrus*	Lamiaceae	Common
273.	*Pouzolzia pentandra*	Urticaceae	Common
274.	*Premna barbata*	Verbenaceae	Common
275.	*Pueraria tuberosa*	Fabaceae	Common
276.	*Pulicaria foliolosa*	Asteraceae	Common
277.	*Pygmaepremna herbacea*	Verbenaceae	Common

278.	*Raphanus sativus*	Brassicaceae	Common
279.	*Rauwolfia serpentina*	Apocynaceae	Critically endangered
280.	*Remusatia vivipara*	Araceae	Common
281.	*Rhoeo discolor*	Commelinaceae	Common
282.	*Rhynchostylis retusa*	Orchidaceae	Common
283.	*Rotala densiflora*	Lythraceae	Common
284.	*Rotala mexicana*	Lythraceae	Common
285.	*Rotala rotundifolia*	Lythraceae	Common
286.	*Rotala serpyllifolia*	Lythraceae	Common
287.	*Rumex dentatus* subsp. *klozschianus*	Polygonaceae	Common
288.	*Rungia pectinata*	Acanthaceae	Common
289.	*Rungia repens*	Acanthaceae	Common
290.	*Salvia officinalis*	Lamiaceae	Common
291.	*Salvia plebeian*	Lamiaceae	Common
292.	*Sansevieria hyacinthoides*	Agavaceae	Common
293.	*Scoparia dulcis*	Scrophulariaceae	Common
294.	*Senecio nudicaulis*	Asteraceae	Common
295.	*Sesamum indicum*	Asteraceae	Common
296.	*Sida acuta*	Malvaceae	Common
297.	*Sida alba*	Malvaceae	Common
298.	*Sida cordata*	Malvaceae	Common
299.	*Sida cordifolia*	Malvaceae	Common
300.	*Sida rhombifolia*	Malvaceae	Common
301.	*Siegesbeckia orientalis*	Asteracerae	Common
302.	*Solanum tuberosum*	Solanaceae	Common
303.	*Solanum virginianum*	Solanaceae	Common
304.	*Sonchus asper*	Asteraceae	Common
305.	*Sonchus brachyotus*	Asteraceae	Common
306.	*Sonchus oleraceus*	Asteraceae	Common
307.	*Sonchus wightianus*	Asteraceae	Common
308.	*Sonerila tenera*	Asteraceae	Common
309.	*Sopubia delphinifolia*	Asteraceae	Common
310.	*Spilanthes calva*	Asteraceae	Common
311.	*Striga angustifolia*	Scrophulariaceae	Common
312.	*Striga densiflora*	Scrophulariaceae	Common
313.	*Stylidium tenellum*	Stylidiaceae	Common
314.	*Swertia angustifolia*	Gentiaceae	Common
315.	*Tamarix ericoides*	Tamaricaceae	Common
316.	*Tephrosia purpurea*	Fabaceae	Common
317.	*Tegetes erecta*	Asteraceae	Common
318.	*Thalictrum foliolosum*	Ranunculiaceae	Vulnerable
319.	*Thalictrum javanicum*	Ranunculiaceae	Common
320.	*Thecagonum ovalifolium*	Rubiaceae	Common
321.	*Thunbergia fragrans*	Acanthaceae	Common

322.	*Trachyspermum stictocarpum*	Apiaceae	Common
323.	*Tridex procumbens*	Asteraceae	Common
324.	*Trimfetta annua*	Tiliaceae	Common
325.	*Trimfetta pentandra*	Tiliaceae	Common
326.	*Trimfetta pilosa*	Tiliaceae	Common
327.	*Tropaeolum majus*	Trapaeolaceae	Common
328.	*Utricularia aurea*	Lentibulariaceae	Common
329.	*Utricularia bifida*	Lentibulariaceae	Common
330.	*Utricularia caerulea*	Lentibulariaceae	Common
331.	*Utricularia graminifolia*	Lentibulariaceae	Common
332.	*Utricularia striatula*	Lentibulariaceae	Common
333.	*Vallisneria natans*	Hydrocharitaceae	Common
334.	*Vanda tassellata*	Orchidaceae	Common
335.	*Vanda testacea*	Orchidaceae	Common
336.	*Verbena officinalis*	Verbenaceae	Common
337.	*Vernonia aspera*	Verbenaceae	Common
338.	*Vernonia cinerea*	Verbenaceae	Common
339.	*Vernonia divergens*	Verbenaceae	Common
340.	*Vernonia squarrosa*	Verbenaceae	Common
341.	*Wahlenbergia erecta*	Campanulaceae	Common
342.	*Wahlenbergia marginata*	Campanulaceae	Common
343.	*Wedelia urticefolia*	Asteraceae	Common
344.	*Withania somnifera*	Solanaceae	Common
345.	*Xanthium indicum*	Asteraceae	Common
346.	*Youngia japonica*	Verbenaceae	Common
347.	*Zingiber officianalis*	Zingiberaceae	Common
348.	*Zingiber roseum*	Zingiberaceae	Common
349.	*Zingiber zerumbet*	Zingiberaceae	Common
350.	*Zinnia elegans*	Asteraceae	Common

Grasses

1.	*Alloteropsis cimicina*	Poaceae	Common
2.	*Alloteropsis semialata*	Poaceae	Rare
3.	*Apluda mutica*	Poaceae	Common
4.	*Aristida cumingiana*	Poaceae	Common
5.	*Aristida setacea*	Poaceae	Common
6.	*Arthraxon lancifolius*	Poaceae	Common
7.	*Arthraxon quartinianus*	Poaceae	Common
8.	*Arundinella pumila*	Poaceae	Common
9.	*Bambusa arundinacea*	Poaceae	Common
10.	*Bothriochola glabra*	Poaceae	Common
11.	*Bothriochola intermedia*	Poaceae	Common
12.	*Bothriochola kuntzeana*	Poaceae	Common

13.	*Bothriochola odorata*	Poaceae	Common
14.	*Bothriochola pertusa*	Poaceae	Common
15.	*Capillipedium assimile*	Poaceae	Common
16.	*Capillipedium huegelii*	Poaceae	Common
17.	*Capillipedium parviflorum*	Poaceae	Common
18.	*Carex phacota*	Cyperaceae	Common
19.	*Carex speciosa*	Cyperaceae	Common
20.	*Carex stramentitia*	Cyperaceae	Common
21.	*Chionachne koenigii*	Cyperaceae	Common
22.	*Chloris dolichostachya*	Poaceae	Common
23.	*Coelachne simpliciuscula*	Poaceae	Common
24.	*Coix gigantean*	Poaceae	Common
25.	*Coix lacryma-jobi*	Poaceae	Common
26.	*Cymbopogon martini*	Poaceae	Common
27.	*Cynodon dactylon*	Poaceae	Common
28.	*Cyperus alulatus*	Cyperaceae	Common
29.	*Cyperus brevifolius*	Cyperaceae	Common
30.	*Cyperus cyperoides*	Cyperaceae	Common
31.	*Cyperus difformis*	Cyperaceae	Common
32.	*Cyperus diffuses*	Cyperaceae	Common
33.	*Cyperus distans*	Cyperaceae	Common
34.	*Cyperus exaltatus*	Cyperaceae	Common
35.	*Cyperus flavidus*	Cyperaceae	Common
36.	*Cyperus halpan*	Cyperaceae	Common
37.	*Cyperus latespicatus*	Cyperaceae	Common
38.	*Cyperus niveus*	Cyperaceae	Common
39.	*Cyperus paniceus*	Cyperaceae	Common
40.	*Cyperus pilosus*	Cyperaceae	Common
41.	*Cyperus pumilus*	Cyperaceae	Common
42.	*Cyperus pygmaeus*	Cyperaceae	Common
43.	*Cyperus rotundus*	Cyperaceae	Common
44.	*Cyperus sanguinolentus*	Cyperaceae	Common
45.	*Cyperus tenuispica*	Cyperaceae	Common
46.	*Dactyloctenium aegyptium*	Poaceae	Common
47.	*Dendrocalamus strictus*	Poaceae	Common
48.	*Dichanthium annulatum*	Poaceae	Common
49.	*Dichanthium aristatum*	Poaceae	Common
50.	*Digitaria abludens*	Poaceae	Common
51.	*Digitaria ciliaris*	Poaceae	Common
52.	*Digitaria longiflora*	Poaceae	Common
53.	*Digitaria setigera*	Poaceae	Common
54.	*Dimeria ornithopoda*	Poaceae	Common
55.	*Echinocholoa colonum*	Poaceae	Common
56.	*Echinocholoa stagnina*	Poaceae	Common
57.	*Eliocharis congesta*	Cyperaceae	Common

58.	*Eleusine indica*	Poaceae	Common
59.	*Eragrostiella bifaria*	Poaceae	Common
60.	*Eragrostiella brachyphylla*	Poaceae	Common
61.	*Eragrostiella nardoides*	Poaceae	Common
62.	*Eragrostis ciliaris*	Poaceae	Common
63.	*Eragrostis gangetica*	Poaceae	Common
64.	*Eragrostis japonica*	Poaceae	Common
65.	*Eragrostis nutans*	Poaceae	Common
66.	*Eragrostis tenella*	Poaceae	Common
67.	*Eragrostis tenuifolia*	Poaceae	Common
68.	*Eragrostis tremula*	Poaceae	Common
69.	*Eragrostis unioloides*	Poaceae	Common
70.	*Eriocaulon breviscapum*	Eriocaulaceae	Rare
71.	*Eriocaulon cinereum*	Eriocaulaceae	Common
72.	*Eriocaulon longicuspis*	Eriocaulaceae	Common
73.	*Eriocaulon martianum*	Eriocaulaceae	Common
74.	*Eriocaulon ritchieanum*	Eriocaulaceae	Common
75.	*Eulalia trispicata*	Poaceae	Common
76.	*Fimbristylis bisumbellata*	Cyperaceae	Common
77.	*Fimbristylis dichotoma*	Cyperaceae	Common
78.	*Fimbristylis falcata*	Cyperaceae	Common
79.	*Hackelochloa granularis*	Poaceae	Common
80.	*Hemarthria compressa*	Poaceae	Common
81.	*Heteropogon contortus*	Poaceae	Common
82.	*Imperata cylindrical*	Poaceae	Common
83.	*Isachne globosa*	Poaceae	Common
84.	*Ischaemum duthei*	Poaceae	Common
85.	*Ischaemum rugosum*	Poaceae	Common
86.	*Iseilema prostratum*	Poaceae	Common
87.	*Lipocarpha chinensis*	Cyperaceae	Common
88.	*Lipocarpha sphacelata*	Cyperaceae	Common
89.	*Manisuris clarkei*	Poaceae	Rare
90.	*Mnesithea laevis*	Poaceae	Rare
91.	*Ophiuros exaltatus*	Poaceae	Common
92.	*Oplismenus burmannii*	Poaceae	Common
93.	*Oplismenus compositus*	Poaceae	Common
94.	*Oryza rufipogon*	Poaceae	Common
95.	*Oryza sativa*	Poaceae	Common
96.	*Panicum brevifolium*	Poaceae	Common
97.	*Panicum notatum*	Poaceae	Common
98.	*Panicum paludosum*	Poaceae	Common
99.	*Panicum psilopodium*	Poaceae	Common
100.	*Panicum repens*	Poaceae	Common
101.	*Panicum sumatrense*	Poaceae	Common
102.	*Panicum walense*	Poaceae	Rare

103.	*Paspalidium flavidum*	Poaceae	Common
104.	*Paspalidium orbiculare*	Poaceae	Common
105.	*Paspalum scrobiculatum*	Poaceae	Common
106.	*Paspalum vaginatum*	Poaceae	Common
107.	*Pennisetum hohenackeri*	Poaceae	Common
108.	*Pennisetum pedicellatum*	Poaceae	Common
109.	*Pogonantherum paniceum*	Poaceae	Common
110.	*Pseudopogonantherum contortum*	Poaceae	Common
111.	*Rhynchospora longisetus*	Cyperaceae	Common
112.	*Rottboellia exaltata*	Poaceae	Common
113.	*Rottboellia perforate*	Poaceae	Common
114.	*Rottboellia exaltata*	Poaceae	Common
115.	*Saccharum spontaneum*	Poaceae	Common
116.	*Sacciolepis indica*	Poaceae	Common
117.	*Sacciolepis mysuroides*	Poaceae	Common
118.	*Schizachyrium brevifolium*	Cyperaceae	Common
119.	*Scirpus articulatus*	Poaceae	Common
120.	*Scirpus lateriflorus*	Poaceae	Common
121.	*Scirpus tuberosus*	Poaceae	Common
122.	*Scleria levis*	Poaceae	Common
123.	*Scleria pergracilis*	Poaceae	Common
124.	*Spodiopogon rhizophorus*	Poaceae	Common
125.	*Sporobolus diander*	Poaceae	Common
126.	*Sporobolus indicus*	Poaceae	Common
127.	*Setaria intermedia*	Poaceae	Common
128.	*Setaria italica*	Poaceae	Common
129.	*Setaria pumila*	Poaceae	Common
130.	*Sorghum halepense*	Poaceae	Common
131.	*Sorghum nitidum*	Poaceae	Common
132.	*Themeda quadrivalvis*	Poaceae	Common
133.	*Themeda triandra*	Poaceae	Common
134.	*Thysanolaena maxima*	Poaceae	Common
135.	*Urochloa panicoides var.panicoides*	Poaceae	Common
136.	*Vetiveria zizanioides*	Poaceae	Common

Most of the above listed angiosperm species are common but there are 8 vulnerable, 4 near threatened and 1 rare tree species. But, when shrub, herb and creeper species existing in AABR are counted there are 4 near threatened and 5 vulnerable species of plants. *Clerodendrum serratum* (Verbenaceae), *Acorus calamus* (Araceae) and the orchid *Eulophia herbacea* (Orchidaceae) are

endangered species among shrubs and herbs known from this BR. The critically endangered plant species, *Rauwolfia serpentina* (Photo 4 b) also grows naturally in Lamni range of AABR. The endangered and critically endangered species need special attention. Besides this, there are nearly 14 rare and 49 common plant species of medicinal value *viz*. *Abroma augusta, Abutilon indicum, Aloe vera, Aristolochia indica, Barleria prionitis, Catharanthus roseus, Cymbopogon flexuosus, Elettaria cardamomum, Nardostachys jatamansi, Paederia foetida, Pandanus odoratissimus, Plumeria acuminata, Polygonum barbatum, Solanum nigrum* and 49 plant species of medicinal value are listed separately in table 7. These species are mostly herbs/ shrubs and not included in table 6.

Medicinal plants

Amarkantak plateau and Achanakmar valley have ideal habitats for existence of medicinally important species (Photo 4 a, b). The pH of the soil varies from 5.1 to 6.5 and the average available soil nutrients NPK varies from 203.9 to 257.1, 18.7 to 29.2, 376.5 to 551.3 Kg/ hectare respectively. There are nearly 130 species of medicinal tree, shrub and herb plants. Some of which are rare in other regions. These plant species are not only utilized by the local tribes for cure of many diseases but are also being sold to contractors, who supply them to manufacturers of Ayurvedic medicines (Prasad and Pandey, 1987a, 1993; Bargaiya and Singh, 2006). A conservation assessment prioritization workshop for medicinal plants (CAMP, 2003) assessed 48 plants as threatened in various categories. Of which, nearly 35 plant species are reported to be distributed from the AABR (Ved, *et al*., 2003).

Among trees, *Acacia catechu, Aegle marmelos, Azadirachta indica, Annona squamosa, Bauhinia variegata, Butea monosperma, Cassia fistula, Holarrhena antidysentrica, Terminalia arjuna, T. bellerica, T. chebula, T. alata (T. tomentosa), etc.* are well known for their medicinal properties. Similarly, there are many species of shrubs like *Abelmoschus esculentus, Abroma augusta, Aloe vera, Calotropis procera. Cassia occidentalis, C. tora,*

Photo 4a - *Hedychium coronarium* (Gulbakawali) – A threatened species

Photo 4b – *Rauwolfia serpentina* (Sarpagandha) – A Critically endangered species

Catharanthus roseus, Datura metel, D. alba, Solanum conferta, S. indicum, S. nigrum, S. surratense, Tinospora cordifolia, Vitex negundo, Xanthium strumarium etc. are well known for their medicinal properties. Among climbers and herbs *Abrus precatorius, Acanthospermum hispidum, Achyranthus aspera Argemone mexicana, Aristolochia indica, Asparagus racemosus, Bauhinia vahlii, Boerhaavia diffusa, Celastrus paniculata, Centella asiatica, Centipeda minima, Chlorophytum arundinaceum, Clitoria ternatea, Curculigo orchioides, Curcuma angustifolia, C. aromatica, C. caesia, C. longa, Cyathocline purpurea, Dendrophthoe falcata, Dioscorea bulbifera, D, hispida, D. pentaphylla, Drimia indica, Elephanthopus scaber, Embelia ribes, Eranthemum purpurascens, Euphorbia hirta, E. thymifolia, Evolvulus alsinioides, Gloriosa superba, Gymnema sylvestre, Hedychium coronarium, Hydrocotyle asiatica, Hyptis suaveloens, Hypericum japonicum, Ipomoea pestigris, I. reniformis, I. turpethum, Justicia simplex, Leucas aspera, Mentha piperata, Mimosa pudica, Mirabilis jalapa, Ocimum gratissimum, Phyllanthus amarus, Plumbago zeylanica, Rauwolfia serpentina, Rungia repens, Setaria italica, Smilax perfoliata, Tephrosia purpurea, Tridax procumbens, Withania somnifera, Zingiber officinalis* are widely distributed in different zones of Biosphere Reserve and known for their medicinal properties.

Table 7. List of medicinal plants reported from different zones of BR.

S. No.	Plant species	Local name	Status
1.	*Abutilon indicum*	Kunghi	Rare
2.	*Adhatoda vasica*	Adusa	Common
3.	*Adiantum capilus-veneris*	Hansraj	Common
4.	*Ageratum conyzoides*	Gangauon	Common
5.	*Ajuga bracteosa*	Nilkanthi	Common
6.	*Alangium salvifolium*	Akola	Common
7.	*Allium sativum*	Lahsun	Common
8.	*Aloe vera*	Gheekumar	Rare
9.	*Amorphophallus campanulatus*	Jimikand	Common
10.	*Amorphophallus sylvaticus*	Jungli Suran	Common
11.	*Argyreia speciosa*	Samandar kapat	Common

12.	*Aristolochia indica*	Iswarmul	Rare
13.	*Atylosia scarabaeoides*	Balar pati	Common
14.	*Barleria prionitis*	Katsareya	Rare
15.	*Blumea flava*	Karanda	Common
16.	*Bombax spp.*	Semal khand	Common
17.	*Borreria stricta*	Singwala	Common
18.	*Bryonia laciniosa*	Shivlingi	Common
19.	*Canscora diffusa*	Shankar phuli	Common
20.	*Catharanthus roseus*	SadaSuhagan	Rare
21.	*Cissus quadrangularis*	Had jod	Common
22.	*Clerodendron phlomidis*	Bharangi	Common
23.	*Colebrookea oppositifolia*	Bhind	Common
24.	*Crotalaria albida*	Banmethi	Common
25.	*Crotalaria burhia*	-	Common
26.	*Crotalaria sericea*	Jhunjunia	Common
27.	*Cymbopogon flexuosus*	Lemon grass	Rare
28.	*Datura alba*	Dhatura safed	Common.
29.	*Elettaria cardamomum*	Elaichi	Rare
30.	*Euphorbia pulcherrima*	Dudhilata	Common
31.	*Gardenia florida*	Gandh Raj	Common
32.	*Gossypium herbaceum*	Kapas	Common
33.	*Hydrocotyle asiatica*	Brahma	Common
34.	*Hyptis suaveolens*	Kariped	Common
35.	*Ipomoea pestigridis*	Shanker kundi	Common
36.	*Ipomoea reniformis*	Musakarni	Common
37.	*Ipomoea turpethum*	Nisoth	Common
38.	*Leucus aspera*	Chotahalkusa	Common
39.	*Nardostachys jatamansi*	Jatamansi	Planted / Rare
40.	*Ocimum sanctum*	Tulsi	Common
41.	*Orobranche aegyptica*	-	Common
42.	*Paederia foetida*	GandhPresai	Rare
43.	*Pandanus odoratissimus*	Kewda	Rare
44.	*Phyllanthus simplex*	Roli	Common
45.	*Plumeria acuminata*	Gulchin	Rare
46.	*Polygonum barbatum*	-	Rare
47.	*Pueraria tuberosa*	Patalkumhaa	Common
48.	*Ricinus communis*	Arand	Common
49.	*Rosa centifolia*	Gulab	Common
50.	*Rungia parviflora*	Pindi	Common
51.	*Smithia conferta*	Nulakhahira	Common
52.	*Solanum indicum*	Kateri	Common
53.	*Solanum nigrum*	Makoia	Rare in BR
54.	*Solanum surratense* (Syn. *S. xanthocarpum*)	Kateri	Common
55.	*Thespesia lampas*	Kapas	Common

56.	*Thevetia nerifolia*	Kaner yellow	Common
57.	*Tinospora cordifolia*	Giloy	Common
58.	*Tribulus terestris*	Gokhara	Common
59.	*Tylophora indica*	Antamul	Common
60.	*Vernonia roxburghii*	Sahedevi	Common
61.	*Vitis quadragularis*	Herjuri	Common
62.	*Xanthium strumarium*	Gokhru	Common
63.	*Zornia gibbosa*	-	Common

Although, the entire biosphere reserve is very rich in flora due to its varied soil types, ecological conditions, etc. Still, both the rare and common species of medicinal value existing in AABR need strong protection. The techniques for their sustainable harvesting in buffer and transitions zones are also urgently required. Side by side, the techniques of their cultivation in and around AABR are to be developed to minimize the pressure on AABR.

Population status of tree species and their regeneration status:

To study the population status of various species of trees, shrubs and herbs distributed in different ranges of core, buffer and transition zones of AABR. Seven sample plots of 1ha each *viz*. 2 in Lamni range (Compartment Nos. 311 & 324), 1 in Game range (Comp. No.507) and 2 in Achanakmar range (Comp. Nos.159 & 198) in core zone and 2 in buffer/ transition zones *viz*. 1 in Lormi range and 1 in Lamni range were laid out by Tropical Forest Research Institute, Jabalpur during August 2006. The regeneration (Photo 5a, b) status of various tree species viz. *Shorea robusta*, *Terminalia tomentosa*, *Diospyros melanoxylon*, *Anogeissus latifolia*, *Lagerstroemia parviflora* and other miscellanous species like *Cassia fistula*, *Syzygium cumini*, *Phyllanthus emblica*,

Photo 5a - Permanent Sample plot laid in AABR

Photo 5b – Regeneration in AABR

etc. in each permanent plot was studied. In Lamni range, maximum regeneration was recorded. In all the ranges sal, *Shorea robusta* was the major tree species followed by *Diospyros melanoxylon* and *Terminalia tomentosa*. As per the working plan of Bilaspur Forest Division (Bajaj, 2005), the regeneration status in Lamni range is given in Table-8.

Table 8 .Regeneration status at Lamni forest range

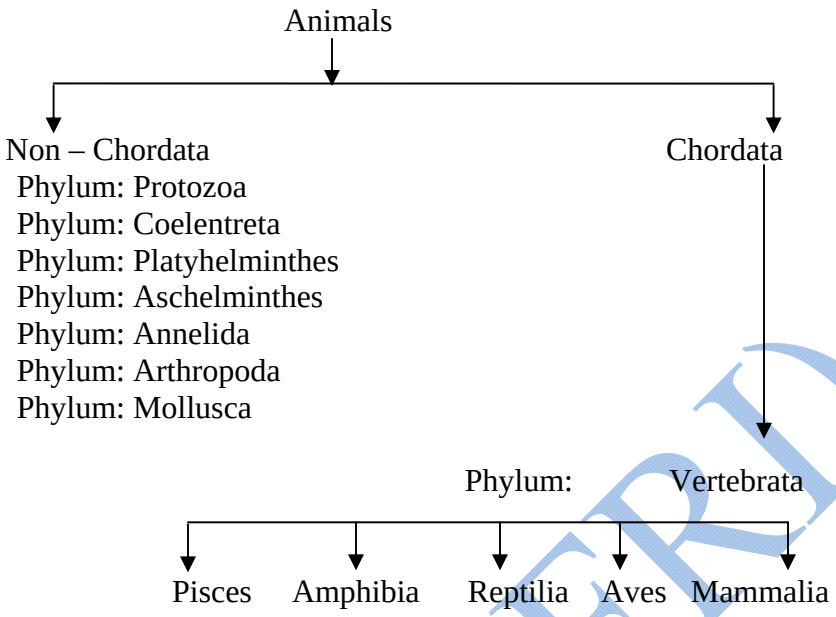
S.N.	Plant Species	Seedlings	Establi-shed	Ist year old saplings	Total Seedlings & Saplings
1.	*Shorea robusta*	2490	308	1567	4365
2.	*Terminalia tomentosa*	625	50	69	744
3.	*Diospyros melanoxylon*	1538	278	69	1885
4.	*Pterocarpus marsupium*	248	10	40	298
5.	*Anogeissus latifolia*	476	60	79	615
6.	*Lagerstroemia parviflora*	208	30	40	278
7.	Other species (*Syzygium cumini, Cassia fistula, Bauhinia variegata,* etc.)	2004	268	625	2897

Present study conducted during October 2006, however, showed lower regeneration rate of above dominant species.Therefore, a detailed study on the regeneration status is urgently required and the causes of depletion are to be investigated. This will be helpful in better management of the BR.

2. Fauna:

The BR represents the Deccan Peninsular zone of the Biogeographic classification of India (Rodgers and Panwar, 1988). The core area of BR i.e. “Achanakmar, Game and Lamni ranges” has a better population of wildlife than the buffer zone. Mostly, all the representatives of the following animal phyla of Animal Kingdom exist in BR. A brief about them follows as hereunder:

Rodgers, W.A. and Panwar, H.S. 1988. Planning Wildlife protected area network in India Vol. I and II. Wildlife Institute of India, Dehradun.



Protozoa and Coelenterata:

Though, there are many species of free-living protozoans exist in fresh water ponds, rivers and dams etc. Besides this, the parasitic species, causing disease in animals also exist in BR. The morphological details and their importance are not known. Thus, there is an ample scope for the studies on these animals.

Platyhelminthes and Aschelminthes:

No work on the helminthes, both flatworms and round worms existing in BR is explored and thus provides ample scope for the scientific study.

Annelida:

The annelids are segmented, vermiform, aquatic, burrowing, free-living animals and widely distributed throughout the BR. Some of them like earthworms are very much beneficial for maintaining the soil fertility, porosity and water holding capacity in soil. Many species of them are universally distributed in core and buffer zones of BR. No published work is available on this group existing in BR and thus, needs a detailed exploration.

Arthropoda:

The arthropods consist of crustaceans, mites, spiders and insect species. They are also inseparable part of its environment. Most of the arthropods feed on plant species whereas others are carnivorous or omnivorous. Some of them are helpful in decomposing the fallen leaves and wood and thus act as scavengers in Achanakmar-Amarkantak Biosphere Reserve. Shadangi and Nath, (2006) have given a concise description on the role of micro arthropod population in decomposition of *Eucalyptus*, pines and *sal* at Amarkantak in buffer zone of the BR. A brief on the population of various groups of invertebrates in litter decomposition in different months is summarized as here under:

Table 9: Population of micro-arthropods in decomposition of E (*Eucalyptus*), P (*Pines*) and S (*Sal*) litter during different months.

Month	Tree species	Group of Micro-Arthropods								Total
		Acari	Isoptera	Collem-bola	Coleo-ptera	Hymeno-ptera	Diptera	Arach-nida	Protura	
July	E	15	0	04	02	-	-	01	-	24
	P	05	06	03	-	-	-	-	01	15
	S	13	02	07	01	-	-	-	-	23
Aug	E	11	02	-	02	02	-	-	-	17
	P	05	04	-	01	03	-	-	-	13
	S	15	02	02	-	04	-	-	04	27
Sep	E	10	01	-	02	03	-	-	-	16
	P	04	03	-	02	02	-	-	-	11
	S	15	08	-	-	-	-	02	-	25
Nov	E	05	03	-	-	02	-	-	-	10
	P	02	01	-	-	01	-	-	-	04
	S	12	-	01	-	-	-	02	-	15
Dec	E	03	03	-	03	-	-	-	-	09
	P	03	02	-	01	02	-	-	-	08
	S	10	02	-	-	-	08	-	-	20
Jan	E	03	04	-	02	-	-	-	-	09
	P	02	03	02	03	-	-	-	-	10
	S	10	03	02	-	-	04	-	-	19
Feb	E	04	04	-	03	-	-	01	-	12
	P	03	02	-	02	-	-		-	07
	S	07	03	02	-	-	05	-	-	17

May	E	05	-	02	02	-	-	02	-	11
	P	10	-	03	-	-	-	01	-	14
	S	12	-	03	-	-	-	-	-	15

E= Eucalyptus, P =Pines, S= *Sal*

No detailed work on the litter decomposition of Achankmar-Amarkantak BR has been done so far. Similarly, nothing is known about various species of crustaceans, mites and spiders. Zoological Survey of India has identified the following 47 species of common butterflies (Table 10) but the information about certain common papilionid, satyrid and peried butterfly species, which is reported from neighbouring districts of AABR, is wanting.

Table 10: List of insects identified from the Achanakmar- Amarkantak Biosphere Reserve.

S.N.	**Name of the species**	**Status**
Family:Papilionidae		
1.	*Chilasa clytia*	Common
2.	*Graphium nomius nomius*	Not rare
3.	*Papilio polytes romulus*	Very Common
4.	*Papilio demoleus demoleus*	Common
Family: Pieridae		
5.	*Anapheis aurota aurota*	Common
6.	*Catopsilia pyranthe*	Very Common
7.	*Catopsilia crocale*	Very Common
8.	*Catposilia pomana*	Common
9.	*Eurema laeta laeta*	Common
10.	*Eurema hecabe simulata*	Very Common
Family: Danaidae		
11.	*Danaus genutia*	Very Common
12.	*Danaus chrysippus chrysippus*	Very Common
13.	*Danaus limniace leopardus*	Common
14.	*Euploea core core*	Very Common
Family : Satyridae		
15.	*Melanitis leda ismene*	Very Common
16.	*Mycalesis mineus*	Very Common
17.	*Mycalesis lepcha*	Common
Family: Nymphalidae		
18.	*Athyma porius*	Common

19.	*Athyma selenophora*	Common
20.	*Charaxes fabius ceryathus*	Common
21.	*Hypolimnas bolina*	Common
22.	*Hypolimnas misippus*	Common
23.	*Moduza procris procris*	Common
24.	*Neptis hylas*	Common
25.	*Neptis jumbah*	Common
26.	*Phaedyma columella*	Common
27.	*Precis atlites*	Common
28.	*Precis almana almana*	Common
29.	*Precis orithya swinhoei*	Common
30.	*Precis hierta hierta*	Common
31.	*Precis lemonias lemonias*	Common
32.	*Precis iphita iphita*	Common
33.	*Phalanta phalantha*	Common
34.	*Symphaedra nais*	Common
Family: Riodinidae/ Erycinidae		
35.	*Abisara echerius*	Common
Family: Lycaenidae		
36.	*Castalius rosimon rosimon*	Common
37.	*Euchrysops phasius*	Common
38.	*Narathura amantes*	Common
39.	*Narathura atras*	Common
40.	*Rapla airbus sorya*	Common
Family: Hesperiidae		
41.	*Badamia exclamationis*	Common
42.	*Caprona ransonnetti*	Common
43.	*Caltoris kumara*	Common
44.	*Caltoris farri*	Common
45.	*Suastus gremius*	Common
46.	*Spialia galaba*	Common
47.	*Udaspes folus*	Very Common

Besides above butterflies, Zoological Survey of India, Jabalpur has also identified 22 species of scarabaeid beetles *viz. Hybosorus orientalis, Catharsius molossus, C. sagax, Gymnopleurus cynaeus, G. gemmatus, G. sinuatus, Heliocopris bucephalus, Onthophagus catta, O. bonasus, O. pactolus, Scarabaeus sanctus, Holotrichia problematica, Adoretus bimarginatus, A. lasiopygus, A. limbatus, Anomala biharensis, A. dorsalis, A. ruficapilla, A. rugosa, Mimela inscripta, Phyllognathus dionysius and Clinteria klugi* (Chandra, 2006) from core area of BR. Chandra and

Gupta (2005) also recorded a rare species of monster cricket, *Schizodactylus monstrosus* from the BR for the first time. It burrows in sandy soil along the river beds.

Information about various other groups of insects like moths, bees, wasps, grasshoppers, dragonflies, damselflies and dipterans is not available and thus, there is need for extensive studies on various species of insects and other arthropods existing in AABR.

Mollusks:

A variety of phytophagous terrestrial and a few fresh water mollusks were seen during the recent visits of the BR between July-August, but no published work is available on the mollusks available in BR. Thus, needs an extensive study of this group existing in AABR.

Pisces:

The BR is quite rich in fish fauna. Following 22 species (Table 11) of fishes like *Catla catla, Labeo* and *Punctius*, etc. are known, but, no published data are available on them. Therefore, a detailed study on the fish fauna is required.

Table 11: Species of fish reported from BR.

S.No.	Scientific name	Local name
1.	*Amblypharyngodon mola*	-
2.	*Badis badis*	-
3.	*Catla catla*	Bakua, Catla
4.	*Chanda ranga*	Chanda
5.	*Channa marulius*	Sanwal
6.	*Cirrhinus mrigala*	Mirgal
7.	*Clarias catrachus*	Magur
8.	*Cyprynous carpio*	Common carp
9.	*Cyprynous sp*	Grass carp
10.	*Esomus danricus*	Darikana

11.	*Forfor gundis*	Kotri
12.	*Glossogobius giuris*	-
13.	*Heteropneustes fossilis*	Singhi
14.	*Labeo bata*	Bata
15.	*Labeo calabasu*	Calbasu
16.	*Labeo rohita*	Rohu
17.	*Nandus nandua*	Nandus
18.	*Notopterus chitala*	Chital, Pupda
19.	*Puntis sarana*	Punti
20.	*Puntis sophore*	Punti
21.	*Tilspia mesambica*	Tilapia
22.	*Wallago attu*	Boal

Amphibia:

As per Zoological Survey of India report 2004, nearly 9 species of amphibians like burrowing frogs, tree frogs, toads, etc. exist in the core area of the BR (Chandra and Pandey, 2004). Most of them are common but no detailed information is available and hence deserve for further investigations.

Table 12: Amphibian reported from the BR**.**

S.N.	Name of the species	English name	Status
Family: Ranidae			
1.	*Euphlyctis cyanophlyctis*	Indian Skipping Frog	Common
2.	*Hoplobatrachus tigerinus*	Indian Bull Frog	Common
3.	*Indirana leithii*	Boulenger Brown Frog	Common
4.	*Limnonectes limnocharis*	Cricket Frog	Common
5.	*Tomopterna breviceps*	Short- headed Burrowing Frog	Common
Family: Microhylidae			
6.	*Microhyla ornate*	Ornate Narrow- mouthed Frog	Common
7.	*Uperodon systoma*	Marbled Balloon Frog	Common
Family: Rhacophoridae			
8.	*Polypedates maculates*	Common Tree Frog	Common
Family: Bufonidae			
9.	*Bufo melanosticus*	Common Asian Toad	Common

Reptiles:

The reptiles may be lizards and snakes. Zoological Survey of India has reported 8 species of lizards and 6 species of snakes from Achanakmar, Game, and Lamni ranges during the year 2004 (Chandra and Pandey, 2005). The study appears incomplete because the state of Chhattisgarh has nearly 3 times more reptiles (*i.e.*, 45 species of reptiles) and hence, further study on this line is urgently required.

Table 13: Species of reptiles reported from the BR.

S.N.	Scientific name	Local name	English name	Status
Family: Gekkonidae				
1.	*Cyrtodactylus collegalensis*	-	Kollegal Ground Gecko	Common
2.	*Hemidactylus brooki*	-	Spotted House Gecko	Becoming rare
Family: Agamidae				
3.	*Calotes versicolor*	-	Garden Lizard	Very common
4.	*Psammophilus blanfordanus*	-	Blanford's Rock Agama	Common
5.	*Sitana ponticeriana*	-	Fan throat Lizard	Common
Family: Scincidae				
6.	*Mabuya carinata*	-	Common Keeled Grass Skink	Very Common
7.	*Mabuya macularia*	-	Bronze green Little Skink	Very Common
Family: Varanidae				
8.	*Varanus bengalensis*	-	Common Indian Monitor	Endangered, Vulnerable
Family: Boidae				
9.	*Python molurus*	Ajgar	Indian Rock Python	Common
Family: Elapidae				
10.	*Bungarus caeruleus*	-	Common Indian Krait	Common
Family: Colubiridae				
11.	*Amphiesma stolata*	-	Buff Striped Keelback	Common
12.	*Lycodon aulicus*	-	Common Wolf Snake	Common
13.	*Ptyas mucosus*	Chuha-mar Sanp	Rat Snake	Common
14.	*Xenochrophis piscator*	Paniw-ala sanp	Checkered Keelback	Common

Aves: (Photo 6 a, b, c, d, e, f)

Studies on identification of birds existing in AABR have been done by Zoological Survey of India. Following 145 common species of birds belonging to different families have been identified so far.

Photo 6a. Brahmini or Blackheaded Myna, *Sturnus pogodarum*

Photo 6b. Golden-backed Woodpecker, *Dinopium benghalensis*

Photo 6c. Magpie-Robin, *Copsychus saularis*

Photo 6d. Indian Robin, *Sexicoloides fulicata*

Photo 6e. Small Green Bee-eater, *Merops orientalis*

Photo 6f. Redwattled Lapwing, *Vanellus indicus*

Table 14: List of birds reported from BR.

S. N.	Scientific name	Common name	Status
Family: Phasinidae (Pheasants)			
1.	*Coturnix coturnix*	Common or Grey Quail	Common
2.	*Francolinus pictus*	Painted Partridge	Common
3.	*Francolinus pondicerianus*	Grey Partridge	Common
4.	*Gallus gallus*	Red Jungle - fowl	Common
5.	*Pavo cristatus*	Common Pea - fowl	Common
6.	*Perdicula asiatica*	Jungle Bush Quail	Common
Family: Anatidae (Duck, Geese)			
7.	*Anser indicus*	Barheaded Goose	Common
8.	*Anas acuta*	Pintzl	Common
9.	*Anas poecilorhyncha*	Spot Bill Duck	Common
10.	*Anas strepera*	Gadwall	Common
11.	*Anas gibberifrons*	Crey Teal	Common
12.	*Aythya ferrina* (Syn. *A. rufa*)	Common Pochard	Common
13.	*Aythya nyroca*	White eyed Pochard	Common
14.	*Aythya fuligula*	Tufted Pochard	Common
15.	*Nettapus coromandelianus*	Cotton Teal	Common
16.	*Sarkidiornis melanotos*	Nukma or Comb Duck	Common
17.	*Tadorna ferruginea* (Syn.*Casarca ferruginea*)	Brahminy Duck	Common
Family: Picidae (Woodpeckers)			
18.	*Dinopium benghalensis* (*Syn.Brachypternus benghalensis*)	Golden - backed Woodpecker	Common
19.	*Micropternmus brachyurus*	Rufous - Woodpecker	Common
20.	*Picoides mahrattensis* (Syn.*Dryobates mahrattensis*)	Yellow - fronted Pied	Common
21.	*Picoides nanus*	Pygmy Woodpecker	Common
Family: Megalaiaedae (Capitauridae)			
22.	*Megalaima rubricapilla*	Crimson - throated Barbet	Common
23.	*Megalaima zeylanica*	Large Green Barbet	Common
Family: Bucerotidae (Hornbill)			
24.	*Anthracoceros malabaricus*	Indian Pied Hornbill	Common
25.	*Tockus birostris*	Common Grey Hornbill	Common
Family: Upupidae (Hoopoes)			
26.	*Upupa epops*	Hoopoe	Common
Family: Coraciidae (Rollers)			
27.	*Coracias benghalensis*	Indian Roller or Blue Jay	Common
Family:Alcedimidae (Kingfisher)			
28.	*Alcedo atthis*	The common Kingfisher	Common
29.	*Ceryle rudis*	Lesser - Pied Kingfisher	Common

30.	*Halcyon smyrnensis*	White -breasted Kingfisher	Common
Family : Merotidae (Bee Eaters)			
31.	*Merops orientalis*	The Common or Green Bee eater	Common
Family: Cuculidae (Cuckoos)			
32.	*Cuculus micropterus*	Indian Cuckoo	Common
33.	*Cuculus varius* (Syn.*Heirococcyx varius*)	Brain fever Bird	Common
34.	*Clamator jacobinus*	Pied Crested Cuckoo	Common
35.	*Centropus sinensis*	Crow Pheasant	Common
36.	*Eudynamis scolopaceus*	Koel	Common
Family: Psittacidae(Parakeets)			
37.	*Psittacula krameri*	Rose Ringed Parakeet	Common
38.	*Psittacula eupatria*	Large Indian Parakeet	Common
39.	*Psittacula cyanocephala*	Blossom Headed Parakeet	Common
Fmily: Apodidae(Swifts)			
40.	*Apus Micropus affinis*	House Swift	Common
41.	*Chaetura sylvatica*	White Rumped Spinetail	Common
Family: Titonidae (Owls)			
42.	*Tyto alba*	Barn Owl or Screech - Owl	Common
Family: Strigidae (Owls)			
43.	*Athene brama*	Spotted Owlet	Common
44.	*Bubo bubo*	Indian Great Horned - Owl	Common
45.	*Bubo nipalonensis*	Forest Eagle - Owl	Common
46.	*Bubo zeylonensis* (Syn. *Ketupa zeylonensis*)	Brown Fish - Owl	Common
47.	*Strix ocellata*	Mottled Wood - Owl	Common
Family: Coprimulgidae (Nightjar)			
48.	*Caprimulgus affinis*	Franklin's Nightjar	Common
49.	*Caprimulgus asiaticus*	Common Indian Nightjar	Common
50.	*Caprimulgus indica*	Indian Jungle Nightjar	Common
Family:Columbidae (Pigeons, Doves)			
51.	*Chalcophaps indica*	Emerald Dove	Common
52.	*Streptopelia chinensis*	Spotted Dove	Common
53.	*Streptopelia tranquebarica* (Syn.*Oenopopelia tranquebarica*)	Red - turtle Dove	Common
54.	*Treron phoenicopterus* (Syn.*Crocopus hoenicopterus*)	Common Green Pigeon	Common
Family: Gruidae (Cranes)			
55.	*Girus antigone* (Syn.*Antigone antigone*)	Sarus Crane	Common
Family:Rallideae (Moore, Hens)			
56.	*Amaurornis phoenicurus*	White - breasted Water Hen	Common

57.	*Amaurornis akool*	Brown Crake	Common
58.	*Fulica atra*	Coot	Common
59.	*Gallinula chloropus*	Indian Moorhen	Common
60.	*Porphyrio porphyrio*	Purple Moorhen	Common
Family: Jakanidae			
61.	*Hydrophasianus chirurus*	Pheasant Tailed Jacana	Common
62.	*Metopidius indicus*	Bronze winged Jacana	Common
Family: Pterodidae (Sandgrouse)			
63.	*Pterocles exustus*	Common Sandgrouse	Common
Family: Burhinidae (Stone Plovers)			
64.	*Burhinus oedicnemus*	Stone Curlew	Common
65.	*Esacus magnirostris*	Great Stone Plover	Common
Family: Charadriidae (Sand Piper Snipes)			
66.	*Gallingo minima*	Jack Spine	Common
67.	*Limosa limosa*	Godwit	Common
68.	*Trigna hypoleucos*	Sand Piper	Common
69.	*Tringa tetanus*	Red Shank	Common
70.	*Vanellus indicus*	Red Wattled Lapwing	Common
71.	*Vanellus malabaricus*	Yellow Wattled Lapwing	Common
Family: Glareolidae (Coursers)			
72.	*Cursorius coromandelicus*	Indian Courser	Common
Family: Lariidae (Torus)			
73.	*Sterna aurantia*	River tern	Common
Family: Accipitridae (Hawkers Eagles)			
74.	*Circus aeruginosus*	Marsh Harrier	Common
75.	*Elanus caeruleus*	Black - winged Kite	Common
76.	*Gyps bengalensis* (Syn. *Pseudogyps bengalensis*)	White - backed Vulture	Common
77.	*Milvus migrans govinda*	Common Pariah Kite	Common
78.	*Neophron percnopterus*	Scavenger Vulture	Common
79.	*Sarcogyps calvus*	King Vulture	Common
Family: Falconidae (Falcons)			
80.	*Falco tinnunculus*	Kestrel	Common
Family: Podicipedidae (Grebes)			
81.	*Podiceps ruficollis*	Little Grebe or Dabchick	Common
Family: Phalacrocoracidae (Cormorants, Darters)			
82.	*Phalarocorax niger*	Little Cormorant	Common
83.	*Phalarocorax fuscicollis*	Indian Shag.	Common
Family: Aredeidae (Egrets, Herons)			
84.	*Ardea cinerea*	Grey Heron	Common
85.	*Ardea purpurea*	Purple Heron	Common
86.	*Ardeola grayii*	Pond Heron	Common
87.	*Bubulcus ibis*	Cattle Egret	Common
88.	*Egretta garzetta*	Little Egret	Common
Family : Threskiormithidae (Ibises, Spoonbills)			

89.	*Pseudibis papillosa*	Black Ibis	Common
Family : Ciconidae (Storks)			
90.	*Cicoma episcopus* (Syn.*Dissoura episcopus*)	White - necked Stork	Common
Family: Pittidae			
91.	*Pitta brachyuras*	Indian Pitta	Common
Family: Irenidae (Ioras)			
92.	*Chloropsis aurifrons*	Gold Fronted Chloropsis or Green Bulbul	Common
93.	*Chloropsis cochinensis*	Gold Mantled Chloropsis	Common
Family: Laniidae (Shrikes)			
94.	*Lanius schach*	Rufous - backed Shrike	Common
95.	*Lanius vittatus*	Bay - backed Shrike	Common
Family: Corvidae (Crow)			
96.	*Corvus macrorhynchos*	Jungle Crow	Common
97.	*Corvus splendens*	House Crow	Common
98.	*Dendrocitta vagabunda*	Indian Tree Pie	Common
Family: Orioiidae (Orioles)			
99.	*Oriolus oriolus*	Golden Oriole	Common
100.	*Oriolus xanthornus*	Black - headed Oriole	Common
Family: Campiphagidae (Cuckoo- shrikes)			
101.	*Coracina novaehollandia*	Large Cockoo Shrike	Common
102.	*Pericrocotus flammeus*	Scarlet Minivet	Common
103.	*Pericrocotus cinnamoments*	Small Minivet	Common
104.	*Tephrodornis pondicerianus*	Wood Shrike	Common
Family: Muscicapidae (Flycatchers)			
105.	*Copsycus malabaricus* (Syn.*Kittacincla malabarica*)	Shama	Common
106.	*Copsycus saularis*	Magpie Robin	Common
107.	*Monticola solitarius* (Syn.*M. solitaria*)	Blue Rock Thrush	Common
108.	*Muscicapula tickelliae*	Tickell's Blue Flycatcher	Common
109.	*Orthotomus sutorius*	Tailor Bird	Common
110.	*Prinia socialis*	Ashy Wren - Warbler	Common
111.	*Prinia sylvatica*	Jungle Wren - Warbler	Common
112.	*Rhipidura aureola* (Syn.*Leucocirca aureola*)	White - browed Fantail Flycatcher	Common
113.	*Saxicola caprata*	Pied Bush Chat	Common
114.	*Saxicoloides fulicata*	Indian Robin	Common
115.	*Terpsiphone paradise* (Syn.*Tchitrea paradise*)	Paradise Flycatcher	Common
Family: Sturnidae (Myna)			
116.	*Acridotheres fuscus*	Jungle Myna	Common
117.	*Acridotheres tristis*	Common Myna	Common
118.	*Sturnus pogodarum*	Brahminy Myna	Common

	(Syn. *Temenuchus pogodarum*)		
Family:Dicruridae (Drongos)			
119.	*Dicrurus adsimilis*	Black Drongo	Common
120.	*Dicrurus paradiseus*	Racket - tailed Drongo	Common
Family: Sittidae			
121.	*Sitta castanea*	Chestnut - bellied Nuthatch	Common
Family: Paridae			
122.	*Parus major*	Grey Tit	Common
Family: Hirundinidae			
123.	*Hirundo concolor* (Syn. *Riparia concolor*)	Dusky Crag Martin	Common
124.	*Hirundo smithii*	Wire - tailed Swallow	Common
125.	*Hirundo fluvicola*	Cliff Swallow	Common
Family: Pycnonotidae			
126.	*Pycnonotus cafer* (*Syn.Molpastes cafer)*	Red - vented Bulbul	Common
Family: Zosteropidae			
127.	*Zostrops palpebrosa*	White Eye	Common
Family: Silvidae (Babblers)			
128.	*Turdoides malcolmi*	Large- grey Babbler	Common
129.	*Turdoides striatus*	Jungle Babbler	Common
Family: Alaudidae (Larks)			
130.	*Eremopterix assamica* (Syn.*E. grisea*)	Ashy - Crown Finch lark	Common
131.	*Galerida cristata*	Crested Lark	Common
Family: Nectariniidae			
132.	*Nectarinia asiatica* (Syn.*Cinnyris asiatica*)	Purple Sunbird	Common
133.	*Nectarinia zeylonica* (Syn.*Cinnyris zeylonica*)	Purple - Rumped Sunbird	Common
Family: Ploceidae a. Passerinae			
134.	*Petronia xanthocolli* (Syn.*Gymnorhis xanthocollis*)	Yellow - throated Sparrow	Common
135.	*Passer domesticus*	House - Sparrow	Common
b. Ploeeinae			
136.	*Ploceus philippinus*	Baya or Common Weaver – Bird	Common
c. Estrildinae			
137.	*Lonchura malabarica* (Syn.*Uroloncha malabarica*)	White - throated Munia	Common
138.	*Lonchura punctulata* (Syn. *Uroloncha punctulata*)	Spotted Munia	Common
Family:Motacillidae			
139.	*Anthus hodgsoni*	Indian Tree Pipit	Common

140.	*Anthus novaseelandiae*	Paddy Field Pipit	Common
141.	*Motacilla alba*	White Wagtail	Common
142.	*Motacilla flava*	Yellow Wagtail	Common
143.	*Motacilla citreola*	Yellow - headed Wagtail	Common
144.	*Motacilla maderaspatensis*	Large - Pied Wagtail	Common
Family: Emberizidae			
145.	*Melophus lathami*	Crested Bunting	Common

But, many species of birds like the grey jungle fowl (*Galus sonneratii*), painted spur fowl (*G. lunulata*), yellow checked tit (*Machlolopus xanthogenys*), Jerdon's Chloropsis (*Chloropsis jerdoni*), Blackbird (*Turdus simillimus*), the Deccan Scimitar Babbler (*Pomatorhinus horsfieldii*), Rufous – bellied Babbler (*Dumetia hyperythra*), the red – whiskered Bulbul (*Otocompsa jocosa*), the redstart (*Phoenicurus ochruros*), etc. which were known to have distribution in central and Peninsular India (Ali, 1946,1996) may exist in AABR and hence there is scope for further exploration about the avian fauna existing in this BR.

MAMMALS: (Photo 7 a, b)

The BR is covered with dense forest vegetation in core and some areas of buffer zones and forms an ideal habitat and has huge potential for supporting various wild animals. Bharos (1988) has reported presence of albino sloth bear, *Melursus ursinus* from AABR. As per the working plan, the following 29 species of wild mammals are known from core area of the BR (Bajaj, 2005). The survey report submitted by Zoological Survey of India, Jabalpur also confirms it.

Table 15: List of mammals found in Achanakmar Amarkantak Biosphere Reserve

S.No.	Name of species	Local names	English Name
1.	*Axis axis*	Chital	Spotted Deer
2.	*Bandicota bangalensis*	Chuha	Field Rat
3.	*Boselaphus tragocamelus*	Nilgai	Blue Bull
4.	*Bos gaurus*	Indian Bison	Gaur
5.	*Canis alpinus*	Jangli Kutta	Indian Wild Dog
6.	*Canis aureus*	Siyar	Jackal
7.	*Canis lupus pallipes*	Bhediya	Nold
8.	*Cervus unicolor*	Sambhar	Sambhar
9.	*Felis chaus*	Jangli Billi	Jungli Cat
10.	*Funambulus pennati*	Gilhari	Three Striped Squirrel
11.	*Gazella gazelle*	Chinkara	Indian Gazella

Photo 7a - Wildlife in Core Zone of AABR - Sambhar

Photo 7b - Wildlife in Core Zone of AABR - Bison

12.	*Herpestes edwardsi*	Newala	Common Mongoose
13.	*Hyaena hyaena*	Lakhar Bagha	Striped Hyaena
14.	*Hystrix indica*	Saihi	Indian Porcupine
15.	*Lepus nigricollis*	Khargosh	Indian Hare
16.	*Macaca mulatta*	Bandar	Rheus Macaque
17.	*Manis crassicaudata*	Gilhari	Flying Squirrel
18.	*Melursus ursinus*	Bhalu	Sloth Bear
19.	*Mallivora capensis*	Bijoo	Indian Ratel
20.	*Muntiacus muntjak*	Kotri	Barking deer
21.	*Panthera pardus*	Tendua	Panther
22.	*Panthera tigris*	Bagh	Tiger
23.	*Presbytis entellus*	Bandar	Common Langur
24.	*Soiurns* sp.	Gilhari	Malabar Squirell
25.	*Suncus murinus*	Chuchundar	Gray Musk Shrew
26.	*Sus scrofa*	Suar	Indian Wild Boar
27.	*Tetracerus quadricornis*	Chowsingha	Four Horned Antelope
28.	*Tragulus meminna*	Mouse Deer	Indian Chevrotin
29.	*Vulpes bengalensis*	Lomari	Indian Fox

E. Inhabitants: (Photo 8 a, b)

In all, 238 forest and revenue villages situated in the AABR falls within Chhattisgarh state. Most of them have been located in the transition and buffer zones. The forest villages existing in the buffer zone area of Chhattisgarh are Atariya, Anrapani, Bijrakachra, Boiraha, Chakda, Danokhar, Jamunahi, Jhiriya, Karidongri, Patparha, Ranjiki, Salgi, Sargadi, Sarasdole, Shivalkhar and Tingipur. In the core zone of AABR, there is no revenue village. However, there are following 22 forest villages with a population of nearly 7,709 persons at present. They belong to scheduled tribes, schedule castes, others backward classes and a few others as shown in the following table:

Table 16: Forest villages in Core zone of AABR

S.N.	**Forest village**	**Population**				
		Schedule Tribe	**Schedule Caste**	**OBC**	**Others**	**Total**
1.	Achanakmar	151	8	253	12	424
2.	Bidaval	618	0	124	03	745
3.	Bankal	97	0	1	0	98

Photo 8a - A Tribal Village in AABR

Photo 8b - A Family of Baiga Tribe in AABR

4.	Bahaud	206	0	8	0	214
5.	Bokrakachhar	106	0	7	0	113
6.	Sambardhsan	44	0	0	0	44
7.	Lamni	453	10	53	0	516
8.	Tilaidabra	170	0	7	0	177
9.	Kuba	60	0	0	0	60
10.	Birorpani	55	0	0	0	55
11.	Chhirhatta	76	0	0	0	76
12.	Chhaparva	138	0	180	14	332
13.	Katami	553	0	52	0	605
14.	Surhi	492	0	91	20	603
15.	Jakadbandha	512	0	18	14	544
16.	Jalda	128	0	0	0	128
17.	Nivaskhar	503	0	8	0	511
18.	Mahamai	762	0	28	0	790
19.	Bamhani	314	0	76	4	394
20.	Dagniya	361	0	17	5	383
21.	Rajak	394	0	0	0	335
22.	Atariya	401	15	85	2	503
					Total	**7709**

Baiga, Bor, Dhanuar, Gond, Kol and Panikar live in AABR. Baigas are well-built, of medium height. Baiga is the most primitive tribe. Baigas live in socially organized community in sal forests of Maikal plateau of BR. They have small community size, possessing high extent of isolation, very low literacy level, development of pre-agriculture stage of economy on land cultivation besides collection of edible and medicinal plants from forest for food. Bor tribe also lives in the BR. Their population is nearly the same as that of Baigas. Dhanuar tribe has comparatively lower in population as compared to Baigas and Bors. Gond, Kol and Panikars also live in the BR. Most of them are uneducated with adult literacy varying from 1 to 35 per cent or an average of 8.7 per cent. The female literacy is negligible. Their children are, however, going to nearby schools. The tribes of BR depend on forest for fuel, food and medicine.

F. Socio-economic Profile:

AABR is inhabited by rural people belonging to schedule tribes, schedule castes and other backward classes. They depend mainly on agriculture and forest for

their food, fuel, fodder, medicine, etc. The agricultural land is limited, unproductive without irrigation facilities. As a result, only one crop consisting of paddy, maize, mustard, gram, pulses and oil seeds, etc. is taken by the farmers living in core, buffer and transition zones. The cattle are low milk producing, unproductive and totally dependent on forest for grazing. Some of the inhabitants are landless and work as agricultural laborers, casual labourers engaged by forest departments. Besides this, lack of education, unapproachable roads and foot paths in remote areas are some of the main huddles in upliftment of the status of the inhabitants. State Forest Research Institute, Jabalpur in the project report submitted to M.P. Forestry (Wild Life) Project, Bhopal on Achanakmar Wild life sanctuary, reported that apart from fuel wood, timber and bamboos, the inhabitants were dependant on fruits and seeds of *mahua*, fruits of *aonla*, bamboo seeds, *chir* grass, *baibidang* seeds, *sal* seeds, *tikhur* tuber, *sal* dhoop, *tendu* leaves, *safed musli* tuber, *mahul* leaves, fruits and seeds of *keoti*, *patal kumbhada* tuber, *baichandi*, *kullu* gum, *saja* fruits, edible mushrooms, honey, *char* fruits, etc. for their livelihood. (Harsh *et al*., 1993; Masih and Sharma, 1997a; 1997b; Anon, 1999). They collect these items and sell them to the businessmen directly on weekly market day. The area has so much potential for NWFPs that nearly 251.71 tonnes of *safed musli* (*Chlorophytum tuberosum*) alone was collected from the core region of the BR during the year 1998-99 (Anon., 1999). Tiwari *et al*. (2000) reported that about 8232.47 tonnes of about 47 items of NTFPs with economic value of more than 2.70 crores are collected by local tribals from Amarkantak plateau. Thus, non-wood forest produce collection plays a vital role in the economy of the inhabitants. The income realized through the sale of NWFPs was recorded to be Rs. 28,325/house/annum (Masih and Sharma, 1997a; 1997b). Tiwari *et al*. (1999), however, recorded an average income of Rs. 49.09 /day/ person and Rs. 2,352.94/ family/month. On the basis of the survey conducted during August 2006, the dependency of BR inhabitants, besides fuel, fodder and NWFPs status is observed as detailed in the following table.

Table 16: Socio – economic status of some Inhabitants of BR besides fuel, fodder and Non Wood Forest Produce:

S. N.	Locality	Range	Village Land	Sample No. (Family)	Tribes	Working persons	Land area in acre	Source of earning	Income/ yr of family
A.	**Buf.&Tran. Zone**	Kota	Rev.	1	Gond		5	Agric	15,000
	Siripali			2	Gond		2	Agric/ Labour	16,000
			Rev.	1	Gond		3	Agric	12,000
	Pataita			2	Gond		1	Agric/ Labour	8,400
	Shivtari		Rev.	1	Gond		5	Agric/ service	56,720
B.	**Core zone**								
	Salai dabra	Lamni	Forest	1	Baiga	3	1	Agric	20,000
		Lamni	Forest	2	Baiga	7	1.5	Agric	5,000
		Lamni	Forest	3	Gond	4	1.5	Agric	25,000
		Lamni	Forest	4	Baiga	5	5	Agric	10,000
		Achan akmar	Forest	1	Panka (OBC)	5	1	Agric	8,300
		Achan akmar	Forest	2	Panka (OBC)	7	2	Agric	6,000
	Achanakmar	Achan akmar	Forest	3	Panka (OBC)	5	2.5	Agric	15,000
	Lamni	Lamni	Forest	1	Baiga	5	5	Agric	10,000
		Lamni	Forest	2	Gond	4	1.0	Agric	2,500
		Lamni	Forest	3	Gond	8	1.5	Agric	5,000
		Lamni	Forest	4	Baiga	3	1.0	Agric	20,000

The data showed that some inhabitants in the buffer and transition zones have better economic status than that of the core zone. This may probably be the reason that some of the inhabitants of core zone seem to be interested to shift from core zone to buffer or transition zones if governments provide them free land and financial support to build their house. The fact was confirmed during the personal interaction with them.

Government efforts to uplift socio-economic status:

Forest Department of Chhattisgarh has provided 41 bulls of good breeds to the forest villages of buffer and core zones to improve the breeds of cows for enhancing milk production. Even then, the inhabitants remain poor and some of them live in remote areas in the core zones. State Forest Department has submitted a proposal to Government of Chhattisgarh to shift 6 forest villages (Table-17) from core zone to buffer and transition zones to provide them better drinking water facility, education,

fertile, irrigated land, etc. During interrogation with different tribals, most of inhabitants were found enthusiastic to shift from remote core area to better approachable, fertile buffer and transition zones. Forest Department of Chhattisgarh has also submitted a proposal to state Government to uplift the economy of the inhabitants by creating facilities for micro irrigation network, leveling of undulating agricultural land, introduction of crop rotation technology, encouraging conservation of indigenous edible fruit bearing plant species, developing grass lands for the cattle, promotion of growing fuel and fodder tree species in buffer and transition zones, promotion of aquaculture, etc. This will not only help to check the cattle grazing in at least the core zone of the BR but also improving environment for sustainability of flora and fauna.

Table 17: Villages and families proposed to shift from core zone of BR.

S.N.	Villages	Range	Population	No. of families
1.	Bahud	Achanakmar	214	33
2.	Baankal	Do	98	21
3.	Bokara-Kachaar	Do	113	18
4.	Jalda	Game	128	29
5.	Kuba	Lamni	60	17
6.	Samardhasan	Achanakmar	44	8
	Total		**657**	**26**

G. Legal status: At present, the AABR is established within the framework of the existing laws including Wildlife (Protection) Act, 1972.The notification of the area as BR has not in any way changed the status of legal ownership of land. It has also not affected the rights of the tribal and other local inhabitants.

H. State of Tourism: Achanakmar and Lamni in the core zone of the BR are well visited by tourists due to their plant diversity, wild animal diversity consisting of tigers, bison, spotted deer, birds, etc. and scenic views. Developing an interpretation centre to sensitize tourists/ visitors almost the ecological richness, history of the area, wild life and their conservation, etc. is urgently needed. Amarkantak in the buffer zone is famous for its religious places like Narmada temple, Shiv Temple, etc; water falls like Kapil dhara, Sonemuda, etc., and other scenic spots like rock caves and hills at various elevations. Laxman dongri, Laxman Paon, Pandwani Talab, Pachripani, Benimata,

Jaleshwar, Ballamgarh and Karaam are very old places and can be developed as tourist places. Conservation of some of them is urgently required.

Besides this, there are many other areas like Siharal sagar, Khudia dam, Rajmergarh, Durgadhara, etc., which can be developed and explored on sustainable basis as eco-tourism centres for trekking, recreation, bird watching, holding retreat, etc. Natural heritage sites in BR like rock caves and rock paintings are also important to attract the tourists. Although there is a road passing through the transition, buffer and core zones, some approachable forest roads are yet to be constructed to reach these points.

I. Logistic Support Function:

i. Development of community in management of natural resources: The inhabitants are far away from town and cities. The nearest town Bilaspur is about 56 km away from BR. Illiteracy among tribals and other inhabitants is one of the main hurdles in their socio-economic development. State Forest Department has opened schools to educate these inhabitants. To prevent exploitation from private contractors and businessmen, forest department has opened collection centers to purchase the forest produce collected by them. They are paid maximum benefits, which department gets by selling the produce to the market.

ii. Sharing of research based knowledge through training: Research based knowledge for the sustainable harvesting of non wood forest produces (NWFPs) from BR, efficient cultivation technique of silkworm, lac and honey etc. will be disseminated to the local inhabitants through trainings. Similarly, training to the inhabitants as guides to the tourists during trekking, bird watching, etc. will enhance the opportunity to earn more and thus to uplift the socio-economic status of the tribes. Joint Forest Management (JFM) schemes are also helpful to enhance the livelihood of the inhabitants.

iii. Research support and exchange of research information on conservation and development: Sample plots laid out in BR will be helpful to students, scientists, BR managers, etc., in studying the various aspects of research like soil texture, soil pH, soil nutrients, porosity, water holding capacity, various species of herbs, shrubs, and trees,

their density, growth, productivity, etc. Establishment of research station within BR will be helpful to monitor the various activities from time to time. The output of the research will be helpful to BR managers of Achanakmar-Amarkantak BR and others. The research information can be shared nationally and globally by managers of different BRs.

J. Research Monitoring:

i. Brief description of past research:

Prasad and Pandey (1987a) and Prasad *et al.* (1988) identified a large number of species of medicinal plants, their density and relative frequency in Lamni, Achanakmar, Amarkantak and Amadobh ranges and documented the information available from the tribal. Later, Pandey (1989) suggested the need of conservation of these species from this area. Prasad and Pandey (1993) briefed about 113 ethno - botanic medicinal plant species existing in Lamni and Achanakmar ranges of BR.

Soni *et al.* (1984) were the first to record a parasitic fungus identified as *Cercosporidium helicteri* damaging leaves of *Helicteres isora* in Amarkantak forests. Jamaluddin *et al*. (1990) studied the susceptibility of different provenances of *Pinus roxburghii* against the needle blight caused by *Cercospora pini-densifloae* at Amadoh, Amarkantak and concluded that the plants of Supkhar (MP) origin have developed a high tolerance to this fungus. Later, Dadwal and Jamaluddin (1991) identified 5 fungal diseases viz. the charcoal root rot caused by *Macrophomina phaseolina*, leaf spot disease caused by *Phoma sorghina, Phoma glomerata, Cytospora sp.* and *Pestalotiopsis* sp. attacking *Grevillea pteridifolia* grown in Amarkantak area of the buffer zone.

Chakraborty *et al*. (1991) isolated 72 species of soil fungi as responsible to improve the physicochemical properties of soil resulting in overall improvement of soil fertility and productivity in sal forests of Achanakmar and Lamni areas. These authors also found that the fenced area without grazing have more soil moisture percentage and organic nitrogen quantity/ ha than unfenced area at both the localities. Studies conducted by SFRI, Jabalpur (Anon., 1999) on the impact of biotic pressure within the protected area of Achanakmar showed that biotic pressure caused tremendous damage

to the biodiversity. Rehabilitation of inhabitants and cattle, illegal removal of NWFPs, *ex-situ* conservation, etc. has been suggested as the remedial measures to minimize it.

Saxena (1970) described the flora of Amarkantak for the first time. Later, Tiwari *et al.* (1995) submitted a preliminary report of flora of Amarkantak and suggested conservation of species by declaring Amarkantak as Biosphere Reserve. They reported the existence of 54 species of thallophytes, 15 species of bryophytes, 24 species of pteridophytes, 15 species of gymnosperms and 790 species of angiosperms. Shadangi *et al.* (1997) also studied the floristic observation in Kapildhara areas of Amarkantak. Later, Shadangi (1999) studied the influence of pedogenic factors on the plant diversity and productivity in plantations and natural forests of Amarkantak region. He also studied soil plant relationship and phyto-sociology of ground flora. Tiwari *et al.* (1999), however, recorded 70 non - wood forest produce species from Amarkantak plateau. Shadangi *et al*. (2001) studied the ground flora productivity in plantations and natural forests of Amarkantak. Chaubey *et al.* (2003) studied the pH, availablility of nutrients and water holding capacity etc., in some compartments of Lamni and Khudia ranges of BR. They concluded that Khudia range although having slightly acidic soil has the maximum nitrogen and water holding capacity. These authors also studied the species density of trees, shrubs, and herbs in some compartments of Khudia and Lamni ranges of BR. Singh *et al*. (2003) studied the species composition and species diversity of high density trees (1040-1290 trees/ha) and understorey vegetation (1100-1800 trees/ha) on closed forest site and open forest site representing 390-930 trees / ha and understorey 700- 1090 trees / ha. They concluded that the plant density and basal cover were much higher in closed forest sites than the open forest sites. Later, the impact of seasons on ground flora of the above plantations and natural forests was also studied (Shadangi and Nath, 2005). Recently, Shadangi and Nath (2006) have studied litter decomposition in *Eucalyptus* and pine plantations; and sal forests related to micro-arthropods in different seasons in Amarkantak.

Roychoudhury *et al.* (2004) investigated that the beetles of sal borer, *Hoplocerambyx spinicornis* preferred older *sal* trees of diameter 121-150 cm girth class as compared to 91-120 and 61-90 cm diameter classes at Jagatpur in Karanjia range falling within the buffer zone of AABR.

ii. Studies completed in Achanakmar-Amarkantak BR

A. Ph D awarded

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iii. Thrust areas (Gaps):

After discussion with the BR authorities, it was felt that there is an urgent need to hold a workshop to identify the thrust areas in research for Achanakmar – Amarkantak BR. On the basis of published literature, the following main thrust areas have been identified.

1. Size, shape and design: As per norms, the BR should have 3 distinct zones viz. core zone, buffer zone and transition zones. A distinct core zone is marked in Achanakmar -Amarkantak Biosphere Reserve but the buffer and the transition zones are not clearly differentiated and shaped. The inhabitants of remote areas, who desire to shift to better areas (as proposed by BR authorities), should be rehabilitated in transition zone instead of buffer zones. Dense forests in buffer zones should not be disturbed. Research projects to study the impact of shifting

on the economy of inhabitants and on biodiversity conservation should be undertaken on priority basis, so that, the research outcomes can be utilized in better management of BR's.

2. The movement of heavy vehicles in BR should be limited and vehicles should not be allowed after the sunset till morning to minimize the disturbances to wild animals.

3. Taxonomic identification of flora and fauna including microbes existing in BR, their distribution and habitat is essential. The documented information about each group of fauna and flora is urgently required for the exchange of views among BR managers of India and abroad.

4. Studies on the threatened species of flora and fauna their status and documentation on the behaviour of each wild animal in response to Achanakmar- Amarkantak BR should be encouraged.

5. Studies on bio-indicator species of fauna and flora of Achanakmar- Amarkantak BR should also be encouraged.

6. Researches should be encouraged to assess sustainability parameters, from time to time, i.e., status of nature's own decomposing/ biodegrading organisms (fungi, bacteria and arthropods) in successful litter decomposition and nutrient cycling in BR.

7. Studies on propagation techniques for rare endemic species of flora and fauna should also be initiated in priority basis.

8. Ecological rehabilitation of degraded habitats is of prime importance in maintenance of wild animals. Therefore, research inputs should be evolved to improve the degraded areas.

9. The density assessment of each species of biological resources, including microbes and other flora and fauna, in the BR is necessary for the sustainable use of resources. Regular studies on density of utilizable species harvested by inhabitants from BR should be monitored to get the sustainability of the species.

10. The BR is rich in water resources. Watershed management is an urgent need in the entire BR. It will not only enrich the fauna and flora but also be helpful in upliftment of the economy of inhabitants in buffer and transition zones. Research projects to monitor the economy of the inhabitants and biodiversity change should get priority for financial support.

11. Studies should be initiated to investigate the suitable plant species to prevent soil erosion in the BR. The possibility of construction of check dams should also be evaluated.

12. To minimize cattle pressure on BR, the state Government has started improving the cattle breeds. This will enhance milk production and minimize unnecessary burden of unproductive cattle. Encouraging the inhabitants to grow suitable fodder species near villages will check forest grazing, which generally destroys not only many useful young plant species growing in association with tree species but also makes soil compact and restricts water percolation and thus making the forest surface unable to hold rain water. Such researches should be encouraged by providing financial support.

13. Studies should also be initiated to uplift the socio-economic status of inhabitants by encouraging them to enhance production of edible/medicinal mushrooms, lac, tassar silkworm, honey and other beneficial species, occurring naturally in the BR.

14. Studies should also be encouraged on bioremediation of the soil through tree species and fungi in core and buffer areas of the BR.

15. Identification of factors that lead to environmental degradation and sustainable use of biological resources.

16. Development of alternative means of livelihood for local populations when existing activities are limited or prohibited within the BR.

17. Distribution and ongoing changes in diversity at the landscapes, habitat, species and land race levels.

18. Alternative possibilities for income generation and subsistence biomass supplies to the local communities and their likely impacts on the distribution of diversity.

19. Studies on wildlife, mapping and corridor values of buffer and transition zone should also be initiated.

iv. Brief description of ongoing research:

Seven permanent sample plots have been laid out to initiate the studies on regeneration status, soil nutrient status and density of plant species in the core zone and buffer zones of the AABR. Studies on the socioeconomic status of the inhabitants have also been initiated. Some scientists and academicians have been requested to submit research projects on physico-chemical properties of soil of the BR, taxonomical studies on microbes, micro-fauna exiting of the BR, taxonomical identification of macro-fauna, status of various insect and other invertebrates, vertebrate fauna, their density and wildlife habitats, etc.

v. Research stations within BR:

Director BR agreed to open a research station for routine research activities within the jurisdiction of the BR. A proposal for procurement of instruments for the research station has been sent to the higher authorities for necessary approval.

vi. Research Institutes close to BR:

The BR is in close vicinity of some universities and research institutes. Teachers, students and researchers from these universities and institutions often visit the BR for their research activities. Guru Ghasidas University, Bilaspur is working on different aspects of BR for M. Sc. dissertations, whereas other universities and institutes have submitted research proposals to different funding agencies, including Ministry of Environment and Forests, Government of India for undertaking research on different themes of the BR. These organizations are:

1. Guru Ghasidas University, Koni, Bilaspur (CG).
2. Indira Gandhi Agriculture University Raipur (CG).

3. Ravi Shankar Shukla University, Raipur (CG).
4. Tropical Forest Research Institute, Jabalpur (MP).
5. Zoological Survey of India, Jabalpur (MP).
6. State Forest Research Institute, Polipather Jabalpur (MP).
7. JNK Vishwa Vidhyalaya, Adhartal, Jabalpur (MP).
8. A.P.S. University, Rewa (MP).
9. Hari Singh Gaur University, Sagar (MP).
10. Central Silk Board, Govt. of India, Vikram Nagar, Bilaspur (CG).
11. District Sericulture Officer, State Sericulture Department , Janjhgir Champa, Bilaspur, (CG).
12. Jiwaji University, Gwalior.

vii. Permanent monitoring plots:

In all, seven permanent sample plots, two in Lamni range (Compartment nos. 311 and 324), one in Game range (Compartment no. 507), two in Achanakmar range (Compartment nos.159 and 198)in core zone , one in Lormi range and one in range in buffer zone have been laid out in the BR. The density of plant species existing in these plots and the regeneration status of different species is being studied.

viii. Training and Education:

Education and training among the tribal and other inhabitants and visitors or tourists on conservation of various flora and fauna is an essential component of the BR management. Training to the inhabitants in maintenance of BR and designing training package for BR management with people's participation in buffer zone villages will also help in training them. Training and education of BR managers responsible for management of BR is also equally important and efforts should also be initiated in this line.

ix. Other facilities available:

A road passes from the transition, buffer and core zones and thus, there is no problem to reach even inside the dense core region for observations on the behaviour, habit, habitat, population density of the wild animals. Besides this, there are some tourist huts which can be used both for research as well as for tourists.