CHAPTER – I

INTRODUCTION

WHAT IS BIODIVERSITY:

Biological diversity or "biodiversity" has been defined as:

"The variability among living organisms from all sources including Inter alia, Terrestrial, Marine and other Aquatic Ecosystems and the Ecological Complexes of which they are part; this includes diversity within species, between species, and of Ecosystems".

Diversity within species (or **genetic diversity**) refers to variability in the functional units of heredity present in any material of plant, animal, microbial or other origin. **Species diversity** is used to describe the variety of species - whether wild or domesticated) within a geographical area. Estimates of the total number of species (defined as a population of organisms which are able to interbreed freely under natural conditions) range from 2 to 100 million, though less than 1.5 million have actually been described. **Ecosystem diversity** refers to the enormous variety of plant, animal and micro organism communities and ecological processes that make them function. In short, biodiversity refers to the variety of life on earth. This variety provides the building blocks to adapt to changing environmental conditions in the future.

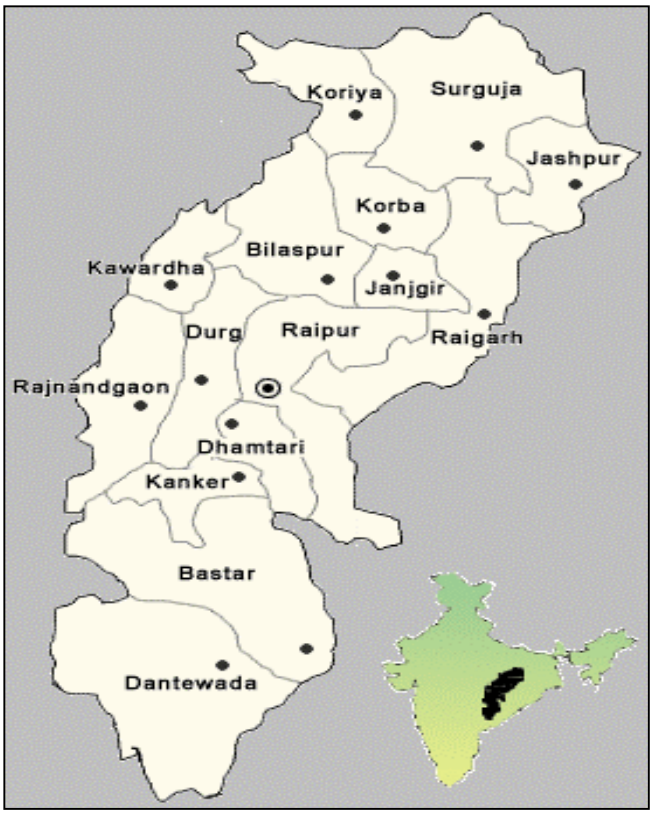
The conservation of biodiversity is the fundamental to achieve sustainable development. It provides flexibility and options for our current (and future) use of natural resources. About 80% of the population in Chhattisgarh lives in rural areas, and a large part of this population, depends directly or indirectly on natural resources. Conservation of biodiversity is crucial for the sustainability of sectors as diverse as agriculture, forestry, fisheries, wildlife, industry, health, tourism, commerce, irrigation and power. Development of Chhattisgarh in future, will depend on the foundation provided by live resources, and conservation of biodiversity will ensure that this foundation remains strong.

The organic link between the conservation and sustainable utilization by the dependent people will be better reinforced by having a sharper focus on the key issues relating to interdependence of Bio-resource management and human sensitivities in terms of felt needs of the people, their social norms, beliefs and system born out of history, culture and traditions.

THE GOVERNMENT OF CHHATTISGARH HAS IDENTIFIED THE STATE FOREST DEPARTMENT AS NODAL AGENCY TO PREPARE THE CHHATTISGARH BIODIVERSITY STRATEGY AND ACTION PLAN i.e. CSBSAP.

SCOPE:

The present CBSAP draft covers the geographical area of the 16 districts of the State. Besides formulating an independent Biodiversity Strategy; for the State; **one important Eco-region of the State i.e. Bastar which as part of Central Eco-Region has been covered independently also by NBSAP. The Agro-climatic Zone of Northern hills of Chhattisgarh covering the districts of Surguja and Jashpur, was declared as Bilaspur Sub - State by NBSAP for the formulation of an independent BSAP.**



BROAD ACTIVITIES UNDERTAKEN BY THE STATE TO PREPARE CBSAP: -

The Nodal agency, undertook the following activities in relation to their stated scope (theme or geographical unit): while preparing the CBSAP:-

I. **Assessment of existing reports, action plans;**
II. **Identification of available information and data;**
III. **Prioritisation of further steps based on above, to focus on major gaps, built on existing knowledge and available plans /reports, and duplication;**

IV. Identification of available expertise and experience, both in formal and informal sectors;

V. Soliciting of inputs from a wide range of individuals/ agencies, through;

- **Letters,**
- **Public meetings and workshops,**
- **Advertisements,**
- **Print and electronic media;**
- **Folk media**

VI. Capacity – building exercises where relevant (e.g. for the local / sub-state/ state level participants, on authentication of data, monitoring, etc.); and

VII. Assessment of all relevant sectoral plans and policies.

VIII. Ground truthing exercise on circle level.

OBJECTIVES OF FORMULATING CBSAP:

FORMULATION OF CBSAP IS BROADLY BASED ON FOLLOWING PRINCIPLES: -

- **Every form of life is essential for the ecological balance thus deserves conservation.**
- **Biodiversity is an indicator of health of the environment. Our lives have a direct bearing for a vast array of goods and services from biodiversity; hence priority should be accorded to its conservation, management and sustainable use for ecological security.**
- **Biodiversity conservation is an asset, as it can yield sustainable benefits.**
- **Biodiversity management should be based on sound "ecological principles", using available indigenous knowledge and upgrading it with innovative and latest technologies.**
- **The interests of the local communities; need to be protected and in turn the communities must recognize the importance of Bio-diversity.**
- **Fair and equitable sharing of benefits arising out of utilisation, or knowledge of bio resource found in the locality is for moral mandate of the State livelihood security of bio-resource dependent populations.**

THE NODAL AGENCY KEPT FOLLOWING STATE SPECIFIC PRIORITIES ALSO IN MIND WHILE PREPARING CBSAP: -

- **To ensure food security by enhancing the productivity of the small and marginal agricultural lands by conserving the local agro-germplasm and propagating it by local innovative and available Biotechnology knowledge.** ***(With special emphasis on Paddy.)***
- **In-situ and Ex-situ conservation of Herbal Plants having medicinal value as one of the means to ensure livelihood security of the tribals of the State.**
- **Sustainable Utilisation & Conservation of the vast NTFP's potential, through participatory mechanisms.**
- **Improving the productivity of the State's 40% degraded forests through peoples' participation and harvesting its true potential in sustainable way for the development of tribals.**
- **Conservation & Sustainable Development of existing Ground Water Resources in the State.**
- **To maintain an equilibrium between Bio-diversity Conservation & Development of Mining & Mining based industries; through introduction of Eco- friendly and Green Technologies; both for exploitation as well as reclamation.**
- **To promote a scientifically based approach to the planning, management, & development of Eco-tourism products and activities in the region.**
- **To check annual temporary migration of local populace, and to assure their dynamic contribution in the socio-economic development of the State.**
- **To create a mechanism to conserve traditional and religious beliefs of tribals concordant to Biodiversity conservation and to float package of justified sustainable use of customary practices for their livelihood security.**

CONTENTS:

The CBSAP Draft consists of Four Volumes. The description of these Volumes is as follows :-

Volume # I: - This volume comprises of Chapters I to III.

Chapter –I and II introduce the biodiversity concept and explain the broad History & Profile of the CBSAP Area. **Chapter –III** contains biophysical and socio-economic

status of Chhattisgarh wherein an account of existing natural ecosystems (Terrestrial and Aquatic system), Status and Profile of Wild Flora and Fauna (plants, animals and micro-organisms), agri-horticultural systems (Agriculture and horticultural crops) and socio-cultural including ethnic diversity in the State (communities and cultural traits) has been discussed in detail.

Volume # II: -This volume comprises of Chapters IV to VIII.

Chapter – IV discusses about Problems &Threats that cross the line of Biodiversity conservation in the area discordantly. Identification of various Actors along with their role in Biodiversity conservation as well as some unsustainable exploitation practices have been discussed in **Chapter -V.** Ongoing biodiversity related initiatives being performed by the State Govt. and others have been explicitly explained in **Chapter -VI.** Based on Chapters IV and V, Gaps have been identified for each thematic component in **Chapter -VII** and accordingly both cross-sectoral and individual sectoral Strategies and Action Plans have been suggested in **Chapter VIII.** The CBSAP also tries to present, an insight into few unique ecosystems of the State in terms of Biodiversity. Certain specific areas of Biodiversity crucial in the State in terms of both ecological and livelihood security like Herbal Plants, Rice diversity, Ground Water Diversity have been mentioned.

Volume # III: - This volume comprises of Annexures; Bibliography related to ChaptersI to VIII.

Volume # IV: -This volume provides an exclusive " Pictorial Review of the State' s Unique Biodiversity".

METHODOLOGY ADOPTED TO PREPARE THE CBSAP:

The process of formulating the CBSAP was initiated with the constitution of a State Steering Committee (SSC) comprising of 17 members **(Annexure- 1.1. of Volume III of CBSAP)**. The SSC members have been drawn from Public; Biodiversity related key Government officials; NGOs; Retd. Natural Resource Professionals and Individual Thematic Experts. The SSC in its first meeting firstly decided to declare the State Forest Deptt. as Nodal Agency for preparing CBSAP and also decided to entrust the job to prepare SAP to DFO's. However, in view of the heavy workload on these officials in the newly created State; it was

decided by SSC to entrust the job to individual thematic area eminent experts drawn from the Universities, Civil Society and; Professionals working in the State or erstwhile Madhya Pradesh.

The eminent experts of all the possible Biodiversity related sectors were selected after series of informal discussions. Then started the process of formal discussions with each appointed expert on the formulation of individual thematic component and sub component drafts on the pattern provided by NBSAP. List of these eminent Resource Persons is annexed as Annexure 1.2 in Vol. III of the CBSAP. List of these eminant resouece persons is annexed in Annxure ------- of Vol III.

At the same time Biodiversity workshops were held by the Forest Department at each Conservators' level covering the entire State of Chhattisgarh. The members of public, Govt. officials, NTFP Traders, NGO's, Self Help Groups, local communities etc actively participated in these workshops. Feedback received from these workshops has been added into the draft after cross checking it with the published materials. In addition to these; suggestions, views, valuable information related to Biodiversity Status received from the general public, through the advertisements in the most circulated News Papers of Chhattisgarh has also been incorporated in the CBSAP Draft.

After the receipt of the individual draft reports from appointed experts; a Drafting & Editing Committee consisting of selected SSC members and Forest Deptt. officials integrated these draft reports into a base draft for CBSAP. This base draft was then circulated to all the SSC members for comments. SSC members and experts from outside the State gave their valuable comments either in writing or in terms of views during discussions with the Member Secretary. Based on these comments and further reviewing the draft; it was felt that firstly the Status & Profile of few prominent and prioritized thematic components like Forest Flora and Fauna; Ground Water; Local Agriculture Crops; etc. had scope of updating Secondly, it was observed that pain staking research done by the scientific community of the State in certain rich biodiversity sectors of the State like Mushrooms; Tubers; Millets; Fishes; Soil Micro-organisms and whose both formal and informal documentation existed, could be galtered form Raipur itself. The base draft, since had been prepared by Govt. officials and was not edited by a professional editor; there were many editorial mistakes too.

Thus during the second round of discussions; appointed experts were guided to strengthen their drafts in terms of Status and profile especially of local biodiversity. In this round; few more experts were identified and their contributions taken, published material on Status of Fauna, Medicinal Plants, Flora pertaining to the State from Zoological Survey of India, State Forest Research Institute, Tropical Forest Research Institute, Jabalpur was also collected and added to draft.

CONCLUDING..... :

The subject of Biodiversity being so vast that the status of each component deserves an independent draft of the size of this present CBSAP draft. Based on the NBSAP' s guidelines for prioritization of actions within BSAP; the State has tried to build up an integrated site specific but locally prioritized BSAP. While prioritizing CBSAP; National guidelines have been used especially in terms of (1) Biological values, (2) Socio-economic values and (3) Conservation feasibility. Based on these criteria; the choice of components, species or strategies which are of high priority in Biodiversity but also practicable to conserve in the State have been presented in the CBSAP draft. Thus lesser attention if any, paid to any component of Biodiversity in the Draft should by no means be construed to lessen its significance in both the ecological and socio-economic perspective of the State.

CHAPTER – II

HISTORY AND PROFILE OF AREA

CREATION OF CHHATTISGARH:

The President of India gave his consent to The Madhya Pradesh Reorganization Act 2000 on the 25th August 2000. The Government of India subsequently set the First day of November 2000 as the day on which the State of Madhya Pradesh was bifurcated into Chhattisgarh and Madhya Pradesh.

There was no single factor but infact a complex interplay of a combination of factors that paved the path for a separate State. One important factor was that there was clear acceptance, within Chhattisgarh and outside that Chhattisgarh had a distinct socio-cultural regional identity that had evolved over centuries. The people of Chhattisgarh accepted this and saw Prithak Chhattisgarh as giving expression to this identity.

- **EMERGING IDENTITY AND SOCIO-CULTURAL SPACES**

New Chhattisgarh in New India

The socio-religious reform movements and the tribal rebellions, contributed, although indirectly to emerging regional consciousness in the region. The tribal rebellions deeply affected the political, social and economic discourse of Chhattisgarh. **The issue of people' s rights over local resources was brought centre stage. It also raised the fundamental question of identity and preserving traditional culture and way of life.**

Guru Ghasidas clearly articulated the need to consolidate and create regional consciousness and solidarity to fight against exploitation.

Pandit Sunderlal Sharma, Thakur Pyarelal Singh and Khub Chand Baghel were members of the Indian National Congress and some of the prominent leaders of the national movement in Chhattisgarh. **These leaders also reiterated the fact that Chhattisgarh had a distinct socio-cultural identity and used this as a base for reforms, encourage the formation of a Chhattisgarhi consciousness amongst the masses through literacy drives, cultural activities and social reform programmes.**

The identity of Chhattisgarh has been created and evolved through a complex process that has largely charted its own course. A combination of cultural, historical, social economic and political factors have contributed to this process. The wide pluralities of cultures, traditions, histories and customs existing in the region have combined to form

a unique mixture that has fed into the development of the Chhattisgarh ethos and identity. However, the key point is that the identity of Chhattisgarh cannot be viewed as separate from the people of Chhattisgarh. It is important to note that the Chhattisgarh identity has been asserted in different forms and has become more pronounced in adverse circumstances manifesting itself especially as protest against exploitation. Dr H.L. Shukla distinguishes between self-image and other image for a more holistic understanding of Chhattisgarh identity and ethos. It is imperative to synthesize and blend the two images to understand the priorities and challenges facing new Chhattisgarh.

GEOGRAPHICAL PROFILE

Chhattisgarh State is carved out of the erstwhile Madhya Pradesh **. It lies between 17°46–24°8 N latitude and 80°15–84°24 E longitude. The State measures 640 km from North to South and 336 km from East to West with a total area of 1,35,194 sq. km. The State shares its boundaries with the 6 Indian States i.e. Madhya Pradesh on the north-west, Uttar Pradesh on the north, Jharkhand on the north-east, Orissa on the south-east, Andhra Pradesh on the south and Maharashtra on the south-west.**

- **GEOGRAPHICAL AREA**

The total geographical area of the State is 136034.28 Sq.Km. Jagdalpur is the largest district (17016.040 Sq.Km.) while Kawardha is the smallest district (3958.01 Sq.Km.) in area.

- **GEOLOGICAL PROFILE**

The geological structure of Chhattisgarh mainly consists of **Achaean and Cudappah rocks but Dharwad, Gondwana, Deccan Trap and old Alluvial Laterite rock** systems are also found in some pockets of the State as shown below in **Fig-2.1.**

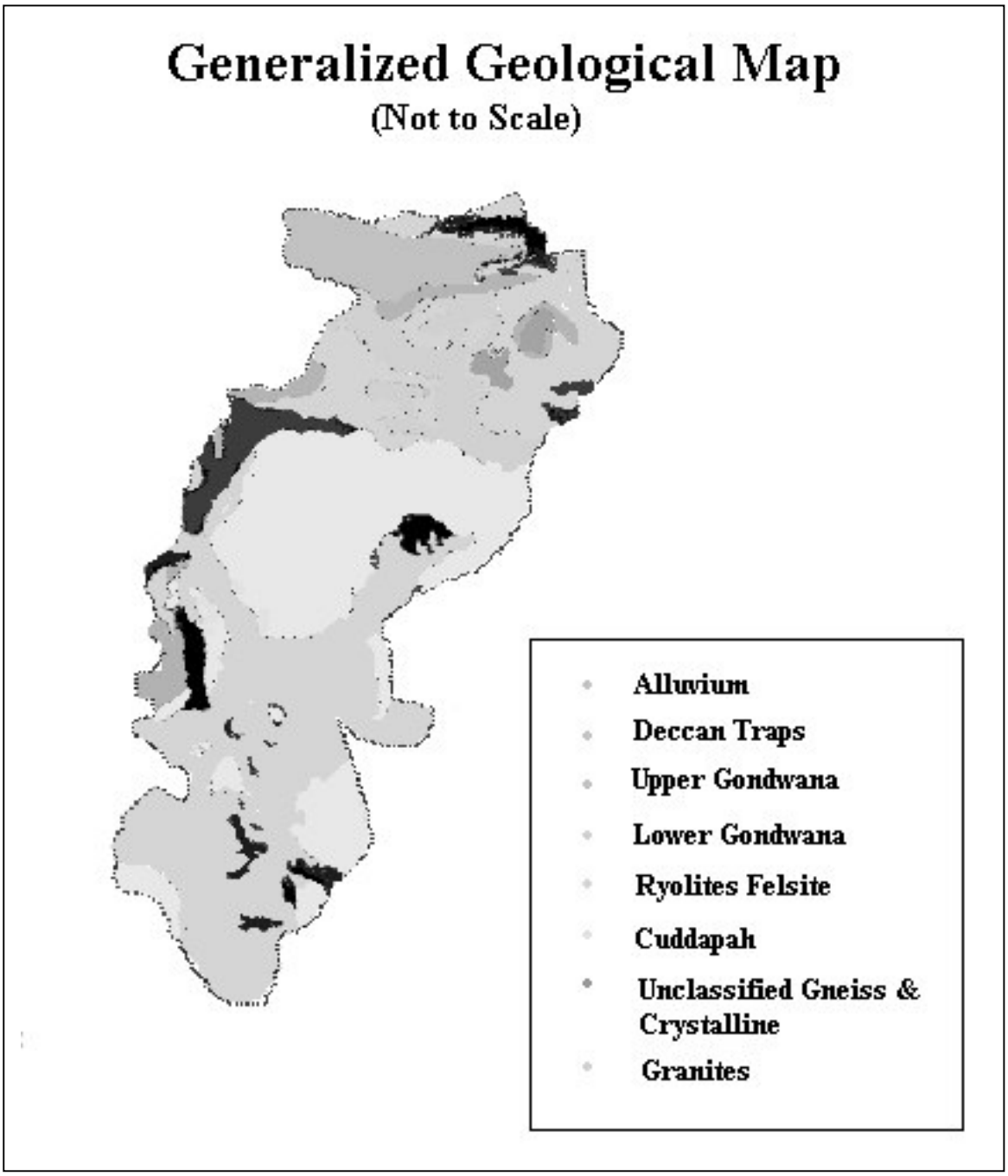


Fig: 2.1.

SOIL PROFILE OF CHHATTISGARH: -

Physiographyically, the State is divided into three zones, namely; Chhattisgarh plains, Bastar plateau and Northern hills. In upper part of the landscape the soils are shallow, young with less developed features and are highly eroded. Down the slope, the soils have more

developed features. The change in soil properties indicates the difference in drainage conditions, transport of eroded material and translocation and deposition of mobile soil constituents. Moving down the slope, there is increase in soil depth, water holding capacity, on exchange capacity(CEC), and preponderance of calcium and magnesium ions on exchange sites. The colour also changes from red to dark brown as we move downwards. The texture changes from sandy loam to clayey, consistency from non-sticky to very sticky, and calcium carbonate from none to abundant. The characteristic features of soils of these three zones have been enumerated herewith**:**

The distribution of various soil types in the State and their suitability to various crops is mentioned in the following table: 2.1.-

Table: 2.1

Types of soil	Mother rocks	Distribution in the State		Main crops
		%	Districts / Region	
Red-yellow soil (or Matasi)	**Gondwana**	**60-65**	**Surguja, Koriya, Jashpur, Raigarh, Korba, Bilaspur, Kawardha, Durg, Raipur, Dhamtari, & Mahasamund districts.**	**Paddy**
Red-sandy soil	**Archaean Granite**	**20-25**	**Bastar, Dantewara, Kanker, Durg, Rajnandgaon, & Dhamtari districts.**	**Kodo-Kutki, Jwar, Maize, Potato, Coarse grains, etc.**
Red-domat soil	**Archaean Granite**	**-**	**Dantewara and Konta tehsils.**	**Paddy**
Laterite soil	**Mixed**	**-**	**Bagicha, Samri, Sitapur, Ambikapur, Kawardha, Chhui-Khadan, Saja, Bemetara and Jagdalpur tehsils.**	**Pulses, Jwar, Kodo-Kutki, Oilseeds, Potato, Coarse grains, etc.**
Black soil	**Deccan Trap & Basalt**	**-**	**Mungeli, Pandariya, Raipur, Rajim, Mahasamund, Kurud and Kawardha tehsils**	**Paddy, Wheat, Cotton, Gram, Sugarcane and Rabi Crops.**

PHYSIOGRAPHIC PROFILE

State of Chhattisgarh has a shape of Sea horse. Main physiographic components are the plains of Mahandi Basin, embanked by high plateaus and hills of Dandakaranya and Northern hills. Overall the area looks like a very broad Valley running west to east with a very gently eastwardly slope. Map showing slope variations in the State is given in Fig-2.2. below :-

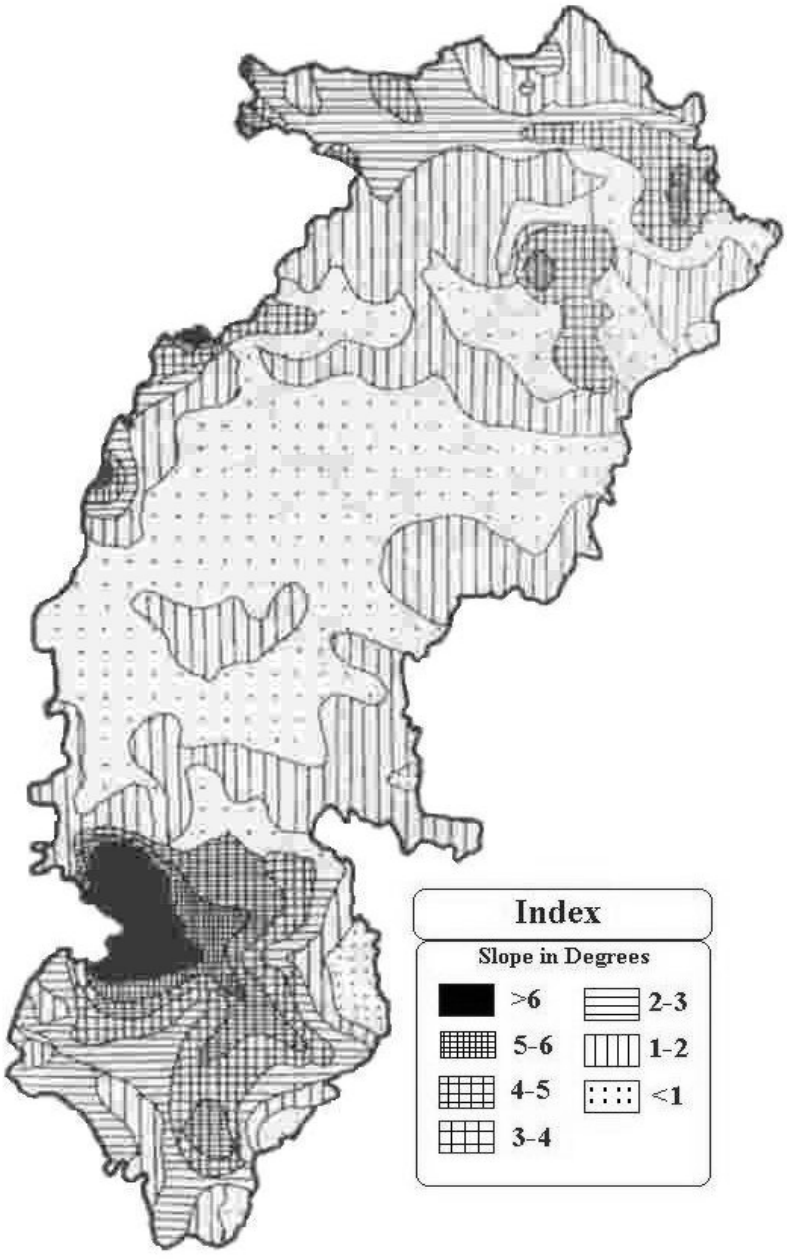


Fig: 2.2.

The mainland of Chhattisgarh comprises of three main physiographic regions:

PHYSIOGRAPHIC REGION	APPROXIMATE % OF GEOGRAPHICAL AREA
A. MOUNTAINS	**27.50%**
B. PLATEAU AND PAT REGIONS	**29.29%**
C. PLAINS / RIVER BASINS	**43.21%**

These main physiographic regions can be further sub divided as:

A1. MOUNTAINS

1. **Maikal Range (Rajnandgaon, Kawardha and Bilaspur districts)**
2. **Chhuri-Udaipur Hills (Korba and Raigarh districts)**
3. **Changbhakhar-Devgarh Hills (Koriya and Surguja districts)**
4. **Abujhmad Hills (Narayanpur, Bijapur, Bhopalpattnam and Pakhanjur tehsils)**

B1. PLATEAU AND PAT REGIONS

1. **Pat regions (Surguja and Jashpur districts)**
2. **Pendra-Lormi Plateau (Lormi, Pendra Road, Kota, and Pandaria tehsils)**
3. **Dhamtari-Mahasamund Uplands (Saraipali, Mahasamund, Kasdol, Nagri, Gariyabandh, Devbhog, Kurud and Dhamtari tehsils.)**
4. **Durg Uplands (Rajnandgaon and Durg districts)**
5. **Bastar Plateau / Dandakaranya Plateau (Kanker, Bastar and Dantewara distt.)**

C1. PLAINS / RIVER BASINS

1. **Kanhar Basin**
2. **Rihand Basin**
3. **Surguja Basin**
4. **Hasdo-Rampura Basin**
5. **Korba Basin**
6. **Raigarh Basin**
7. **Bilaspur-Raigarh Plains**
8. **Sarangarh Plains**
9. **Durg- Raipur Plains**
10. **Kotri Basin**
11. **Bastar Plains**

DRAINAGE PATTERNS

MAHANADI is the main and the largest river of Chhattisgarh. It is called the "Life Line of Chhattisgarh".

The main rivers that flow in the State are Mahanadi and its tributaries viz. Seonath, Hasdeo, Mand, Arpa, which drain parts of Raipur, Durg, Rajnandgaon, Bilaspur, Raigarh and Surguja districts. The river Indravati, a tributary of Godavari, drains parts of Rajnandgaon, Durg, Bastar and Dantewada districts. Some, of the tributaries of Ganges drain parts of Sarguja and Koria districts. Parts of Rajnandgaon and Kawardha districts are drained by Narmada river. Most of the rivers are perennial. Generally, the drainage patterns are dendritic, parallel, angular and radial types as shown in the Drainage map of the State in **Fig-2.3.**

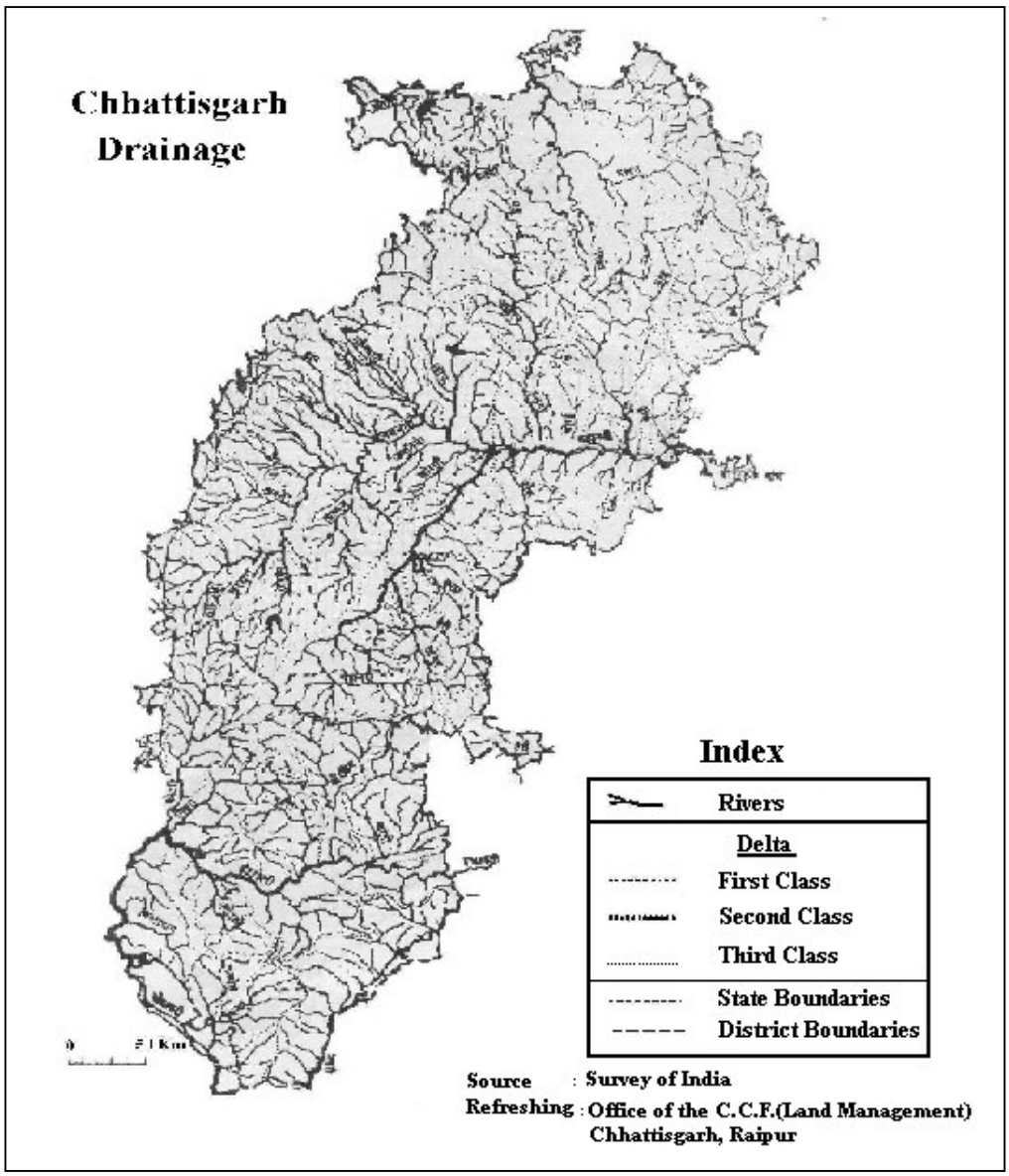


Fig-2.3.

RAIN FALL

The average annual rainfall in Chhattisgarh is 1405.3 mm (maximum average annual rainfall upto 1885.1 mm in Jashpur district).

Table: 2.2.
Annual Rainfall and Distribution During Cropping Season in Chhattisgarh

Station	Lat	Lon	Annual Rainfall (mm)	Kharif (Jun.-Oct.) (mm)	Rabi (Nov.-Mar.) (mm)	Summer (Apr.-May) (mm)
Chhattisgarh Plains						
Raipur	**21.2**	**81.7**	**1304.6**	**1191.8 (91)**	**71.6 (5)**	**41.2 (3)**
Durg	**21.2**	**81.3**	**1283.1**	**1168.8 (91)**	**77.9 (6)**	**36.4 (3)**
Rajnandgoan	**37.1**	**81.0**	**1346.4**	**1243.5 (92)**	**67.4 (5)**	**35.5 (3)**
Mahasamund	**21.1**	**82.1**	**1342.1**	**1248.8 (93)**	**53.4 (4)**	**39.8 (3)**
Raigarh	**21.9**	**83.4**	**1514.3**	**1397.6 (92)**	**74.5 (5)**	**42.2 (3)**
Bilaspur	**30.1**	**90.1**	**1383.3**	**1233.6 (89)**	**93.1 (7)**	**56.7 (4)**
Janjgir	**22.0**	**82.6**	**1500.8**	**1357.4 (90)**	**109.8 (7)**	**33.7 (2)**
Korba	**22.3**	**82.7**	**1397.3**	**1302.1 (93)**	**71.8 (5)**	**23.4 (2)**
Kawardha	**22.0**	**81.2**	**1159.1**	**1002.0 (86)**	**104.4 (9)**	**52.8 (5)**
Kanker	**20.3**	**81.5**	**1297.8**	**1180.3 (91)**	**67.1 (5)**	**50.3 (4)**
Dhamtari	**20.7**	**81.6**	**1288.7**	**1192.4 (93)**	**52.4 (4)**	**43.9 (3)**
Bastar Pleateau						
Jagdalpur	**19.1**	**82.0**	**1509.0**	**1315.0 (97)**	**72.0 (5)**	**122.0 (8)**
Dantewara	**18.9**	**81.3**	**1365.0**	**1280.1 (94)**	**34.7 (3)**	**50.1 (4)**
Northern Hills						
Ambikapur	**23.1**	**83.2**	**1534.6**	**1393.4 (91)**	**94.1 (6)**	**47.0 (3)**
Baikunthpur	**23.2**	**82.6**	**1374.1**	**1266.6 (92)**	**84.7 (6)**	**22.8 (2)**
Jashpur	**-**	**-**	**1885.1**	**1704.8 (90)**	**113.3 (6)**	**67.0 (4)**
Chhattisgarh			**1405.3**	**1279.9 (91)**	**77.6 (6)**	**47.8 (3)**

TEMPERATURE

Temperature variations during different months has been depicted in **Table –2.3.** where as Annual Maximum and Minimum temperature along with Maximum and Minimum temperature during Kharif and Rabi season have Fig-2.2.

Table : 2.3.

Maximum and Minimum temperature During Different Months in Different Stations of Chhattisgarh

Station	Temp. (^{0}C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ambikapur	Max.T.	23.7	27.0	31.9	36.7	39.5	35.5	29.7	29.2	29.8	29.5	26.6	23.9
	Min.T.	8.4	11.0	15.4	20.7	24.7	24.9	23.1	22.8	22.0	18.0	11.7	8.2
Raipur	Max.T.	27.5	31.1	35.5	39.6	42.0	37.4	30.8	30.2	31.3	31.6	29.6	27.3
	Min.T.	13.3	16.5	20.8	25.3	28.3	26.5	24.0	23.9	23.9	21.5	16.5	13.2
Jagdalpur	Max.T.	28.4	31.5	35.0	37.1	38.2	33.6	28.6	28.4	29.6	30.0	28.6	27.6
	Min.T.	11.9	14.9	19.0	22.6	24.5	23.9	22.4	22.3	22.1	20.0	15.2	11.7
Raigarh	Max.T.	28.3	31.6	36.0	40.3	42.6	38.0	31.6	31.1	32.2	32.4	30.3	28.2
	Min.T.	13.2	16.0	20.4	25.1	28.0	27.1	24.7	24.7	24.5	22.0	17.1	13.3
Champa	Max.T.	27.2	30.7	35.5	40.2	42.7	38.2	31.3	30.7	31.6	31.7	29.7	27.3
	Min.T.	13.0	15.6	19.6	24.4	27.9	27.0	24.5	24.5	24.3	21.4	16.4	13.0
Pendra	Max.T.	24.0	27.2	31.9	36.5	39.1	35.3	29.0	28.4	29.0	29.2	26.9	24.3
	Min.T.	10.9	13.6	18.0	22.7	25.9	25.0	22.8	22.5	21.9	18.7	14.1	10.9
Kanker	Max.T.	27.9	30.9	34.7	38.1	40.2	35.5	29.8	29.2	30.2	30.6	29.0	27.3
	Min.T.	12.5	15.5	9.6	24.4	27.6	26.1	23.8	23.5	23.1	20.3	15.1	12.1
Jashpur Nagar	Max.T.	23.2	26.0	30.8	35.0	37.0	33.1	28.1	27.6	28.3	28.3	26.0	23.7
	Min.T.	7.9	10.7	15.0	19.9	22.7	23.0	21.8	21.5	20.8	17.2	12.5	7.9

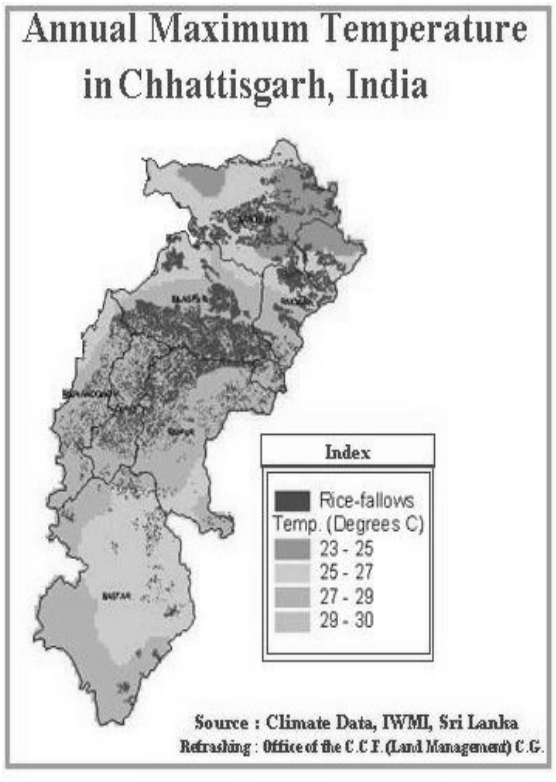


Fig: 2.4.

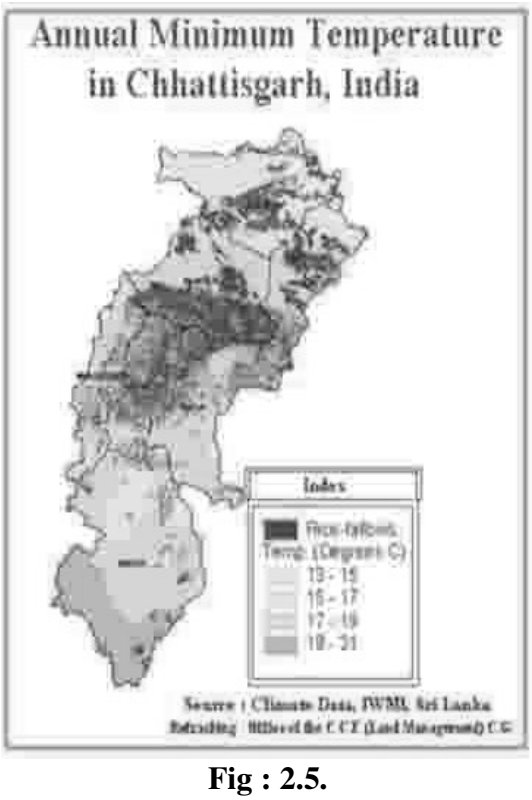


Fig : 2.5.

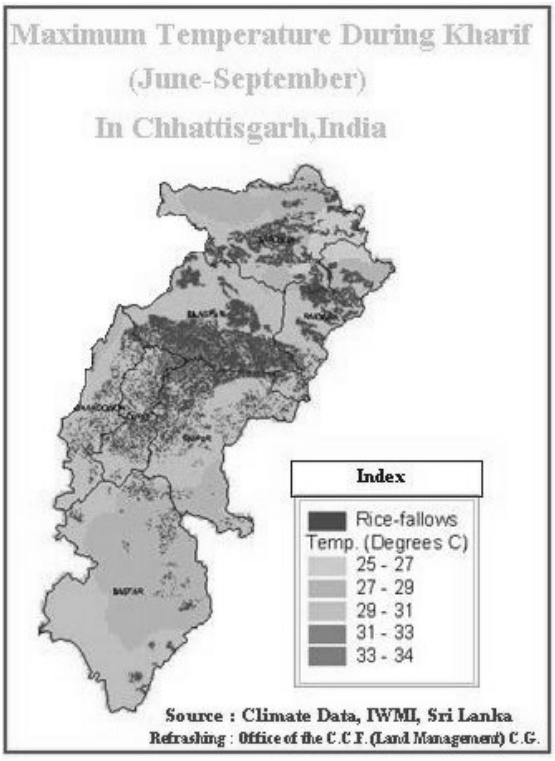


Fig: 2.6.

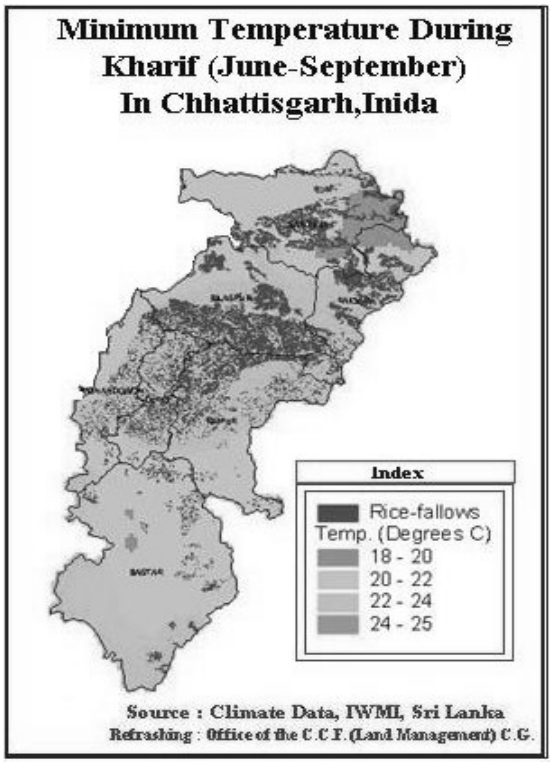


Fig : 2.7.

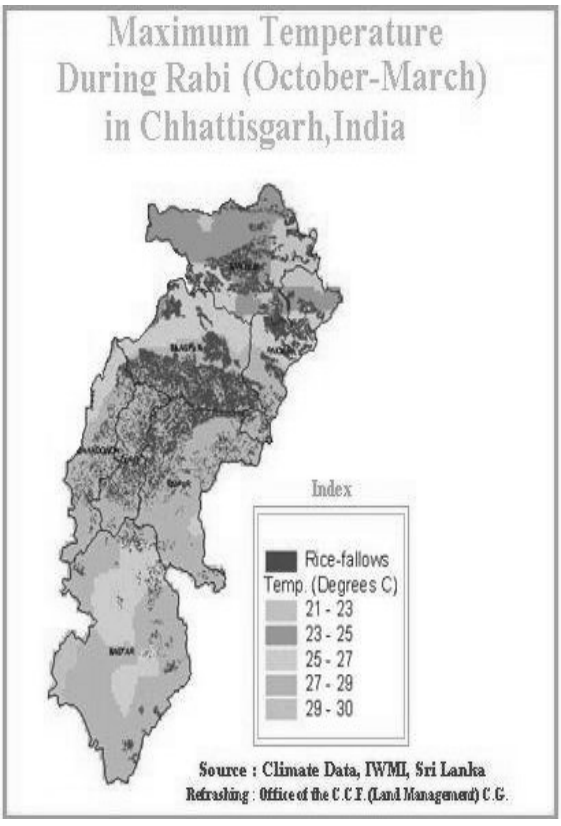


Fig : 2.8.

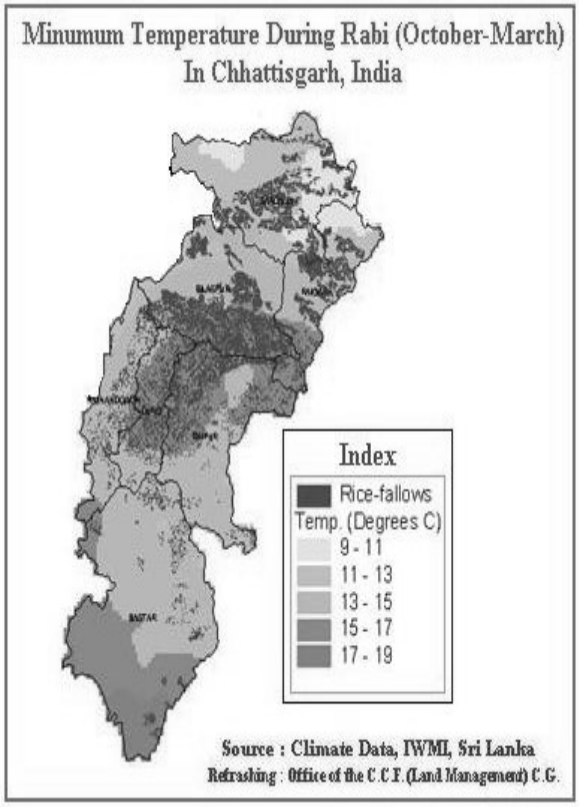


Fig : 2.9.

- **LAND USE**

Land use is an important index of human, social, cultural, and economic developments.

42.8 percent of the State area is covered by forest (59772.389 sq. km.) which is greater that the net area sown (48278 sq. km.) i.e. 35 %.

Land utilization in the State during 1999-2000 is shown below and a graphical presentation is also shown in Fig-2.10.

Land Non-Agricultural uses	6.73 Lacs.ha.
Barren and uncultivable land	3.52 Lacs.ha.
Permanent pastures and Grazing land	8.70 Lacs.ha.
Land under miscellaneous trees and groves	0.01 Lacs.ha.
Cultivable waste land	3.29 Lacs.ha.
Fallow land (current)	2.34 Lacs.ha.
Old fallow land	2.19 Lacs.ha.
Gross cropped area	56.44 Lacs.ha.
Net Cropped area (sown)	48.24 Lacs.ha.
Area sown more than once	8.20 Lacs.ha.

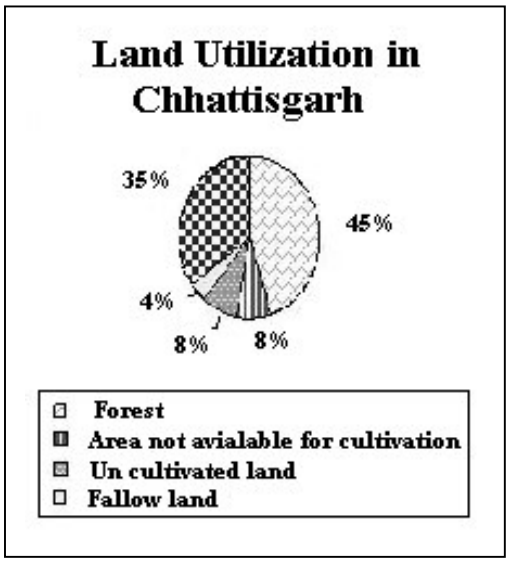


Fig-2.10

- **FOREST AREA**

59772.389 Sq. km. of the State is covered with forests, which is 42.8% of the total geographical area. Korba district has the maximum i.e. 72.58% while the lowest is found in Janjgir-Champa district i.e. 5.6%.

District wise forest area details have been shown in Table: 2.4. below:

Table : 2.4.

S No	Name of District	Area Details		
		Geographical Area (Sq. Km.)	Forest Area (Sq. Km.)	Forest Area (%)
1	Korba	5769.470	4187.371	72.578
2	Dantewada	15610.220	10017.303	64.171
3	Koriya	5977.700	3529.297	59.041
4	Sarguja	16034.400	8654.968	53.977
5	Kanker	6433.740	3358.370	52.199
6	Dhamtari	4082.430	2125.540	52.066
7	Raigarh	6527.740	3243.015	49.681
8	Kawardha	3958.010	1852.250	46.798
9	Jashpur	6457.410	2752.285	42.622
10	Jagdalpur	17016.040	7112.394	41.798
11	Rajnandgoan	8022.520	2923.010	36.435
12	Bilaspur	8568.850	2987.560	34.865
13	Raipur	13443.900	4412.780	32.824
14	Mahasamund	4963.310	1502.970	30.282
15	Durg	8701.800	863.210	9.920
16	Janjgir/Champa	4466.740	250.066	5.598
	Total	136034.280	59772.389	42.803

The forest cover map of the State based on the IRS-IB LISS-II data of Dec, 1998 is shown in **Fig-2.11.**

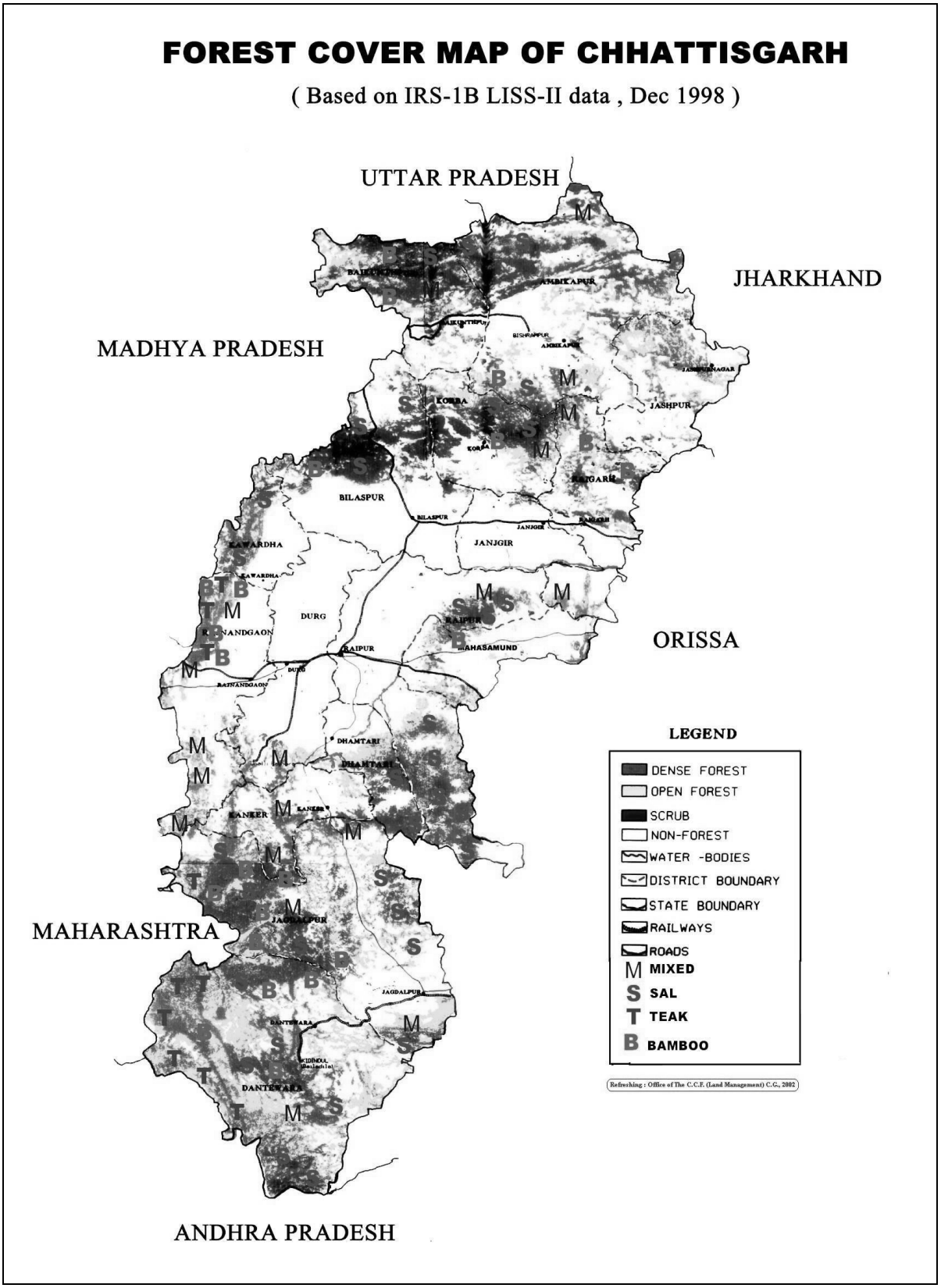

FOREST COVER MAP OF CHHATTISGARH
(Based on IRS-1B LISS-II data , Dec 1998)
UTTAR PRADESH
JHARKHAND
MADHYA PRADESH
ORISSA
MAHARASHTRA
ANDHRA PRADESH
BILASPUR
JANJGIR
DURG
RAIPUR
KORBA
JASHPUR
KANKER
DANTEWADA
JAGDALPUR
LEGEND
DENSE FOREST
OPEN FOREST
SCRUB
NON-FOREST
WATER -BODIES
DISTRICT BOUNDARY
STATE BOUNDARY
RAILWAYS
ROADS
M MIXED
S SAL
T TEAK
B BAMBOO
Refreshing : Office of The C.C.F. (Land Management) C.G., 2002

Fig-2.11.

LAND UNDER AGRICULTURE USE

51.57% of the geographical area of the State (48,23,863 hectares) is net sown area. Janjgir-Champa district has the maximum percentage (71.17%) of net sown area while Dantewada district has the lowest percentage (29.15%).

DOUBLE CROP AREA: -

In 8,20,050 hectares i.e. 16.99% land of net sown area; the crops are taken twice or more. Maximum double crop area is obeserved in Dhamtari district (49.90%) and the least in Dantewada (1.61%) as shown in Table 2.5.

Table: 2.5.

District	Gross Sown Area	Net Sown Area	Double Cropped Area	Gross Irrigated Area by Gross sown Area	Net Irrigated Area by net Sown Area	Double Cropped Area as % of Net sown Area
Raipur						
Dhamtari	1204895	953184	251711	38.1%	46.0%	26.4
Mahasamund						
Durg	793596	555297	238299	29.4%	37.0%	42.9
Rajnandgoan	636041	500020	136021	12.8%	15.3%	27.2
Kawardha						
Bastar						
Kanker	898005	868201	29804	2.8%	2.9%	3.4
Dantewada						
Bilaspur						
Korba	1016934	825137	191797	27.9%	32.3%	23.2
Janjgir/Champa						
Sarguja	682892	597046	85846	4.6%	4.9%	14.4
Koriya						
Raigarh	572184	538112	34072	8.2%	7.1%	6.3
Jashpur						
Chhattisgarh	5804547	4836997	967550	20.0%	22.3%	20.0

Source : Data from Commissioner of Land records, Gwalior, Departments of Agriculture and Irrigation, Government of Madhya Pradesh

- **CROPS**

The main agriculture crops being grown in the State are described in the Table 2.6.

Table- 2.6.

Crop	Chhattisgarh	District wise distribution (Area Sown)			
	% of net sown area in the state.	Maximum		Minimum	
		District	%	District	%
Food Grains	70.62				
Paddy/Rice	65.54	Mahasamund	84.01	Kawardha	37.52
Makka (Maize)	1.63	Surguja	6.51	Durg	0.10
Wheat	1.53	Koriya	4.06	Dantewada	4 ha. Only
Kodo-Kutki	0.20	Bastar	1.58	Jashpur	0.39
Jwar	0.19	Surguja	3.50	Dantewada	1.56
Barley	0.10	Koriya	0.84	Surguja	0.78
Others					
Pulses	15.05	Kawardha	32.89	Dantewada	3.87
Gram	3.43	Kawardha	19.71	Dantewada	18ha.Only
Arhar	0.72	Koriya	1.72	Kanker	0.16
Oil Seeds	6.17	Surguja	13.09	Janjgir-Champa	1.25
Alsi	1.95	Rajnandgaon	6.56	Dantewada	10ha.Only
Mustard	0.91	Surguja	3.81	Mahasamund	0.06
Soya bean		Kawardha	5.37		
Groundnut	0.60	Mahasamund	2.90		
Sugarcane	0.09	Kawardha	0.89		

IMPORTANT BIO RESOURCES IN THE STATE

WATER RESOURCES

The State has surface water resources available for use around 41720 MCM It is estimated that 43 lakh ha area can be irrigated as against the existing irrigation potential of 13.37 lakh ha, as shown district wise Table-2.7

Talbe-2.7

District	Cultivable Area (lakh ha)	Potential Created (lakh ha)
Raipur	7.06	1.43
Mahasamund	2.87	0.61
Dhamtari	2.11	2.77
Durg	7.94	1.88
Rajnandgaon	4.69	0.83
Kawardha	2.28	0.33
Bastar	0.36	0.22
Kanker	2.33	0.35
Dantewada	3.05	0.19
Bilaspur	5.05	1.18
Janjgir	3.05	2.22
Korba	1.46	0.1
Surguja	5.58	0.52
Koria	1.25	0.19
Raigarh	2.84	0.37
Jashpuranagar	2.88	0.18
Total	**54.8**	**13.37**

Source: Water Resources Department

SURFACE WATER

The State of Chhattisgarh is served by four river basins as shown in the Table 2.8.

Table: 2.8.

Basin	Area (Sq. Km)	%
Ganga	**18600**	**14%**
Mahanadi	**74997**	**56%**
Godawari	**39553**	**29%**
Narmada	**1950**	**1%**
Graphical Area of State	**135100**	**100%**

Besides existing irrigation projects , there are a number of incomplete/ on-going Major, Medium and Minor schemes in the State. a summary of which is presented in Table 2.9. overleaf. Once the on-going schemes are completed, a total irrigation potential of 7,13,535 ha would be added of which 4,25,037 ha has already been added.

Table – 2.9.

Summary of On-going Irrigation Projects in Chhattisgarh

Scheme	District	Latest Estimated Cost (Rs. Crore)	Exp. till Jan 2001 (Rs. Crore)	Balance Funds Required (Rs. Crore)	Designed Irr. Pot. (ha)	Capacity Created till Jan 2001 (ha)	Identified Source of Funds
Major							
Mahanadi Reservoir Project	Dhamtari Raipur Durg	572.00	429.71	230.88	264311	241556	
Sondur Project	Dhamtari	88.59	-	-	12260	9510	
Jonk Diversion	Mahasamund	58.48	31.44	27.03	14567	5000	AIBP
Hasdeo Bango Project	Korba	1020.00	679.71	340.29	255000	126000	
	Sub-Total	1739.07	1140.86	598.20	546138	382066	
Medium							
Kharkhara Mohdinaat	Durg	23.81	1.92	21.89	12145	-	NABARD
Sutiyapat	Kawardha	15.60	0.32	15.28	6960	-	AIBP (proposed)
Upper Jonk	Mahasamund	4.80	0.72	4.08	810	-	AIBP (proposed)
Sheonath Diversion	Rajnandgaon	12.13	11.79	0.34	5870	632	AIBP (approved)
Kosarteda	Bastar	62.19	11.75	50.49	11120	-	AIBP (proposed)
Bilaspur Diversion	Bilaspur	19.58	0.37	19.21	5467	-	AIBP (proposed)
Maand Diversion	Raigarh	46.59	49.47	-	-	4050	
Dhonda Diversion	Bilaspur	9.64	7.26	2.38	8323	8323	
Bamni Project	Surguja	18.70	12.47	6.23	2820	-	AIBP (proposed)
	Sub-Total	213.04	96.07	119.90	53515	13005	
Minor (348 nos.)		667.28	197.98	469.80	113882	29966	
GRAND TOTAL		2619.39	1434.91	1187.90	713535	425037	

Source: Data from WRD Note for the Chief Minister

GROUND WATER (GW)

Groundwater is an unregulated resource in Chhattisgarh, i.e. unlike surface water, the development of groundwater is not covered under any Act.

Chhattisgarh appears to be comfortably placed in terms of Ground Water (GW) potential available for use. As shown in Table-2.10. the level of GW development in most of the districts is below 10%, except in Durg, Surguja and Koriya.

Table-2.10.

Status of Ground Water in Chhattisgarh		
Districts	Status of Ground Water	
	Balance GW available for use (MCM/yr.)	Level of GW Development (%)
Bastar Kanker Dantewada	1366.70	1.06
Bilaspur Korba Janjgir Chhampa	1647.80	9.62
Durg	682.00	12.97
Raigarh Jashpur	849.20	4.97
Raipur Dhamtari Mahasamund	1955.20	6.43
Rajnandgaon Kawardha	876.00	3.40
Surguja Koriya	812.30	17.29
Total	**8189.20**	
Source: Central Ground Water Board-North Central Region, 1995		

- **WATER RESOURCES DEVELOPMENT**

Due to rapid urbanisation and industrialisation the under ground water table is decreasing very fast and now people residing in the urban areas are facing problem of drinking water. Geological studies reveals that there are not good aquifers in the upper crust. Upper layer consists of hard impermeable lime stone rocks retaining percolation of pond' s water. Ponds technology of water harvesting and utilization is very successful in the Chhattisgarh. Details of district wise **1.** Depth to water table **2.** Water table fluctuation map **3.** Water table fluctuation map **4.** Water table fluctuation map is shown in Fig-2.12. to 2.15. below.

Fig-2.12.

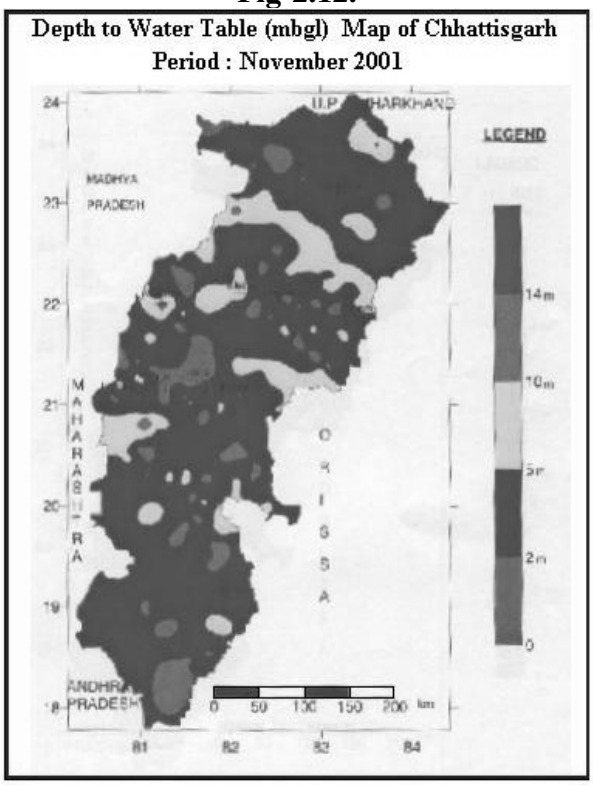


Fig-2.13.

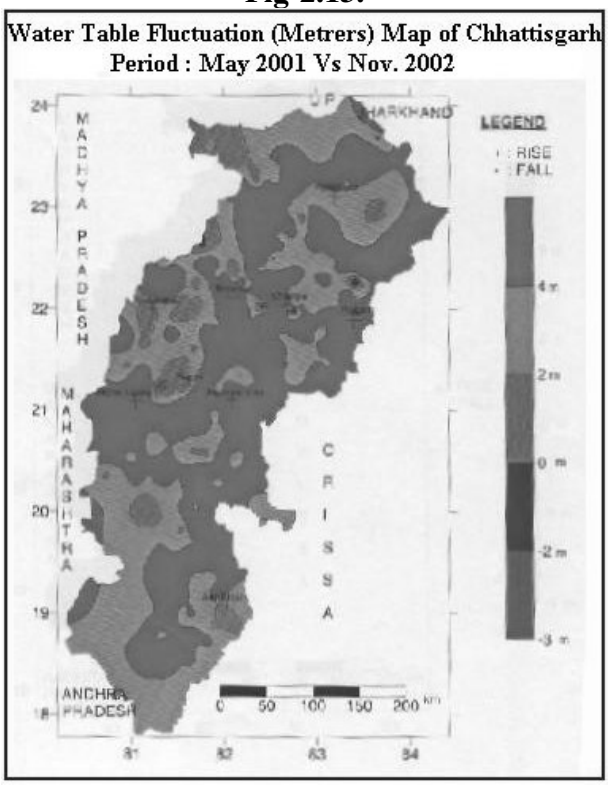


Fig-2.14.

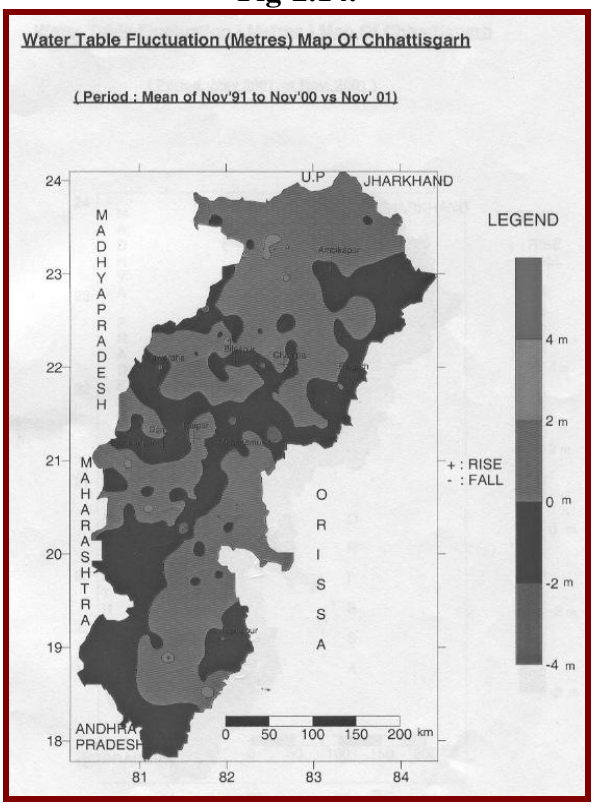
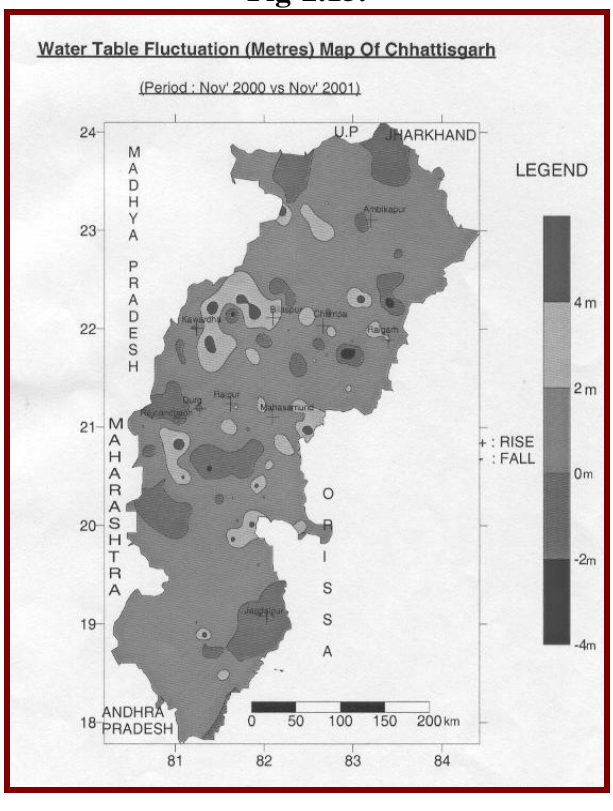


Fig-2.15.



- **IRRIGATION**

Land Use Classification, use of land by village records, and level of Irrigation in Chhattisgarh, 1997-98

Table-2.11.

District	Canals		Tanks		Tube wells		Wells		Other Sources		Total Irrigation Area	
	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net	Gross	Net
Raipur Dhamtari Mahasamund	324248	356593	25659	25522	25268	23164	18358	17793	15500	15201	459033	438273
Durg	157746	151197	10026	9786	35571	21904	10093	6501	19736	16160	233172	205548
Rajnandgoan Kawardha	57047	55349	3369	3314	5489	4565	4509	3375	10889	10056	81303	76659
Bastar Kanker Dantewara	7205	7205	8940	8940	1134	1134	2206	2206	5294	5294	24779	24779
Bilaspur Korba Janjgir/Champa	234631	221700	12124	11713	19146	16854	12083	10019	6222	5854	284206	266140
Sarguja Koriya	9810	8938	1196	1184	318	318	6454	5949	13483	13133	31261	29522
Raigarh Jashpur	20423	17141	5131	4914	11779	7372	2683	2566	6931	6369	46947	38362
Chhattisgarh	861110	818123	66445	65373	98705	75311	56386	48409	78055	72067	1160701	1079283

Source : Data from Commissioner of Land records, Gwalior, Departments of Agriculture and Irrigation, Government of Madhya Pradesh

MINERALS

Chhattisgarh contributes 13.64 % of the income generated through the minerals of our country. The State has huge deposits of the minerals i.e. Iron ore, Coal, Lime stone, Uranium, Bauxite, Dolomite, Tin ore, Gold, etc. and also rich in the deposits of precious stones like Diamond, Corundum, Alexandrite, Garnet, etc as shown in Fig-2.16.

In Chhattisgarh, Bilaspur revenue division contributes (80%) of the total income through the minerals, while 11% and 9% is generated from Raipur and Bastar Revenue divisions, respectively. Among all the districts Korba district, itself contributes 50% of the total income generated through the minerals in the State.

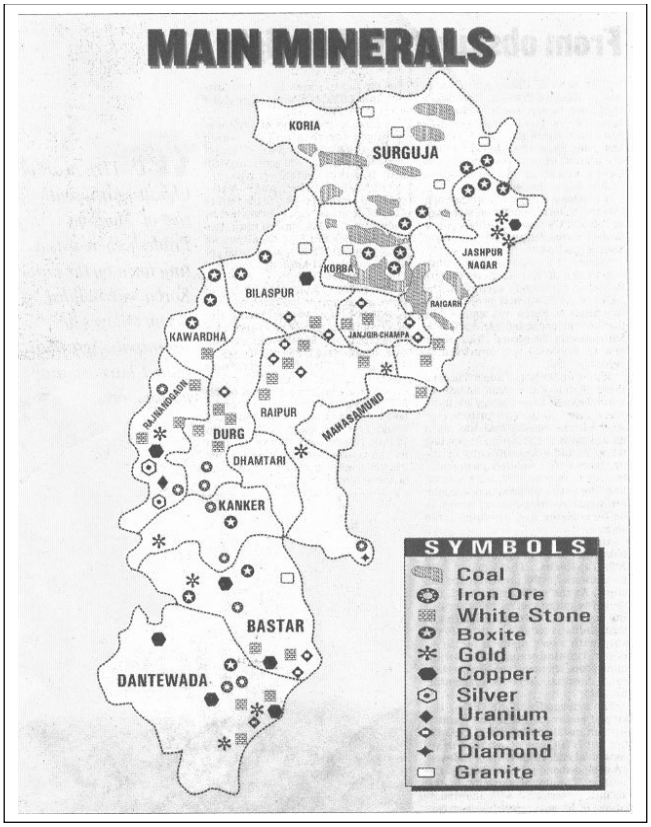


Fig: 2.16.

District wise availability of various minerals has been shown in Table- 2.12. below:-

Table-2.12.

No.	District	Minerals	Source Area
1	Korea	Coal	Sonhat, Chirmiri, Jilmili
2	Sarguja	Coal Bauxite	Tatapani, Ramcola, Lakhanpur, Vishrampur, Mainpat, Samripat,
3	Jashpur	Bauxite Gypsum Gold	Jashpur (Bagicha & Jashpur Tahshil) Jashpur Tahshil Kunkuri & Patthal
4	Raigarh	Coal Limestone	Karsiya, Dharmjaygarh, Garhghora, Raigarh (Area Of Madh River Coal) Saranggarh & Karsiya
5	Korba	Coal Bauxite	Gavra, Deepika, Kushmunda, Korba, Hasdo, Rampur, Balgi, Bankimongra Phutkapahadh, Pawankherapahadh, Kamselapahadh, Korba

6	**Janjgir-Champa**	**Limestone** **Dolomite**	**Agartala, Pamgarh Tahshil** **Champadhabra,Akartala**
7	**Bilaspur**	**Dolomite** **Limestone** **Manganese** **Bauxite** **Iron Alloys** **Gypsum**	**Bilha,Kota** **Bilha** **Kota** **Pendra And Lormi** **Pendra** **Pendra**
8	**Kawardha**	**Bauxite** **Chhi** **Limestone**	**Kawardha And Pandariya** **Kawardha** **Kawardha**
9	**Rajnandgoan**	**Limestone** **Iron Alloys** **Gold** **Silver** **Quartzite**	**Khairagarh,Chhikhadan And Rajnandgoan** **Khairagarh,Chhikhadan And Mohla** **Rajnandgoan** **Rajnandgoan And Mohla** **Dongargarh** **Mohla**
10	**Durg**	**Uranium** **Iron Alloys** **Limestone**	**Dalirajhara,Dondi Lohara** **Durg,Gunderdahi,Gurur,Dhamdha** **Manpur And Devbhog**
11	**Raipur**	**Diamond,Granit,** **Corrundum** **Gold** **Limestone**	**Manpur And Devbhog** **Navapara,Rajim And Navagaon** **Raipur,Bhatapara,Tilda And Bhilaigarh**
12	**Mahasamund**	**Limestone**	**Saraipalli,Mahasamund**
13	**Dhamtari**	**Khadiya**	**Dhamtari**
14	**Kanker**	**Bauxite** **Iron Alloys** **Gold**	**Antagarh** **Bhanupratappur** **Pankhajur**
15	**Bastar**	**Iron Alloys** **Gold** **Bauxite** **Limestone** **Copper** **Dolomite**	**Narayanpur** **Narayanpur** **Narayanpur** **Jagdalpur** **Narayanpur** **Jagdalpur**
16	**Dantewada**	**Iron Alloys** **Copper** **Limestone**	**Bailadilla And Raoghat** **Bijapur,Bhopalpatnam And Dantewada** **Konta,Dantewada**

		Quarzite	**Dantewada**
		Dolomite	**Konta**
		Gold	**Konta**
		Tin Alloys	**Konta And Dantewada**
		Granite	**Bhopalpatnam**
		Korandam	**Bhopalpatnam And Konta**
		Alexandrite	**Dantewada**

- **ENERGY RESOURCES**

Chhattisgarh is rich in energy resources. The main energy resource is Coal. The State produces 15% of total coal of the country.

The main coal producing areas are:

1. **Korba - Produces 75% coal of the state and 11% of the country.**
2. **Hasdo-Rampur Colliery.**
3. **Mand-Raigarh Colliery**
4. **Vishrampur Colliery**
5. **Lakhanpur Colliery**
6. **Tatapani-Ramkola Colliery**
7. **Jhilmili Colliery**
8. **Sonhat Colliery**
9. **Jhagrakhand Colliery**
10. **Chirmiri-Kurasiya Colliery**

- **POWER: -**

Although currently a power surplus State, Chhattisgarh is likely to witness a peak power shortage of approximately 150 MW during the current year i.e. 2001-02. This is likely to increase to 917 MW by the year 2010-11.

Availability of large quantities of coal reserves can ensure constant supply of raw materials for future thermal power projects to be set up in the State. The reduced unit cost of power for such units could act as an incentive for project developers to set up power projects in the State

- **INDUSTRIES**

Chhattisgarh is rich in agriculture, forests, electricity and mineral resources but the industrial development is very slow in the State. Only 9% of the total working population is employed in the industries while the national average is 24%.

Various industries of the state are steel, cement, aluminium, tin, mining, thermal power production plants, cotton clothes, rice mills, flour mills, oil mills, chemical industries, silk, jute, lac, bidi, foods, plastics industries, and other large, medium or small scale industries.

- **ECOLOGICAL PROFILE**
  - **Forest Cover**

Chhattisgarh is rich in forest resources. About 44% of the total area of the State is under forest cover.

Fig : WILD BUFFALO

Fig : SAL FOREST

Fig : HILL MYNA

As per Udvardy (1975), State is placed under Indo-malayam realm. Sal and mixed forests are the main forest types of Chhattisgarh. Biogeographically the state is placed in Deccan Plateau zone with three provinces namely 6D Chota Nagpur plateau, 6C Eastern Highlands and 6E Central high land (Rodgers and Panwar, 1988). Chhattisgarh is possibly last home of genetically un-swamped and critically endangered wild Buffalo (*Bubalus bubalis*) and Bastar myna (*Gracula religiosa*) and quite rightly the State has declared them as **State Animal** and **State bird** respectively. Chhattisgarh is a tribal dominated state in the country with extensive forest areas bearing the prints of traditional use. Large forest tracks of the state have been under scientific management over a century. The landform, the soil and the rainfall attributes of state allow for large biodiversity of crop cultivator and land races. These unique features cause Chhattisgarh to have extremely rich biodiversity within the old growth forest systems, the traditionally influence forest systems, the managed forest systems and the agro-pastoral systems.

On all these considerations Chhattisgarh encompasses highly rich biodiversity of crucial significance at the national level. With its two major most forested water basins; State is one of the biggest carbon sink of the country & strong contributor to soil and water securities of neighboring states also.

- **PROTECTED AREA NETWORK:**

The list of Protected Areas (PA's) in the state along with the areas are tabulated below:

S.No.	Name of the PA	District Location	Area (in sq. km.)*
	National Parks		
1	Indravati	Dantewada	1258
2	Kanger Ghati	Bastar	200
3	Guru Ghasidas	Sarguja / Korea	1441
	Wildlife Sancturies		**(*All figures rounded.)**
1	Achanakmar	Bilaspur	552
2	Badalkhol	Jashpur	105
3	Bhairamgarh	Dantewara	139
4	Barnawapara	Raipur	245
5	Gomarda	Raigarh	278
6	Pamed	Dantewara	262
7	Semarsot	Sarguja	430
8	Sitanadi	Dhantari	559
9	Tomarpingla	Sarguja	608
10	Udanti	Raipur	231
11	Bhoramdeo	Kawardha	164

DEMOGRAPHY

SCHEDULED CASTES

12.19% of the total population of Chhattisgarh belongs to the Scheduled Castes (SC) as defined in the Constitution of India in Art. 341. The main castes under this category are: Chamar, Satnami, Mochi, Dewar, Ganda, Ghasi, Ghasia, Kanjar, Khatik, Bhangi, Mahettar, Banchhada, Bedia, Mahar, Pasi, Chikwa, Bansod, etc. The 82.30% of the total population of scheduled castes belongs to the rural areas and rest (17.70%) to the urban areas. District wise distribution of SC's is the highest in Janjgir-Champa (22.00%) and lowest in Dantewada (4.00%). Gender Ratio in this community is 987, which is nearer to the Average Gender Ratio of the state (990).The average literacy of the SC population of the state is 29.42%. District wise literacy of this community is maximum in Durg (39.57%) and minimum in Surguja (14.99%).

SCHEDULED TRIBES

The castes under the scheduled tribes (ST) as defined by the Art. 342(1) comprises 32.46% (or 1/3) population of Chhattisgarh (Census of India 1991). There are 42 tribal groups which are further divided in to their sub groups / castes. Gond is the largest tribal group (55.05% of the tribal population of Chhattisgarh) in the state which is divided in to 13 sub groups / castes. Other tribal groups are Kanwar (11.84%), Halba (4.76%), Bhatra (2.52%), Urao (1.89%), Bijhwar (1.72%), Bhariya (1.58%), Sanwara (1.34%), Baiga (0.93%), Agariya (0.74%), etc.

HEALTH

Outcome indicators in health are not available separately for Chhattisgarh for current years. Information is available for entire Madhya Pradesh on infant mortality rate, birth rate and death rate through the Sample Registration Scheme of the Registrar General of India. In 1990, 1991 and 1992 the Infant Mortality Rate for rural Chhattisgarh fluctuated from 82.7 to 111.8 and then to 76.5.

Data from the Census of 1991 also give us mortality and fertility indicators for the year 1991. The table 2.16. given below presents some basic health indicators from 1991. The life expectancy at birth in Chhattisgarh was 61.4 years, What is also very encouraging in Chhattisgarh is that female life expectancy in higher than that of males.

Health Indicators of Chhattisgarh, 1991

Table-2.13.

	All	Male	Female	Rural	Urban
Mean Age of Marriage	**52.4**	**25.5**	**25.3**	**25.4**	**25.2**
Total Fertility Rate	**4.3**	**-**	**-**	**4.3**	**4.2**
Infant Mortality	**85.0**	**88.0**	**83.0**	**92.0**	**52.0**
Life Expectancy at Birth	**61.4**	**60.9**	**62.0**	**60.0**	**69.6**
Population expected to survive beyond 20 years	**0.173**	**0.168**	**0.178**	**0.185**	**0.109**
Child Mortality uptill 5 years	**129.0**	**134.0**	**124.0**	**141.0**	**79.0**

Source: Indicators calculated from Fertility Tables, Census of India 1991, Registrar General of India, New Delhi.

- **HOUSING AND BASIC AMENITIES**

The 1991 census provides detailed information on the types of houses occupied in Chhattisgarh as well as access to basic amenities of safe drinking water, electricity, and sanitation by households. More than three fourths of the households in Chhattisgarh resided in semi-pucca houses, and about 19% lived in pucca houses. Eleven percent rural houses in 1991 were Kutcha houses.

In term of access to amenities, the **Table- 2.14.** below shows the situation as in 1991.

Table-2.14.

Basic Amenity	All	Rural	Urban
Access to Electricity	**31.8%**	**25.4%**	**61.2%**
Access to Safe Drinking Water	**51.2%**	**45.1%**	**79.6%**
Access to Toilet	**10.3%**	**3.3%**	**42.4%**
Access to all Three	**7.6%**	**1.5%**	**35.6%**
Access to None of the Three	**36.1%**	**41.9%**	**09.6%**

Source : Household tables ,Census of India 1991, Registrar General of India, New Delhi.

- **EMPLOYMENT**

Information on Employment in Chhattisgarh is available on a comprehensive scale only from the Census of 1991.

The Worker Participation Rate (WPR) in Chhattisgarh was 47.7 percent, 54.3 percent for males and 41 percent for females. The high Worker Participation Rate for females is commensurate with paddy being a major crop for the region. Paddy is sown in around 90 percent of the total sown area under cereals in *kharif,* and about 85 percent of all area sown under food grains in *kharif* in Chhattisgarh. The southern and eastern districts have the highest worker participation rates, all well above fifty percent. The same areas of Bastar, Dantewara, Kanker, Rajnandgaon, and Kawardha also have high female worker participation rates.

The Farm Sector dominates employment. The census of 1991 found that 82 percent of all workers and 90 percent of rural workers were involved in farm related activities including cultivation, and agriculture allied activities. After the primary sector, the services sector offers the highest employment. Eleven percent of the entire Chhattisgarh and fifty two percent of urban employment was in the services sector.

The total estimated head count ratio for poverty in 1993-94 was 28.6 percent, which was marginally lower at 25.74 percent for rural Chhattisgarh and much higher at 42.2 percent for urban Chhattisgarh.

Table 2.15.

Area	1987		1993/94	
	Official	Expert	Official	Expert
	PL	PL	PL	PL
All	**55.35**	**45.27**	**38.91**	**28.64**
Rural	**58.47**	**46.72**	**38.21**	**25.74**
Urban	**35.38**	**35.99**	**42.21**	**42.21**

Source : Primary Abstract Census of India 1991, Registrar General of India, New Delhi

Official PL : Poverty Line as per Planning Commission

Expert PL : Poverty Line as per recommendations of the Expert Group on Poverty

Table: 2.16.

District	Employment in Sectors					Agriculture Labour in Workers
	Farm	Non-Farm	Primary	Secondary	Tertiary	
Sarguja	89.2%	10.8	90.7	2.5	6.8	18.4
Bilaspur	80.8%	19.2	81.2	5.4	13.4	26.7
Raigarh	83.7%	16.3	53.8	5.9	10.3	29.0
Rajnandgoan	84.1%	15.9	84.3	6.0	9.7	18.7
Durg	70.0%	30.0	71.4	13.1	15.5	25.0
Raipur	76.0%	24.0	76.3	8.5	15.2	25.8
Bastar	88.2%	11.8	88.3	3.7	8.0	17.3
Koriya	66.6%	33.4	83.0	3.6	13.4	11.3
Janjgir/Champa	86.6%	13.2	87.3	4.8	7.9	24.5
Korba	70.7%	29.3	75.7	8.7	15.6	20.7
Jashpur	88.8%	11.2	88.8	4.2	7.0	15.6
Kawardha	92.2%	7.8	92.2	2.4	5.4	24.2
Mahasamund	87.6%	12.4	87.9	4.3	7.8	34.5
Dhamtari	85.6%	14.4	85.7	5.6	8.7	33.3
Kanker	88.9%	11.1	89.0	3.7	7.4	16.8
Dantewada	90.2%	9.8	92.0	2.1	5.9	8.8
Chhattisgarh	81.6%	18.4	82.7	6.3	11.0	23.1

Source : Primary Abstract Census of India 1991, Registrar General of India, New Delhi

Table: 2.17.

District	Scheduled Castes		Scheduled Tribes	
	Gender Ratio	Population Share	Gender Ratio	Population Share
Sarguja	96	4.8%	979	56.7%
Bilaspur	96	19.1%	1005	20.5%
Raigarh	100	14.0%	1016	36.8%
Rajnandgoan	101	10.1%	1046	26.9%
Durg	98	12.8%	1017	12.4%
Raipur	99	16.7%	1017	13.1%
Bastar	99	7.5%	1009	66.5%
Koriya	93	7.9%	960	44.0%
Janjgir/Champa	99	22.4%	1035	12.2%
Korba	94	10.0%	989	43.1%
Jashpur	99	7.2%	1020	65.4%
Kawardha	99	13.9%	1009	20.2%
Mahasamund	101	12.7%	1035	28.1%
Dhamtari	100	6.9%	1029	27.3%
Kanker	104	4.5%	1013	55.7%
Dantewara	98	4.1%	1027	78.8%
Chhattisgarh	98	12.2%	1009	32.5%

Source : Primary Abstract Census of India 1991, Registrar General of India, New Delhi

HUMAN DEVELOPMENT INDEX

The Human Development Index is a composite index of three main components of human development, **knowledge** (which is measured by literacy and children' s enrolment in schools); **longevity** (measured by expectancy of life at birth); and **access to resources** to lead a reasonable quality of life (measured by per capita incomes and adjusted to reduce the impact of very high of very high per capita incomes and sensitized to levels of poverty in the districts.)

There is insufficient data available for fifteen of the sixteen districts of Chhattisgarh for developing Human Development Index based indicators directly associated with the districts. However, data is available for the seven original districts. Since Durg is the only district that was not divided, data is available for this district. Of all the other fifteen districts, data is available for literacy for all of the fifteen, but on other indicators we have applied the indicators of the parent district to the divided districts for constructing the Human Development Index.

District Durg comes out on top followed by Dhamtari, Raipur, Bilaspur and then Korba. At the bottom lies Kawardha district, which was carved out from Rajnandgaon. The other districts at the bottom come from the northern most and southern most districts of Surguja, Dantewada, Bastar, Raigarh, and Koriya.

Human Development Index in District of Chhattisgarh, 1998
Table-2.18.

DISTRCT	EDUCATION			HELTH		INCOME				Human Development Index	RANK	
	Literacy	Children's Enrolment in Schools	Education	Life Expectancy	Health	Adjusted per capita income	Poverty Rate	Adjusted Income & Poverty	Income		In CG.	In Undivided M.P.
	IOD	IOD	HDI	IOD	HDI	IOD	IOD	IOD	HDI			
	A	B	D	E	F	H	I	J	K	M	N	O
DURG	0.413	0.315	0.620	0.346	0.654	0.533	0.282	0.282	0.407	0.622	1	2
DHAMTARI	0.472	0.279	0.593	0.411	0.589	0.671	0.262	0.262	0.466	0.572	2	9
RAIPUR	0.514	0.279	0.565	0.411	0.589	0.671	0.262	0.262	0.466	0.562	3	9
BILASPUR	0.545	0.340	0.523	0.386	0.614	0.608	0.333	0.333	0.471	0.555	4	10
KORBA	0.547	0.340	0.522	0.386	0.614	0.608	0.333	0.333	0.471	0.555	5	10
MAHASAMUND	0.572	0.279	0.526	0.411	0.589	0.671	0.262	0.262	0.466	0.550	6	9
KANKER	0.609	0.629	0.384	0.286	0.732	0.709	0.252	0.252	0.480	0.545	7	21
JANGIR	0.617	0.340	0.476	0.386	0.614	0.608	0.333	0.333	0.471	0.540	8	10
JASHPUR	0.526	0.418	0.510	0.437	0.563	0.722	0.285	0.285	0.504	0.523	9	23
RAJNANDGOAN	0.512	0.423	0.517	0.443	0.557	0.732	0.286	0.286	0.509	0.522	10	22
KORIYA	0.612	0.416	0.453	0.337	0.663	0.783	0.365	0.365	0.574	0.514	11	28
RAIGARH	0.570	0.418	0.480	0.437	0.563	0.722	0.285	0.285	0.504	0.513	12	23
BASTAR	0.773	0.629	0.275	0.268	0.732	0.709	0.252	0.252	0.480	0.509	13	21
DANTEWADA	0.853	0.629	0.233	0.268	0.732	0.709	0.252	0.252	0.480	0.495	14	21
SARGUJA	0.727	0.416	0.377	0.337	0.663	0.783	0.365	0.365	0.574	0.489	15	28
KAWARDHA	0.702	0.423	0.391	0.443	0557	0.732	0.286	0.286	0.509	0.479	16	22

Source : Primary Abstract Census of India 1991, Registrar General of India, New Delhi

IOD ; Index of Deprivation
HDI : Human Development Index

SOCIAL INFRASTRUCTURE

- Chhattisgarh has shown a decade population growth rate of 18.06% (1991-2001) that is better than that of BIMARU States. The State also has one of the highest sex or gender ratios in India, indicating better conditions for women as compared to other States in India
- Education forms the backbone for social and economic development and the State has shown a healthy improvement in its literacy rates during the last decade
- Long distances, lack of adequate transport network, remote villages and dense forest cover have been deterrents to the Government's efforts in delivering health services to the people.

The current health infrastructure in the State is inadequate to cater to the needs of the population, especially in the rural areas

- The primary sector employs a major part of the population, with agriculture being the mainstay of the people. The worker participation of females is very low in Chhattisgarh

As per the 2001 census, Chhattisgarh has a population of 20,795,956, and has grown by 18.06% during the last decade. If the trend continues, there would be less pressure on the State to provide the basic minimum services to its population. However the State has a very low population density - 154 persons per sq.km in Chhattisgarh compared to 324 persons per Sq. Km for all India.

The largest concentration of population within the State is in the central and north central parts as detailed in **Table-2.19.**

Table- 2.19.

Districts	% of total state area	% of total state population
Bastar	20%	6%
Bilaspur	5%	10%
Dantewada	7%	3%
Dhamtari	2%	3%
Durg	6%	13%
Janjgir	3%	6%
Jashpur	3%	4%
Kanker	2%	3%
Kawardha	1%	3%
Korba	7%	5%
Korea	3%	3%
Mahasamund	3%	4%
Raigarh	6%	6%
Raipur	11%	14%
Rajnandgaon	7%	6%
Surguja	13%	9%

Source: 2001 Census

Raipur and Durg have the maximum population, comprising 14% and 13% respectively of the State's entire population.

These two districts, along with Bilaspur and Surguja makeup for 46% of the entire State's population. Scheduled Castes (SC)/ Scheduled Tribes (ST) constitute almost 44.7% of the total State's population.

The highest concentration of ST population is in Bastar and Dantewada in the south. Almost 98% of the ST population reside in rural areas.

Gender ratio or the sex ratio for the State is 990, which is very high when compared to other Indian States. Chhattisgarh has the third highest gender ratio in India, after Kerala (1058) and Pondicherry (1001). Amongst the districts, Rajnandgaon (1024) and Mahasamund (1019) have the highest gender ratio.

- **POPULATION**

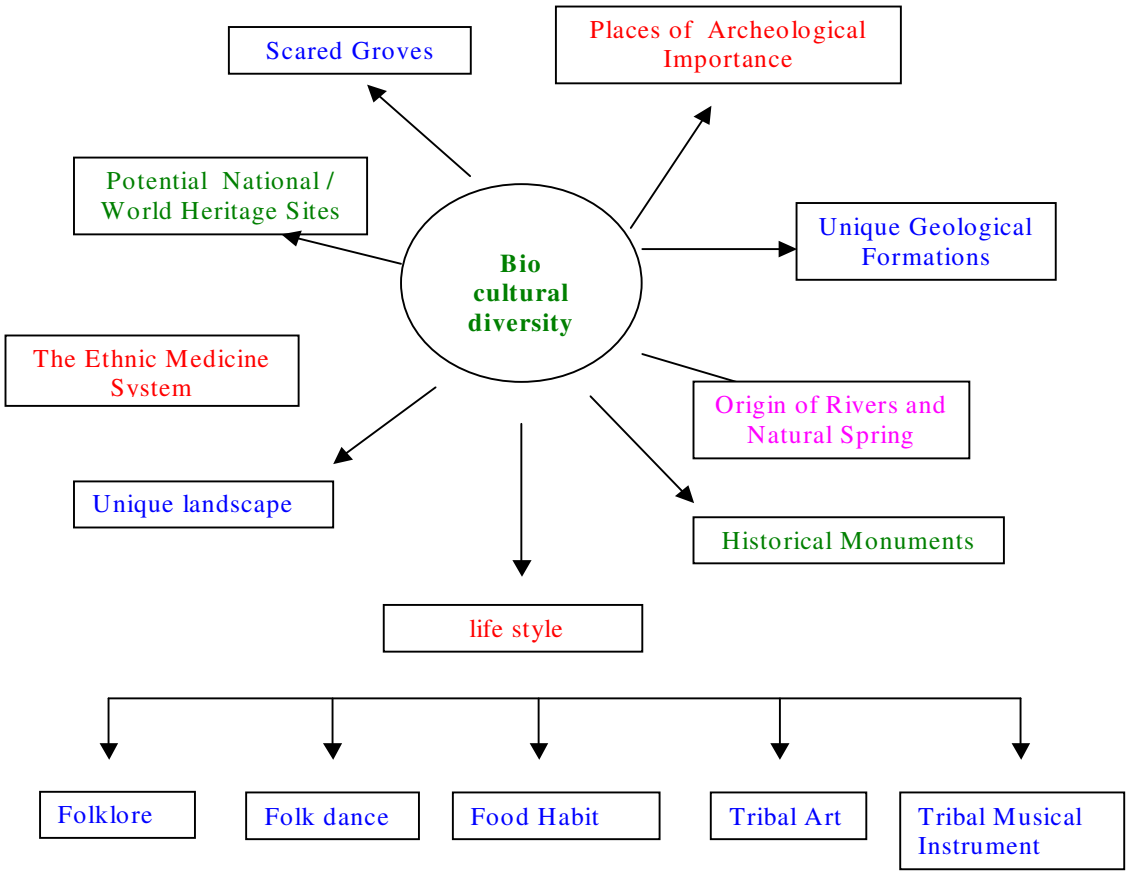
Total Population

Table-2.20.

Districts	Area	Population			Share of States Population	Gender Ratio
		Persons	Male	Female		
Koriya	4311.7	585455	300723	284732	2.82	947
Surguja		1970661	999196	971465	9.48	972
Jashpur	457.0	7369780	370287	369493	3.56	998
Raigarh	835.0	1265084	633993	631091	6.08	995
Korba	9009.7	1012121	515467	496654	4.87	964
Janjgir/Champa	3672.4	1316140	658377	657763	6.33	999
Bilaspur	7214.9	1993042	1009007	984035	9.58	975
Kawardha	1746.3	584667	292054	292613	2.81	1002
Rajnandgoan	9380.7	1281811	633292	648519	6.16	1024
Durg	853.0	2801757	1413785	1387972	13.47	982
Raipur	1535.0	3009042	1520024	1489018	14.47	980
Mahasamund	386.0	860176	426011	434165	4.14	1019
Dhamtari	207.0	703569	350962	352607	3.38	1005
Kanker	3122.3	651333	324678	326655	3.13	1006
Bastar	26882.1	1302253	648068	654185	6.26	1009
Dantewada	9109.6	719065	356502	362185	3.46	1017
Chhattisgarh	135237	20795956	10452426	10343530	100.00	990

- **CULTURAL DIVERSITY**

In contemporary history; evidence of ancient people has been found in the hills of Raigarh, Singhanpur, Kabra, Basnajhar, Boslade and Ongana Mountains at "Chitwandongri" in Rajnandgaon district. The stone equipments made and used by ancient people have been found from the banks of Mahanadi, Mand, Kanhar, Manihari, and Kelo River. The rock-Paintings of Singhanpur and Kabra Mountains are quite famous among contemporary paintings due to variety and style. Among remains of historical age, traces of bone, animal burial has been found in abundance in Raipur and Durg districts.



Along with archaeology, the culture of Chhattisgarh is also quite famous. The tribal diversity is quite unique since multi-ethnic tribes like Kanwars, Kamar, Baiga, Halba, Korea, Pando, Birhai, Biniwar are found in the State. The rice-bowl Chhattisgarh land has unique eroticism and sweetness. Apart from the mesmerising dances, songs of Dadra, Pandwani, Karma, Panthi and Suva, the region has National Parks/Sanctuaries and has places of archaeological and religious importance such as Sirpur, Rajim, Malhar, Sita Bengra, Jogibhatta, Deepadih, Dantewada and Dongargarh where tourists come automatically. The ancient deposits of Chhattisgarh and Jain religion memorials are found at Malhar, Sirpur, Mahespur and Arang.

THE CONTOURS OF BIO-CULTUTRAL DIVERSITY

Details of the customs religion, political system, organization of some of the tribes, food habits have been discussed below: -

1. Korwa/Hill Korwa:-

- **Distribution:-**

Surguja, Jashpur and Raigarh districts. The history of this tribe suggests that they migrated from Chotanagpur region to Khudia region of Jashpur. From Khudia they migrated to the adjacent parts of Surguja. During the course of migration those settled on the hills and dense forests are known as Pahari or Hill Korwas and the others who settled down in the plains are known as Deharia Korwa.

- **SOCIAL CUSTOMS:-**
  - The Pahari Korwas are divided into five totemistic clans i.e. Hansdwar, Edigwar, Samar, Ginnur and Renla.
  - Religion is confined to ancestral worship. The important festivals are - Haryali, Kora, Navakhai and Charts.
  - Leadership in the Korwas is hereditary and conventional. Baiga is the religious head, Dewar is the medicine man. Every village of the Korwas has a Baiga and he is the socio- religious and socio- political head of the community. Every hamlet has a ' Sayana' an elder for solving community disputes. Mahan is the head of the clan, and he solves the clan based disputes.

2. PANDO

- **Distribution:-**

Surguja, Raigarh and Bilaspur districts. In Surguja mainly found in - Surajpur, Pal, Baikunthpur, Ambikapur, Manendragarh, Bharatpur.

- **FAIR AND FESTIVALS:-**

(i) **Kharbhoj Puja-** Related with Jungle grass- *Sukra* and *Cheend* used for thatching roofs is first offered to the village deities.

(ii) **Hareli-** Flowers of *Lakda* and *Minjhri* are offered to the deities by the religious man or specialist - *Baiga*.

(iii) **Mahua Festival-** *Mahua latta* is prepared and first offered to ancestral spirits and clan spirits and then consumed.

(iv) **Nawa Khai**- New crops are ready for consumption after been offered to the spirits.

(v) **Karma Festival-** Stump of the Karma tree is planted in the courtyard of the *Mukhiya or Pradhan* of the village and the villagers dance together (Karma Dance).

- **RELIGOUS SPECIALISTS :-**

(i) *Baiga* - Religious head

(ii) *Aolawa*- Assists the Baiga

(iii) *Gunia Dewar*- Medicine man and also uses magico-religious mean' s for curing ailments

POLITICAL SYSTEM:-

(i) **Mukhiya Panchayat or Darbar-**

This is confined to the village and composed of a m*ukhiya* and Members called as *Panchbhai*. The position of the *Mukhiya* is hereditary and the *Panchbhai* or village elders are elected.

(ii) **Jati Panchyat-**

This is a set up of at least 5-6 Pando villages. All the grievances and appeals are attended by this Panchayat.

- **SPIRITS-**

1	*Orbongas*	home spirits
2	*Bura bongas*	Hill spirits
3	*Khuntbhuts*	Clan spirits

- **TOTEM TABOOS-**

Birhor abstains from killing, hunting or eating the totem animals and plants specified before.

BIRHORS ARE SUB DIVIDED INTO –

(i) *Uthlus* (wanderers) - hunting

(ii) *Jaghis* (settlers) - rope making out of chop creepers.

The Jaghi Settlements have sacred grooves called the *jayar* or *jilae jayar* marked by trees. This is the abode of *sendra-bongas* or the hut spirits. They are worshipped before every activity. *Uthlus* also have a tree to mark their *jilu-jayar*.

GONDS

The Gonds refer to themselves as *'Koyattor'* . The Gonds are variously sub divided for example the Dandami Maria of Dantewada, *Koyattor* or the Mudia of Narayanpur refer to Mudia *Koyattor*.

The root word of Gond arises from Telugu ' Kond' means hill. Abujhmaria is the oldest possible division of the Gonds.

The criteria for *Koyattor* is:-

1	*Undi Kodta*	Similar festivals (agronomial)
2	*Karsaadh*	pen festival should be similar
3	*Kadti*	clan rules similar
4	*Kaser Gayta*	worship and religious head should be similar
5	*Kola*	home deities should be similar
6	*'Kal Kalk' Jagaa*	settlement should be hilly terrain

The distribution of the Gond is wide from Bilaspur, Durg, Raigarh & Bastar in Chhattisgarh.

- **KAMARS**

  - **GENERAL DESCRIPTION-**

This tribe is mainly divided into two groups based on the habitat, the ones who dwell on the hills (Dongar) call themselves as *'Pahar Pathiya'* and the ones dwelling in the plains, call themselves as the *'Budh rajiya'*. The Kamars trace their origin from Deodongar village of the ' mainpur' block and even today their prominent deity is situated in ' Waman Dongri' at Deodongar. There are three Divisions among them, namely the *Paharpatiya, Bundhraja* and the *Kachharpatiya,* which are further divided into few totemic clans.

- **SOCIAL ORGANISATION-**

Six clans have been seen namely- Jagat, Netam, Sori, Marai and Chhedaiha.Clan exogamy is strictly practiced.

- **FAMILY-**

The family is mostly nuclear, patrilineal and patrilocal, married sons generally shift and establish a separate household but the property is undivided ever after marriage.

- **MARRIAGE-**

The Kamars are strictly exogamous. The normal age at marriage for males is 18 years and for females it is 15. Kamars are usually monogamous, sometimes Polygamy is reported polygamy is generally practised due to the death or barreness of the wife i.e., sororal polygamy is usually preferred. Levirate marriage is also sanctioned in them.

- **ECONOMY**-

The Kamars are not advanced cultivators. Whatever numbers have land take to dry farming since irrigation facility is not available to them. Bamboo work and labour for wages is the only sustaining factor of the kamar economy at present. They work as agricultural labourers which is at best only a seasonal operation during the Kharif Season. Bamboo work has also become a very grim source to depend upon due to the shrinkage of Bamboo cover.

The Kamar dwelling and settlements are since surrounded by forest; collection of minor forest produce is another source of the Kamar subsistence and survival.

- **FOOD AND DRINKS-**

Rice is the staple food of the Kamars. Besides Rice, maize and wheat are also consumed vegetables, tubers and roots are collected from the nearly forest and fishing is also done using the indigenous fish traps. The Kamars have a fixation for ' *Mand*(Mahua liquor) to drive away the monotony of life. Smoking and tobacco chewing is also seen.

- **RELIGOUS LIFE-**

The Kamar pantheon comprises of various deities having abode in forest which are propitiated time to time other deities are *Gaata, Duma, Dharti Mata, Budharaja, Dulha Deo, Mata Bhai* (Pox), *Devi* (Cholera), *Badi Mai, Choti Mai, Thakur Deo, Bati garh mai* and *Bamharna mai* etc.

Mahua is the main ingredient of Kamar worship.

The main festivals are Hareli, Pola, Nava khai, Dussehra, Diwali, Cherchera and phagun. Ancestor worship is prevalent in the kamars and various rituals are followed and carried on by the *Baiga* (Religious head). *Guniya* is the medicine man.

- **TRIBES IN BASTAR DIVISION**

THE MAJOR TRIBAL GROUPS ARE: -

Table: 2.21.

Tribe	Occupation
Muria	**Plain cultivation, labour**
Abujhmaria	**hill cultivation, Basketry**
Dandami Maria	**Plain cultivation; labour**
Maria	**--„--**
Dorla	**--„--**
Bhatra	**--„--**
Dhurwa	**Basketry and cultivation**
Halba	**Plain cultivation and labour**

The tribes of Bastar are based on *'Pargana* System*'* - consisting of many villages. The name of the *pargana* is either on clan or place name. The parganas are headed by traditional head the *pargana majhi* (Political Head).

***Pen majhi* (Religious Head), he wields more authority to that of the *majhi*. Every pargana has a clan God, the ancestral sprit called the *'Lone Duma'*.**

- **VILLAGE LEVEL DESCRIPTION (SOCIO-POLITICAL):-**

(i) Head - Village *patel*

(ii) *Sirha* - Medicine man, religious head and practices magico-religious performances.

(iii) *Gayata* - village priest.

Muria and Maria are Moiety based then Hierarchy of deities is seen. Memorial Pillars both lithic and non lithic are seen. **Wood of Iramara, Bel and Saja are revered and considered as sacred as they are used to carve out clan gods.**

- **RELIGIOUS FAIRS** :-

(i) *Madia* - held annually

(ii) *Jatra* - held every 3-7 years, the date is fixed by the Pen *Majhi* and this is exclusively religious in context.

- **SOCIAL ORGANISATION**:-

Clans divided into *Dada bhai* and *Akomama,* marriage is prohibited within the *Dada Bhai*

AUTHORITY & LEADERSHIP:-

- Patel is the village head (Political head)
- *Kasyeg Gaita* is the religious head.
- The *Pargana Majhi* is the pargana head and in his absence the *Chalki* looks after the pargana.
- *Bhum Gaita* is the secular head.
- *Waddai* is the clan priest

The bio-cultural rich important site/places of C.G. are enclosed as Annexure 2.1 of Vol III

CHAPTER – III

Biodiversity in Chhattisgarh – An overview

This Chapter presents the Current Status of State' s rich floral and faunal diversity in four major parts:

(i) Wild Biodiversity: comprising the forest and aquatic ecosystems.

(ii) Domesticated Biodiversity; covering Agriculture, Horticulture & Livestock.

(iii) Bicultural – diversity.

(iv) Policies, Laws & other Biodiversity related Legal Framework.

WILD BIODIVERSITY: -

FOREST ECOSYSTEM: -

The State of Chhattisgarh lies in the Deccan Bio-geographic Area, which houses rich and unique biological diversity. The State is conspicuously significant with rich endemic fauna and flora especially Herbal Plants of medicinal importance.

Forests in the State according to the management objectives are as under:

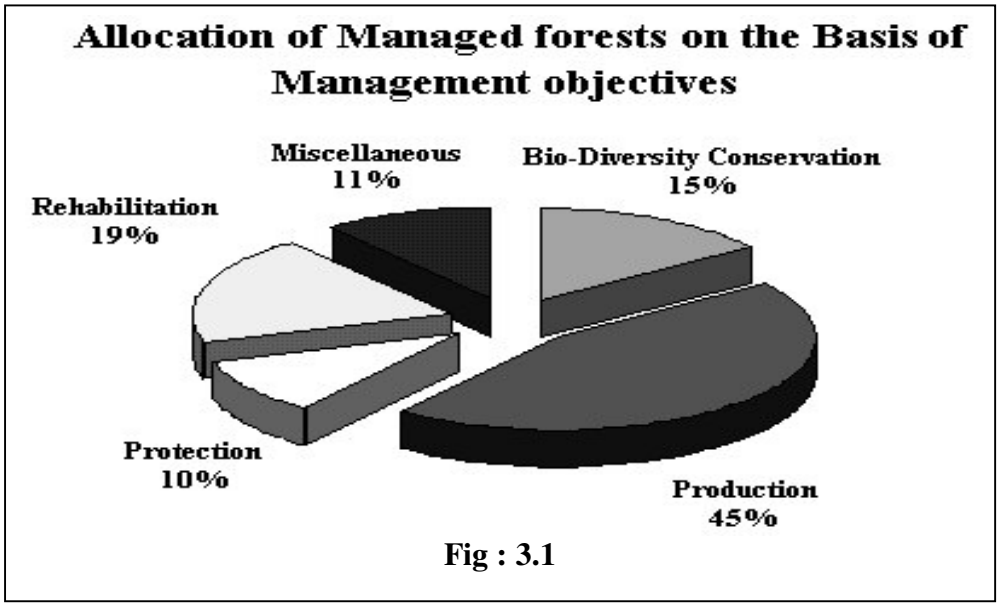


Fig : 3.1

The above allocation shows the priority the state lies on Biodiversity Conservation since 15% of the state' s total forest area has been reserved with this management objective.

FOREST DIVERSITY: -

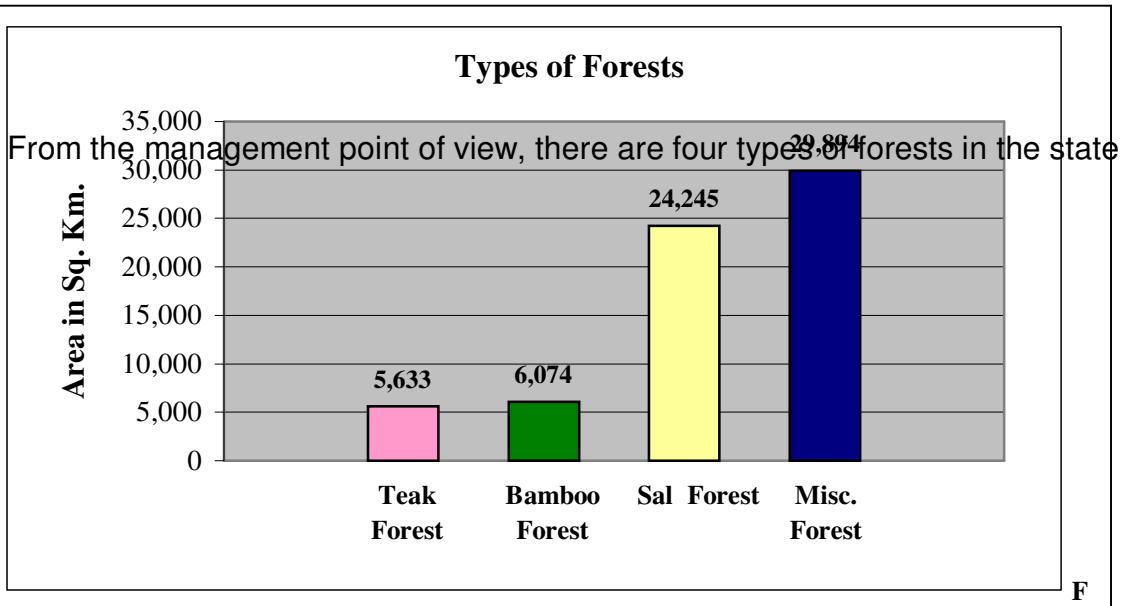
The forest cover in the State is placed at 56,693 Sq. km (FSI, 1999). Out of this, 39,557 Sq. km i.e. 41.93% is dense forest and 17,136 Sq. Km. i.e. 12.67% is open and degraded forest. However, as per the legal status; the State has 59,772 Sq. Km. of forest area, which accounts for 44.21% of the geographical area of the State.

Source :- Status of Forest, 1999 FSI.

FOREST TYPES BASED ON DOMINANT SPECIES: -

Sal (*Shorea robusta*) and Teak (*Tectona grandis*) are two major tree species in the State. Other notable overwood species are Bija *(Pterocarpus marsupium*), Saja (*Terminalia tomentosa*), Dhawra (*Anogeissus latifolia*), Mahua (Madhuca *indica*), and Tendu (*Diospyros melanoxylon*) etc. Aonla (Emblica *officinalis*), Karra (*Cleistanthus collinus*) and Bamboo (*Dendrocalamus strictus*) constitute a significant chunk of middle canopy of State's forests.

Based on the major over wood species; the distribution of State' s forests is shown below: -



From the management point of view, there are four types of forests in the state of Chhatti

F

ig: 3.2.

ANAYSIS OF FOREST FLORA: -

- **As a result of periodic and extensive collection made in erstwhile M.P. from 1964 and onwords 27,000 plant specimens of different plant species have been collected. Till now 1685 species belonging to 785 genera and 147 families have been identified and kept preserved in the herbarium.**
- **The generic co-efficient for the forest flora of erstwhile M.P. is**

$$\frac{785 \text{ X } 100}{1685} = 46.58$$

- **Fabacaceae, Superede, Poaceae family has the maximum number of genera and species in erstwhile M.P., which includes Chhattisgarh.**
- **Ten dominant families of Chhattisgarh are Fabaceae, Poaceae, Cyperaceae, Asteraceae, Euphorbiaceae, Acanthanceae, Convolvulaceae, Malvaceae, Scrophulariaceae, Rubiaceae.**

Detailed floral diversity inventorisation has been done in the State' s Forests and the species diversity (both Macro & Micro) **has been enlisted in detail in the Flora of Madhya Pradesh Volume-I, published by Botanical Survey of India in 1993, Flora of Raipur, Durg and Rajnandgaon, BSI. Another compilation of the Forest Flora done by M.A. Waheed Khan I.F.S., Conservator of Forests, Rewa M.P. as "Madhya Pradesh Plants" is enclosed as Annexure 3.1. in Vol. III of the CBSAP.**

List of Grasses found in Chhattisgarh is also enclosed in Annexure 3.2. in Vol.III of the CBSAP. (Source: Ecology of Grasslands on Bhata Wastes of Raipur, B.R. Verma and R. D. Dass, Deptt. of Botany, Science College, Raipur, Ecology of Grasslands of Bhata soils of Bilaspur by A.K. Bansal and A. M. Agrawal, & Ecology of Some Grasslands of Ambikapur, by Shri. M.L. Naik)

ENDANGERED FLORA: -

Floristic study of the erstwhile seven districts of Chhattisgarh was made by National Botanical Research Institute, Lucknow and identified 45 species as Endangered taxa of the State, enlisted in Table 3.1

Table: 3.1.

LIST OF ENDANGERED TAXA OF THE STATE

S.No.	Scientific Name	Family
1	*Alstonia venneta R.Br.*	Apocynaceae
2	*Balospermum montanum Muell – Arg*	Euphorbiaceae
3	*Barleria lupulina Lindl*	Acnathaceae
4	*Begonia picta Sm.*	Begoniaceae
5	*Berberis asiatica Roxb. ex DC.*	Berberidaceae
6	*Butea monosperma var. Lutea*	Papilionaceae
7	*Celastrus paniculata Willd.*	Celastraceae
8	*Chlorophytum arundinaceum Baker*	Liliaceae
9	*Chlorophytum tuberosum Baker*	Liliaceae
10	*Clerodendrum serratum (l) Moon*	Verbenaceae
11	*Cordia rothii Roem & Schult*	Boraginaceae
12	*Costus speciosus (Koen.)*	Zingiberaceae
13	*Crateriostigma plantaagineum Hochst*	Scrophulariaceae
14	*Curculigo orchioides Gaertn.*	Amaryllidaceae
15	*Curculigo angustifolia Roxb. .*	Zingiberaceae
16	*Curcuma aromatica Salish*	Zingiberaceae
17	*Curcuma caesia Roxb.*	Zingiberaceae
18	*Cymbidium aloifolium Sw.*	Orchidaceae
19	*Embelia tsjerian-cottam A.Dc.*	Myrsinaceae
20	*Entada phaseoloides Merrill.*	Mimosaceae
21	*Eryngium foeditum L.*	Apiaceae
22	*Euphorbia fusiformis Buch-Ham.*	Euphorbiaceae
23	*Geodorum dialatatum R.Br.*	Orchidaceae
24	*Gloriosa superba L.*	Liliaceae
25	*Grewia rothii DC.*	Tiliaceae
26	*Gymnema sylvestre R.Br.*	Asclepiadaceae
27`	*Hedyschium cronarium Koenig ex Retz*	Zingiberaceae
28	*Marsdenia tencissima (Roxb) Moon*	Asclepiadaceae
29	*Neolitsia chinensis (Lamk.) Chun*	Lauraceae
30	*Operculina turpethum*	Convolvulaceae
31	*Oryza meyeriana Mailli ssp. graulata Tateoka*	Poaceae
32	*Peucedaman dhana Buch-Ham.ex Clarke*	Apiaceae
33	*Phrynium imbricatum Roxb.*	Zingiberaceae
34	*Plumbago zeylanica L.*	Plumbaginaceae
35	*Pterocarpus marsupium Roxb.*	Fabaceae
36	*Pygmaeopremna herbacea (Roxb) Moldenke*	Verbenaceae
37	*Rauvolfia serpentina Benth. ex. Kurz.*	Apocynaceae
38	*Spilanthus calva DC.*	Asteraceae
39	*Strychnous potatorum L.f.*	Loganiaceae

40	***Swertia angustifolia Buch-Ham.ex D.Don***	**Gentianaceae**
41	***Tacca leontopetaloides (L.)Kuntze***	**Taccaceae**
42	***Trachyspermum sytctocarpum (Clarke)Wolff***	**Apiaceae**
43	***Tylophora indica (Burm.f.)Merr.***	**Asclepiadaceae**
44	***Urginea indica (Kunth.) Roxb.***	**Liliaceae**
45	***Zanthoxylum rhesta (Roxb.) DC.***	**Rutaceae**

ENDEMIC AND RARE FLORA OF CHHATTISGARH STATE: -

As per the 3rd Conservation Assessment And Management Plan Workshop For Southern Indian Medicinal Plants, held at Bangalore in January 1997, some Endemic, Rare, Critical, Endangered And Vulnerable floral species in the State Of Chhattisgarh have been listed in the tables 3.2 and 3.3. below;

Table: 3.2.

Endemic and Rare Flora of Chhattisgarh State

S.No.	Name of the Flora	Location / Remarks
1	***Sophora bakeri***	**Restricted to the cooler parts of Jashpur**
2	***Crotalaria trifoliastrum***	**Recorded from Raigarh**
3	***Uraria prunellaefolia***	**Collected from Bastar forests in 1952 and believed to be extinct.**
4	***Mucuna imbricata, Vigna pisosa***	**Rare species collected from marshes of Bhudeopur (Raigarh)**
5	***Nogra and Lespideza sps.***	**Recorded from Jashpur division**
6	***Hoya wrighitii***	**Large perennial climber, totally epiphytic, Found in Bailadilla hills**
7	***Desmodium tortosum***	**Endemic in the State.**
8	***Erythrina resupinata***	**Getting rare and found only in a few marshy places in the State.**

Table: 3.3.

List Of Species Assessed As Critical, Endangered And Vulnerable In The State Of Chhattisgarh

S.No.	Species Name	Categories
1.	*Artocarpus hirsutus*	VU
2.	*Baliospermum montanum*	VU
3.	*Celastrus paniculata*	VU
4.	*Cleome burmanni*	DD
5.	*Curcuma pseudomontana*	VU
6.	*Diospyros paniculata*	VU
7.	*Embellia tsjeriam cottam*	VU
8.	*Madhuca longifolia*	EN
9.	*Santalum album*	EN
10.	*Sapindus laurifolia*	LRLC
11.	*Smilax zeylanica*	VU
12.	*Terminalia arjuna*	LR
13.	*Vitex trifolia*	LRLC

Categories

DD - Data Deficient

VU - Vulnerable

EN - Endangered

CR - Critically Endangered

LR - Low Risk

LRLC - Low Risk Least Concern

FOSSIL FLORA REPORTED FROM CHHATTISGARH: -

FLORAL COMPOSITION: -

Most of the fossil flora described from this region is from the lower Gondwana coal fields, however, Precambrian forms have also been reported from Jonk river beds in the Raipur dist. (Sahani & Shrivastav 1962). Mega floristically the assemblages recovered from lower gondawana localities are essentially the impressions of leaves and stems belonging to

Glossopteridales. The flora shows predominance of G*lossoptaris* along with *Vertebraria* and other allied leaf genra *Gangmopteries* and *Noeggerathiopsis* the family Phyllothecaceae is represented in Barakar by Phyllotheca (Biswas 1995 & Ganguly 1959). Another important genus is Schizoneura. The palynological studies of these sediments show a sizeable number of micro-spores belonging to different groups.

DIVERSITY OF HERBAL (MEDICINAL & AROMATIC) PLANTS USED IN LOCAL HEALTH CARE: -

The place of herbs in popular sayings in the State.

A number of sayings prevalent in every day speech in Chhattisgarh are associated with herbs. For example:

1. कुँआर करेला कातिक ढही, महरी नहीं तो पर ही सही।
2. करेला तेमा लीम चढे।
3. नेवइ के जोगी, कलिन्ढर के खप्पर।
4. कोनों ल भाटा पथ, कोनो ला भाटा बैर।
5. अण्डा के लकड़ी ल हण्डा फोरे मा का लगेहे।
6. तेन्ढु के अंगरा, बरे के न बुताय के।
7. बाढ़े बर बाढ़े, फेर अम्डा असन ठाढे।
8. थाना थाना, सेमी लगाबे, टोरे बर ठोमहा भर।
9. एक ठन हरा और गाँव भर के खोंखी।
10. रखवा बैरागी डूमर के माला, खाही ओला त पहिरही काला।

Munga, Kumhada, Ber, Aonla, Mahua, Tad, Amaltaas, Babul, Palash, Bamboo, Semal, Kadamb, Gular etc. are widely prevalent in the riddles of Chhattisgarh. A few of them are quoted below:

1. एक ही रूख में तीन ठी साग।
2. एक अचम्भा ढेखे जलव, सुक्खा लकरी में लगय फल।
3. फूल-फूले रींगी-चींगी फर फरे लमडोरा।
4. अइसन सिधवा राजा ते ह खपरा में बइठे- कुम्हडा।
5. खरखस पान के खरखस ढेंटा, रामचन्द्र के सुन्दर बेटा।
6. ऊँच डउकी के कूच नहीं, लइका सेवय त ढूध नहीं- केला का पेड
7. एक फूल फूले, सौ फर फरे-केला।
8. झिथरी रूख में छाँव नहीं - ताड वृक्ष।
9. एक ठन रूख में ढ़ेले च ढ़ेला - बेल का पेड़
10. एक ठन रूख माँ लाठी च लाठी - घनबहेर।
11. लोहा कस पेड़ मँ, सोन कस फूल, चाँढ़ी कस फर में पथरा कस झूल-बबूल।
12. पेड़ हे चुबुक ठिया, पान के कतारी, ए धंधा ला नी जानबे त जावे डूमरपाली - सरफोक - सरफीन।1
13. फूल फूले रींगी चींगी, फर फरे कटधेरा।
14. पान बहेरा, फूले कढ़म, फरे केरा- फूँडहर का पेड़।
15. पेड़ हे थाबक थुइक, पान हे थारी। बेटी ओकर श्याम सुन्दर, ढेही हे कारी। - पलास
16. आये खानि लाल खान, जावें खानि छोटे कान - पलास
17. पेढ खरखस पान बहेरा, फले खान फरे केरा - सेमल
18. फरे न फूले, ठाढ़ रूख ला लीले - अमरबेल।
19. बालक पन में टोपी खाते, जवानी में कृष्ण ला मोहे। अऊ बुढ़ापा में रावण ला मारे - बांस
20. नोहे केतकी, नोहे केंवरा, अऊ नो हे कइ फूलन बांस हो। डारा पाना झरि जावे अऊ फर रइथे मइ मास हो। - बेल का पेड़

The inventorisation of 645 medicinal plant species in the State. Source : and their distribution Habit wise has been shown in Annexure 3.3 & Table 3.4. respectively as below:

Table:3.4.

DISTRIBUTION OF MEDICINAL PLANTS IN CHHATTISGARH STATE.

S.No.	Habit	No. of Species	Percentage
1.	Herbs	325	50.38%
2.	Shrubs	121	18.75%
3.	Trees	144	22.3%
4.	Climbers	55	8.52%

Although one or the other plant species recorded to be of medicinal importance is found in the forests of the State; surveys carried out (Prasad and Pandey, 1987; Prasad et at. 1988; Pandey and Shrivastava, 1989; Prasad et at. 1989; Prasad and Pandey, 1989; Oommachan et al. 1989) indicate that: -

"Generally speaking the natural Sal (Shorea robusta) forests are rich in medicinal plant wealth and among these forests also, the moister valley sal forests are considered to be 'gene sanctuaries' (Anon, 1988). "

The above mentioned fact gets authenticated by the survey done in one of the natural Sal forests districts of the State i.e. Bilaspur. The results of the survey are summarized in Table 3.5.below:-

Table: 3.5.

DISTRIBUTION PATTERN OF IMPORTANT MEDICINAL PLANTS IN NATURAL SAL FORESTS OF CHHATTISGARH

Bilaspur District						
	Amadoh		Lamni		Achanakmar (W.L.S)	
	No. of Species	Density (Per Ha.)	No. of Species	Density (Per Ha.)	No. of Species	Density (Per Ha.)
• Medicinally useful plants	15	143425	31	208250	31	184250
• Plant species important as food source	4	20000	5	38000	2	36500
• Plants species having not much importance in respect to medicine or food	2	14500	6	38750	2	22750

PANAROMIC VIEW OF TRADITIONAL HEALING PRACTICES IN CHHATTISGARH USING MEDICINAL PLANTS

Use of herbs for traditional healing is very common phenomenon in Chhattisgarh. Listed below are some practices which local healers very frequently use to cure diseases. The information regarding these practices have been gathered by Sh. P. Oudhia, an eminent expert of herbs in the State. List of herbs used in these healing practices by the local Vaidyas is with

our resource person, which can be verified. Whole of the knowledge enlisted below is not only well known to general public, but also is being used extensively in the specific regions of the State.

WE INTEND TO EMPHASISE THAT FOLLOWING KNOWLEDGE BASE AND LOCAL TRADITIONAL HEALING PRACTICES ARE WELL WITHIN THE DOMAIN OF PEOPLE OF CHHATTISGARH.

Leucas aspera **(Family Labiateae) is locally known as Gumma Bhaji and commonly known as Dronpushpi, is a common field and wasteland weed. In Chhattisgarh, *Leucas* is widely used as potherb. Its new leaves and tender shoots are used as vegetable. It is general belief in Chhattisgarh that if taken regularly this weed as potherb, develops a specific smell in human body. This smell repels the snakes and other venomous animals. Villagers particularly farmers prefer this weed during rainy season, when the incidences of snakebites are higher.**

In Chhattisgarh, *Achyranthes aspera* (Onga, Chirchita, Apamarg) is a common roadside weed. This weed possesses anti-venom properties like Leucas. It is specially used in the treatment of scorpion bite. The fresh juice of leaves and roots is effective for this. Even you can carry the black scorpion in your palm, after applying fresh juice on palm.

Bathua (*Chenopodium album*) belonging to Chenopodiaceae family is a winter weed. Bathua is widely used as potherb. Regular use of this potherb is believed to cure skin disorders like Leucoderma. The oil extracted from seeds is used for the treatment of hookworm.

Gorakhmundi (*Sphaeranthus indicus*) in Chhattisgarh, is found as winter weed in wheat and chickpea fields. It's flower head is used for the treatment of eosinophilia and respiratory troubles.

Cassia tora, a leguminous weed, locally known as Charota germinates as the first monsoon rains start. Its young leaves and tender shoots are used as potherb. The seeds are boiled in water and taken by local people as refreshing drink. The oil extracted from seeds is used for the treatment of skin troubles like eczima and ringworm. This oil is applied externally. In Ambikapur district of Chhattisgarh, farmers use, protein rich Cassia seeds as cattle feed.

Blumea lacera (Family Compositeae) commonly known as Kukuronda and locally as Kukurmutta, is a common rabi weed. Its leaves are used for the treatment of bronchial asthama specially in acute condition. For quick relief, dried leaves are burnt and fumes are inhaled. Herbal cigarette prepared from Blumea and Datura leaves is also popular among chronic asthama patients.

GUDMAR (*Gymnema sylvestris*)

Gudmar is another useful herb for patients suffering from diabetes. The meaning of 'Gud' is Jaggery, sugar and 'mar', to kill or destroy. It is used to destroy sugar hence useful in diabetes. Traditional healers in Bastar region, are using this herb in combination of other herbs like Chirayata (Correct name Kalmegh) etc, but main constituent is Gudmar.

SADASUHAGAN (*Catharanthus roseus*)

Sadaphooli or Sada Suhagan is well known herb in western countries also. The traditional healers use the fresh flowers for the treatment of diabetes. The patients are advised to swallow this flower daily. The number of flowers depends upon the severity of the disease. In this herb, white and pink colored flowers are found. Traditional healers prefer white flowered variety.

UNIQUE WHITE FLOWERED VARIETY OF ASTERACANTHA

Asteracantha specially the white flowered variety is one of the most frequently used herbs in Chhattisgarh for the treatments of many common ailments. In general, the roots, leaves and seeds of common Astracantha are

used for the preparation of drug but in Chhattisgarh whole plant is mostly used. Significantly high density of this weed was noted in swampy places. In paddy growing areas, farmers use this weed as first aid measure to stop bleeding from injured parts.

BRAHMARMAR –THE FLY AND SNAKE ATTRACTANT PLANT

According to tribals in the State this plant is becoming endangered and less than 1000 plants are remaining in the state. This plant attracts the flies and venomous snakes. Any time of the year, you will find the dead bodies of thousands of flies and hundreds of snakes around this plant even upto depth of 1 to 2 meters. The traditional healer uses the bark of stem against snakebite. It is also used in case of lethal diseases like cancer.

The Sargi is another example of the tree contributes to an extremely large extent in maintaining the ecological balance of the region. The people of Bastar use the tree for the following purposes:

- For making pattals and Dona as substitute for utensils.
- Using its figs for cleaning their teeth in form of datoon.
- Using its branches for making enclosures for their fields and farms.
- Extracting gum out of its trunk.
- Of particular importance is the fact that one of the species of the ant family "Chapda" which is one of the popular delicacies of the people thrives on the leaves of this tree.

In the rainy season a mushroom resembling potato comes out abundantly under this tree. It is not only tasty but possesses high nutritious quality. It is called Boda in the local dialect and cooked as an item of vegetable as well.

Box Cont.....

- In addition the logs of the tree are used by the tribal as beams for their huts, for making ploughs and carts and a number of items of everyday domestic use.

Sargi Chapda is an example of the co-existence between the species and man. The Sargi ants make nests for themselves out of the leaves of the tree using their saliva as the adhesive to join the leaves, since the leaves are large and have smooth surface, they offer the necessary protection to them. Chapda is a particular delicacy for the tribal; they make chutny out of them. It is a prevalent belief among them that this is a sure protection against any eye ailment. It is interesting to note that generally they consume this delicacy in abundance during the months of April-May when the summer is at its peak and winds blow strong, causing a number of eye diseases. Another belief prevalent is that if a nest of these ants with its occupants is put on the body of a patient their sting would prove a sure cure against the illness. The etymology of the word Chapda is interesting - the literal meaning of Chapda is a basket made out of the leaves. In all probability the word was coined after observing the nest of Chapda.

MEDICINAL INSECTS:

Chhattisgarh state has varieties of insects used in traditional medicines such as Red velvet mite (*Trombidium grandisssimum*), Pod Borer (*Heliothis armigera*), Green Leaf Hopper (*Nephotettix nigropictus & N. virescens*), Bed Bug (*Cimex lectularius*), Lightening Beetles or Fire Flies. The local traditional practitioners use these in the treatment of different diseases.

In the State, local tribal communities and farmer communities have been using rice, rice weeds, medicinal weeds, and medicinal herbs found extensively in agro ecosystems. **Some of these herbal species of the State have found usage in Industry, in the preparation of Homeo drugs, and Allopathic drugs.** The above inventorisation done has been shown in the tables 3.6 to 3.14 in the next pages.

Table: 3.6.
Rice as medicinal plant in Chhattisgarh (India): A survey

S.No.	Rice Varieties	Medicinal Uses
1.	Gathuan	Grain is useful in treatment of rheumatism.
2.	Alcha	Cooked grains are useful for lactating woman to cure

		small boil of infants.
3.	**Laicha**	**Cooked grains are useful for pregnant woman to prevent unborn from 'Laicha' disease (skin infection)**
4.	**Karhani**	**Useful in case of paralysis.**
5.	**Maharaji**	**As a tonic for woman after delivery**
6.	**Baisoor**	**In case of headache, hemicrania and epilepsy, inhalation of fumes of rice bran in useful.**
7.	**Nagkesar**	**Useful for persons troubled with lung diseases.**
8.	**Bhejri***	**For early removal of placenta, it is given with linseed seed and Gur to cows after delivery.**

* Indicates that authors have used these medicinal varieties for various aliments.

Source: -Das, G.K. and Oudhia, P. (2001) Rice as medicinal plant in Chhattisgarh (India) : A survey In Souvenir cum Abstracts. National Research Seminar on Herbal Conservation, Cultivation, Marketing and Utilization with Special Emphasis on Chhattisgarh, 'The Herbal State'. Srishti Herbal Academy and Research Institute (SHARI) and Chhattisgarh Minor Forest Produce (Trading & Dev.) Co-operative Federation Ltd., Raipur (India), 13-14 December, 2001. p.92.

Table: 3.7.
Common Rice weeds used for First Aid by Chhattisgarh Farmers.

Ailment	**Weeds used**			
	Scientific Name	**Common Name**	**Family**	**Useful parts**
(A) For minor injuries,cuts, wounds etc.	***Tridax procumbens L.***	**Van Bhengra**	**Compositae**	**Leaves (80%)**
	Cynodon dactylon (L.) Pers.	**Doob**	**Gramineae**	**Leaves (80%)**
	Caesulia axillaries Roxb	**Belonda**	**Compositae**	**Whole (20%)**
	Blumea lacera L.	**Kukurmutta**	**Gramineae**	**Leaves (10%)**
	Eclipta alba (L.) Hassk.	**Bhengra**	**Malvaceae**	**Leaves (10%)**
	Sida acuta L.	**Bariyara**	**Malvaceae**	**Leaves (25%)**
	Achyranthes aspera L.	**Chirchita**	**Amarantaceae**	**Leaves (30%)**
(B) For Scorpion-bite	***Achyranthes aspera L.***	**Chirchita**	**Amarantaceae**	**Leaves and Roots (25%)**
(C) For Snake-bite	***Leucas aspera (Wild.) Spreng***	**Gumma**	**Labiateae**	**Whole Plant (45%)**

(D) Toothache	***Spillanthus acmella L.***	**Van Akarkara**	**Compositae**	**Matured (80%)**
(E) Headache	***Ocimum basilicum L.***	**Van Tulsa**	**Labiateae**	**Leaves (10%)**
	Xanthium strumarium L.	**Kuthua**	**Solanaceae**	**Matured fruit (15%)**
(F) Sun-stroke	***Scoparia dulcis L.***	**Mithi Patti**	**Scrophuleraceae**	**Leaves (45%)**
(G) Indigestion	***Cucumis trigonus Roxb.***	**Kothi-kekdi**	**Cucurbitaceae**	**Matured fruits (10%)**

Note: Figures in parentheses indicate the percentage of respondents that are using these weeds as first aid.

Source: -Oudhia,P.(2001). Common rice weeds used for first aid by Chhattisgarh farmers. Agri. Sci. Digest.21 (4):273-274.

Table: 3.8.
Potential medicinal weeds of Chhattisgarh having heavy demand in foreign countries.

S.No.	Scientific Name	Useful Name
1.	***Cassia tora***	**Seeds**
2.	***Psoralea corylifolia***	**Seeds**
3.	***Tephrosia purpurea***	**Dried leaves, Seeds**
4.	***Mucuna pruriens***	**Seeds**
5.	***Cyperus rotundus***	**Nuts**
6.	***Chenopodium album***	**Seeds**
7.	***Jatropha curcas***	**Seeds**
8.	***Abutilon indicum***	**Seeds, Roots, Barks**
9.	***Xanthium strumarium***	**Seeds, Roots**

Source: -Oudhia, P., Tripathi, R. S. and Pandey, N. (1998). The possibilities of utilization of medicinal weeds to increase the income of the farmers. Proc. National Seminar on Medicinal Plant Resources Development organised by Gujarat Government, Jamnagar Ayurved University and AADAR Gandhi Labour Institute, Ahmedabad. (In press).

Table:3.9.
Medicinal herbs in rice growing areas, Chhattisgarh, India.

Herb species	Local Name	Medicinal uses
Cyperus scariosus	**Month**	**For fever.**
Fimbristylis sp.	**Chuhaka**	**For stomach disorders.**

Kyliingia monocephala	**Bandarphool**	**Anti-Venom.**
Abutilon indicum	**Raksi**	**Leaves used for bleeding piles Seeds used for treating cough.**
Phyllanthus niruri	**Bhuinawla**	**For jaundice.**
Eclipta alba	**Bhengra**	**For respiratory problems.**
Euphorbia hirta	**Duddhi**	**For respiratory problems.**
Cynodon dactylon	**Doobi**	**For hysteria, epilepsy and insanity.**
Echinocloa colonum	**Sawan**	**For stomach disorders.**
Oxalis corniculata	**Khattibuti**	**For skin eruptions.**

Table:3.10.
Medicinal herbs in rice growing areas, Chhattisgarh, India.

S. No.	Scientific Name	Growing Season
1.	***Cassia tora***	**Kharif**
2.	***Ipomoea reniformis***	**Kharif**
3.	***Ipomoea aquatica***	**Kharif**
4.	***Corchorus sp.***	**Kharif**
5.	***Oxalis latifolia***	**Kharif , Rabi, Zaid**
6.	***Chenopodium album***	**Rabi**
7.	***Cucumis trigonus***	**Kharif**
8.	***Leucas aspera***	**Kharif**
9.	***Mucuna pruriencs***	**Kharif**

Source:- Oudhia, P.and Tripathi, R.S. (1997): Scope of cultivation of important medicinal plants in Chhattisgarh plains. National Conference on Health Care and Development of Herbal Medicines, IGAU, Raipur 29-30 Aug. p 43.

Table: 3.11.
Industrial uses of some Common Medicinal Herbs of Chhattisgarh.

S.No.	Scientific Name	Industrial uses
1.	***Melilotus alba***	**Seed oil suitable for oil and paint industry.**
2.	***Cassia tora***	**Seed yield tannins and yellow. Blue and red dyes;**

		used for tanning and dyeing yields tannins a gum (7.65%); good agent for suspending and binding.
3.	***Cyperus rotundus***	**Yield an essential oil (0.5-0.9%) used in perfumery and incense.**
4.	***Jatropha curcas***	**Yield an essential oil (30-40%) suitable as fuel for diesel engine**
5.	***Saccharum spontaneum***	**Culm suitable for pulp for different types of paper; also for hard boards.**
6.	***Xanthium strumarium***	**Seeds used in soap, oil, paper industries. Shell useful for activated carbon and for furfural.**

Source :-Oudhia, P. and Tripathi, R.S.,(1999) Medicinal weeds of Raipur and Durg (Madhya Pradesh) region Proc. National Conference on Health Care and Development of Herbal Medicines, IGAU, Raipur (India) 29-30 Aug. 1997: 71-78.

Table:3.12.
Medicinal herbs of Chhattisgarh used to prepare Homoeo-drugs.

S.No.	Scientific Name	Local Name	Homeopathic uses
1.	***Chenopodium album***	**Bathua**	**Tonsillitis, right side paralysis, pain in scapula.**
2.	***Argemone maxicama***	**Satyanashi**	**Colic.**
3.	***Solanum nigrum***	**Makoi**	**Pruritis of vagina.**
4.	***Solanum xanthocarpum***	**Batkatya**	**Disorders of throat, in urinary stones.**
5.	***Ocimum canum***	**Van Tulsa**	**Constipation of young children, renal colic, cough, fever, coryza.**
6.	***Anagallis arvensis***	**Krishnaneel**	**Hydrophobia, urinary problems.**
7.	***Aloe vera***	**Gwarpatha**	**Diarrhea, dysentery, bleeding pile, disorders of stomach.**
8.	***Calotropis gigantea***	**Fudhar**	**Syphilis, philaria, Leprosy, dysentery.**
9.	***Jatropha curcas***	**Ratanjot**	**Cholera, diarrhea, hiccough, disorders of stomach.**
10.	***Tribulus terrestris***	**Gokhru**	**Disorders of Urino-genital system.**
11.	***Datura stramonium***	**Dhatra**	**Headache, heartburn and related**

			symptoms.
12.	***Blumea lacera***	**Kukurmutta**	**Dropsy, coryza, cough, headache, neuralgia, enuresis.**
13.	***Boerhhavia diffusa***	**Punarnava**	**Dropsy, migraine, coryza, cough**
14.	***Melilotus alba***	**Dhekna**	**Disorders of circulatory systems.**
15.	***Leucas aspera***	**Gumma**	**Asthma, skin troubles, disorders of spleen, malaria, jaundice.**
16.	***Cynodon dactylon***	**Doobi**	**All types of bleeding and skin troubles.**

Source: -Oudhia, P., Joshi, B.S. and Kosta, V. K. (1998). The possibilities of preparing Homeopathic drugs from the obnoxious weeds of Chhattisgarh Bhartiya Krishi Anusandhan Patrika 13 (1/2:53-57

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Table: 3.13.
Potential herbs of Chhattisgarh identified for allopathic uses.

Weeds	Crops
Datura stramonium	**Linseed**
	Kodo
	Rice
	Mustard
	Chickpea
Calotropis gigantea	**Kodo, Soybean, Mustard**
	Chickpea
	Linseed
	Wheat
Ipomoea carrne	**Soybean**
	Wheat
	Kodo
	Chickpea
	Rice
	Mustard
Parthenium hysterophorus	**Chickpea**
	Kodo, Mustard
	Linseed
	Wheat
Lantana camara	**Kodo**
	Mustard
	Linseed
	Rice
	Wheat
Blumea lacera	**Rice**
	Wheat

	Chickpea
	Mustard
Ageratum conyzoides	**Linseed**
	Mustard
	Rice

Source:- P. Oudhia et al.

Table: 3.14.

Medicinal uses of 10 common herbs in Banana orchards of Chhattisgarh (India) and its Traditional Medicinal uses.

S.No.	Scientific Name	Common Name	Medicinal uses
1.	***Cyperus rotundus***	**Motha**	**Root is useful in leprosy, thirst, fever, diseases of blood biliousness, dysentery intense, epilepsy, opthalmia.**
2.	***Parthenium hysterophorus***	**Gajar gha**	**As a Homeopathic drug to cure respiratory.**
3.	***Ageratum conyzoides***	**Mahkua**	**In skin troubles.**
4.	***Euphorbia sp.***	**Duddhi**	**In respiratory troubles.**
5.	***Chenopodium album***	**Bathua**	**For hook worm, Leucoderma.**
6.	***Blumea lacera***	**Kukurmutta**	**For bronchitis, fevers, thirst and burning sensations.**
7.	***Achyranthes aspera***	**Latkana**	**As styptic, antivenom, in diseases of digestive.**
8.	***Calotropis gigantea***	**Fudhar**	**In rheumatism, reproductive organ diseases.**
9.	***Jatropha curcas***	**Ratanjot**	**In diseases of digestive, respiratory and reproductive system.**

Source: - Oudhia,P.(2001).Medicinal weeds in banana.orchards :A boon for small farmers of Chhattisgarh (India).Agric.Sci.Digest.21(4):267-268.

MEDICO-BOTANY OF BASTAR: -

An exclusive survey conducted by the Central Council for Research in Ayurveda and Siddha, New Delhi during the period from 19th December 1978 to 18th Feb. 1979 made an inventory of 750 herbal species belonging to 499 genera in 147 families. A total of 190

folklore claims based on 113 medicinal plants have also been recorded. This inventory though has been published by Central Council for Research in Ayurveda and Siddha (Ministry of Health and Family Welfare GOI.). in the book titled Glimpses of Medico Botany of Bastar District (M.P.), but inventory of 750 herbal species and a total of 190 folklore claims have been enclosed as Annexure 3.5. in Vol. III of the CBSAP.

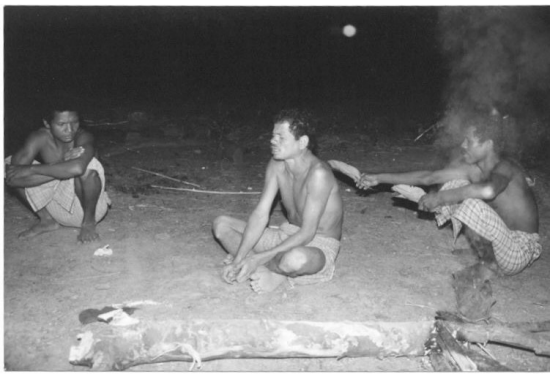

Fig: 3.2.

Fig: 3.3.

These inventories (along with earlier reference of 645 species on page 56) gives an impression that an exhaustive inventorisation of herbal species and their threat status needs to be conducted especially in the unexplored, virgin wild ecosystems of the State.

A few of the medicinal plants of Bastar district which are facing threat and thus immediately need conservation are listed below in Table: 3.15: -

Table: 3.15.

Sl. No.	Vernacular name	Botanical name	Family name	Roots & leaves used in various diseases
1.	Gajharra	*Sideroxylon tomentosum*	Scrophulariaceae	Fruit for digestive trouble
2.	Kuchla	*Strychnos nuxvomica*	Logiaceae	Purified seeds for rheumatism
3.	Maidalakdi	*Litsea sebiferapers*	Auraceae	Bark for joining broken bone
4.	Nirmali	*Strychnos potatorum*	Logiaceae	Seed for water filtration and purification
5.	Dahipalas	*Cordia macclodii*	Broaginaceae	Flower & bark for family planning
6.	Garud	*Oleacraduli*	Marke bite	To ward off snakes through

		ferra		**wood and fruit.**
7.	**Hadjodi**	***Cissu quadraangularis***	**Menis permaceae**	**Stem used for joining broken bone**
8.	**Khirni**	***Oxystelma esculatum b.r.***	**Beraniceae**	**Seeds are tonic**
9.	**Manjur godi**	***Vitex penduncularis***	**Rox burghiana**	**Decoction of leaves for malaria fever**
10.	**Gudmar**	***Gymnema sylvastre***	**Asclepia daceae**	**Leaves for diabetes with other complaints.**
11.	**Safed musli**	***Chlorophytumat tenoutum bakfr***	**Liliaceae**	**Root is tonic**
12.	**Lona**	***Dioscorea aculata***	**Dioscoreacea**	**Root tonic and insecticide**
13.	**Chopdi alu**	***Dioscorea globosa***	**Dioscoreacea**	**Tuber used for worms, leprosy & poisons**
14.	**Katalu**	***Dioscorea pantaphylla***	**Dioscoreacea**	**Tuber tonic**
15.	**Manda (poisonous)**	***Dioscorea tryphylla***	**Diosco reacea**	**Tuber used after purification for external pains.**
16.	**Kali haldi**	***Curcuma caesia***	**Scitaminaceae**	**For leprosy tuber & for longivity**
17.	**Kali nirgundi**	***Justicia gendurusa***	**Acanthaceae**	**For rheumatism root,whole plant for kimiya**
18.	**Barah kand**	***Tacca aspera***	**Tacca ceae**	**Tuber for dysentery, and strength**
19.	**Chitrak**	***Plumbago rosea***	**Plum baginaceae**	**Bruiced root with oil for rheumatism**
20.	**Kaliyari**	***Gloriosa superba***	**Liliaceae**	**Root for white patches(leuco derma)**
21.	**Bhring raj**	***Eclipta alba***	**Compositae**	**Roots and seeds with ajwain for derangement of lever.**
22.	**Swarnakhiri**	***Cleomfelina linn***	**Capparida eae**	**Root with milk and sugar for epostaxis**
23.	**Safed madar**	***Calotropis procera***	**Asclepediaceae**	**The root and black pepper for destroying snake poison.**
24.	**Mayur sikha**	***Celosia cristata***	**Amaranttaceae**	**Seeds are used in painful mictoration flower for diarrhea**
25.	**Samura sokh**	***Argyreia specosa***	**Convol vulaceae**	**Leaf a pplied with oil warm tied over tumour dilutes it.**
26.	**Ishar mool**	***Aristrolo chia indica***	**Aristolochiaceae**	**Roots used for snake bite.**
27.	**Morsikha**	***Action daphne dictoma forsk***	**Lauranaceae**	**Oil from seeds good for sprains.**

28.	**Utangan**	***Blepharis edulis***	**Acanthaceae**	**Diuretic, resolven, aphordisiac & expectorant**
29.	**Lajalu**	***Biophytum sentivum***	**Geraniaceae**	**Root used gonorrhoea and lithiasis**
30.	**Punarnavalal**	***Boerhaaria difeusalinn***	**Nyctaginaceae**	**Root cures cornel ulcers and cough**
31.	**Pashadbhed**	***Saxiferaga ligulata***	**Sazifraceae**	**Root dissolves stone in gall bladder**
32.	**Somlata**	***Ephedra sinica***	**Gnetaceae**	**Nose for epistaxis juice of berris for respiratory troubles**
33.	**Hirankhuri**	***Emilia son chi foliadc***	**Compositae**	**Leaves juice given for stomachache & digestion**
34.	**Shar phunka**	***Trephrosia purpurea***	**Trephoraceae**	**Root ground made into pills and taken cures stomachache**
35.	**Rakta rohida**	***A moora rohitika***	**Meliaceae**	**Bark, root used for enlargement of spleen, lever & gland.**
36.	**Kakjangha**	***Peristrophic bicaly cutata nees***	**Acanthaceae**	**Antidote to snake poison.**
37.	**Varun**	***Cratava religiosa hook***	**Cappiradaceae**	**Bark for sprain leaves for broken bones & cuts**
38.	**Indrayanbadi**	***Citrullus colocynthus***	**Cucur bitaceae**	**Leaves smoke for asthma & for blackening hair**
39.	**Indrayan badi lal**	***Trichosanthes brctiota or palmata***	**Cucurbitaceae**	**Drug used for snake poison juice applied for eruptions.**
40.	**Kakoda bajh**	***Momordica cochinchinensis***	**Cucurbitaceae**	**Root diabetes and cough**
41.	**Kamar kash**	***Salvia plebeia***	**Libiatae**	**Seed used for gonorrhea and menorrhagia**
42.	**Gandhpasarni**	***Paederia foftida***	**Rubi aceae**	**Leave juice for diarrhea and colic**
43.	**Pakhan bhed**	***Saxi fragalingulata***	**Saxifragaeceae**	**Root decoction for cough, diarrhea & as antidote for opium.**
44.	**Netrawala indigoera paucifolia**	***Indigoera paucifolia***	**Papilionaceae**	**Decoction of root given for cough for pain**
45.	**Chhota chand**	***Rawol phia tetraphylla benth***	**Apocynaceae**	**The root is given for epilepsy**
46.	**Sarpa gandha**	***Rauvlofia serpentina***	**Apocynaceae**	**Root given for high blood pressure**
47.	**Narkachoor**	***Ziziber zerum bet roxb smith***	**Scita minaceae**	**Root is given for cough and asthma**

48.	**Kachri kappor**	***Hedychium spicatum***	**Scita minaceae**	**Root is given for stomach.**
49.	**Katsaraiya**	***Barleria prionitlslinn***	**Anataceae**	**Leaves juice and honey for catarrahal affections**

WILD FAUNA: -

Biogeographically, the State is under Deccan Bioregion comprising of the representative fauna of Central India. ("As per Rodger and Pawar plan.") like the Tiger (Panthera tigris), Leopard (Panthera pardus), Gaur (Bos gaurus), Sambhar (Cervus unicolor), Chital (Axis axis), Nilgai (Boselaphus tragocamelus) and Wild Boar (Sus scrofa).

The State is a proud possessor of rare wildlife like the Wild Buffalo (Bubalus bubalis) and Hill Myna (Gracula religiosa), which have been declared as rare and endangered. **The detailed Wild Faunal inventory of the State is given in Annexure 3.7. of Vol. III of the CBSAP.**

A brief description of rare and endangered species of Wild Buffalo and Hill Myna is given below: -

♂ **HILL MYNA (*Gracula religiosa*): -**

Hill Myna are glossy jet black myna in colour with a conspicuous white patch on the wings, yellow bill and legs, and bright orange-yellow patches of naked skin and wattles on the head. The sexes are alike. Hill myna is commonly known as " Bastar Myna" in the State.

Fig: - Hill Myna (*Gracula religiosa*)

Distribution: Restricted and patchy. In India it is found in three distinct areas: (1) Himalayan foothills at about 2500 ft elevation from Almora to Assam, (2) Chota Nagpur (Jharkhand), Orissa and (Bastar) Chhattisgarh. {3) The Western Ghats north to Mumbai.

Habits: Arboreal. Pairs or noisy flocks in well-wooded country feeding on the various wild figs. An accomplished mimic and talker, and much prized as a cage bird.

Nesting: Season- March to October. Eggs -2 or 3, deep blue sparsely spotted and blotched with reddish brown or chocolate.

- **It is becoming an endangered species as their number is dwindling down fast. The Government of Chhattisgarh took initiative and declared this species as State Bird.**
- It is an excellent mimic of human voice and tone, which makes it different from the other birds. It can mimic human voice with great exactitude and perfection. This quality unfortunately is responsible for it' s dwindling number. It is captured and caged as a pet and fetches a handsome price in local and international market.

WILD BUFFALO (*Bubalus bubalis*) : -

Fig: Wild Buffalo (*Bubalus bubalis*)

- **Indian Wild Buffalo *(Bubalus bubalis)*** has been enlisted as an Endangered species in the Red Data book of IUCN. (Categories A2e, C1-Asian Wild Cattle Specialist Group).
- IIIrd largest land animal in India.
- It has been categorised in Appendix III of CITES, which indicates that there is a complete ban on its trade.
- It is classified under Schedule I of Wild Life Protection Act, 1972.

In the State, Wild buffalo populations survive as small-scattered populations in Bhairamgarh, Indravati & Pamed in Bastar Distt. But the relatively genetically pure populations survive only in Udanti Wild Life Sanctuary of the State.

STATUS OF HERPETO FAUNA IN CHHATTISGARH: -

- **THE SNAKE HABITAT OF CHHATTISGARH:**

Probably the largest population of snakes in our state is found in the Farsabahar area of Jashpur district. Because of the snake population and the varieties of snake found here this area is famous as the "Naglok" of our region. The rainfall, vegetation and the forests suits the snake habit and it has become the breeding ground of many of the species of snakes. Some of the deadly species found in this area include the Common Cobra, Common Krait, Russels Viper along with other breed of snakes. Due to this, the deaths caused by snakebites are very high in this specific area. A systematic intervention needs to be administered urgently in this matter. Most of the deaths are caused by the Common Krait and the Cobra.

STATUS OF AVIFAUNA IN CHHATTISGARH: -

Species of Birds have been identified in the State whose documentation is enclosed as Annexure 3.8. in Vol. III of the CBSAP.

BUTTERFLY STATUS: -

The exclusive survey done by ZSI for Butterflies in Bastar Distt., has revealed 60 species and subspecies belonging to 38 genera under nine families. This together with their Geographical Distribution is enclosed as Annexure 3.9. in Vol. III of the CBSAP.

DRAGONFLY STATUS: -

The dragonflies are known to be one of the best biological indicators of ecological degradation and pollution in the water bodies. They form integrated part of the food chain in ecosystem. . **List of Dragonflies found in Chhattisgarh forests is shown in Annexure 3.10. in Vol. III of the CBSAP.**

CURRENT STATUS OF PROTECTED AREAS: -

Biogeographically (Rodgers & Panwar 1988), the Chhattisgarh State falls in three Biological provinces namely 6D Chotanagpur Plateau, 6C Eastern Highlands and 6E Central Highlands. There are three National Parks and 11 Wildlife Sanctuaries in the State covering an

area of 6,471 sq. km **(11% of the forest area of the State and 4.78% of the Geographical area of the State).** The list of Protected Areas (PA's) in the State along with the areas is tabulated below.

Table: 3.16.

PROTECTED AREAS OF CHHATTISGARH

S.No	Protected Areas	Area in Sq. Km.	District
	(I) National Park		
1	**Indravati National Park**	**1258.000**	Dantewada
2	**Kanger Ghati National Park**	**200.00**	**Bastar**
3	**Guru Ghasi Das National Park**	**1440.705**	**Sarjuga/Korea**
	(II) Wild Life Sanctuary		
1	**Barnawapara Wild Life Sanctuary**	**244.66**	**Raipur**
2	**Udanti Wild Life Sanctuary**	**247.59**	**Raipur**
3	**Sitanadi Wild Life Sanctuary**	**553.36**	**Dhamtari**
4	**Bhoramdeo Wild Life Sanctuary**	**163.80**	**Kawardha**
5	**Achanakmar Wild Life Sanctuary**	**551.55**	**Bilaspur**
6	**Gomarda Wild Life Sanctuary**	**411.20**	**Raigarh**
7	**Badalkhol Wild Life Sanctuary**	**104.55**	**Jashpur**
8	**Samarsot Wild Life Sanctuary**	**430.36**	**Sarguja**
9	**Tamorpingla Wild Life Sanctuary**	**608.52**	**Sarguja**
10	**Pamed Wild Life Sanctuary**	**262.00**	**Dantewada**
11	**Bhairam Garh Wild Life Sanctuary**	**139.00**	**Dantewada**

Rodgers and Panwar's; "Planning a Wildlife Protected Area Network of India" (Wildlife Institute of India-1988), have accorded Sitanadi WLS and Sainmura WLS* Priority I Status (National Importance), Bahiramgarh and Semarsot WLS Priority II status (Regional Importance) and Gollapalli* and Hasdeo Basin WLS* Priority III status (State level importance).

(*Proposed new WLS in the Chhattisgarh State by WII)

WILD FAUNA CENSUS: -

The wild fauna census done in the State in the year 2002 is shown below.

Table: 3.17.

WILD LIFE CENSUS OF CHHATTISGARH STATE

TIGER, PANTHER CENSUS

YEAR –2002

No.	Circle Name	Tiger					Panther				
		Male	Female	Cub	Unide-ntified	Total	Male	Female	Cub	Unide-ntified	Total
1	2	3	4	5	6	7	8	9	10	11	12
1	Indrawati Tiger Reserve	11	12	4	2	29	18	26	5	4	53
2	Kanker	6	5		1	12	72	53	5	10	140
3	Bilaspur	19	15	4	3	41	91	95	6	14	206
4	Raipur	23	16	3	2	44	140	150	21	13	324
5	Jagdalpur	32	28	5	2	67	26	47	16	6	95
7	Sarguja	8	5	1	3	17	80	53	15	20	168
8	Durg	6	5	4	2	17	47	54	30	23	154
	Total	105	86	21	15	227	474	478	98	90	1140

Source:- Office of The Chief Wildlife Wardon, Chhattisgarh Raipur.

SUBTERRANEAN FAUNA: -

Kotumsar caves are on the bank of river Kanger in Kanger Valley National Park. The floor of the caves spans 1.0 km. They are truely limestone caves. Many animals inhabiting these caves are said to be blind. Probably the eyes and pigments do not provide any selective advantage to them.

Fig: 3.4.

- **FISHES OF KOTUMSAR: -**

The caves fish, *Nemacheilus evezardi* has successfully colonized the Kotumsar Cave, At the British Museum

there are two specimens of *N. evezardi* collected from a cave in India, one of which is fully pigmented and the other somewhat de-pigmented but apparently with normal eyes. This species is found as both, a hypogean and an epigean form. When did it become an exclusive cave-adapted species? Are the cavefishes reproductively isolated from their river-dwelling ancestors? These and many other questions still remain unanswered. Although people know them as blind, they are not really blind.

DOMESTICATED BIO-DIVERSITY: -

☞ *AGRICULTURAL DIVERSITY: -*

Chhattisgarh state is divided in 3 agro climatic zones namely Bastar Plateau, Northern Hills, and Chhattisgarh Plains.

RICE BIODIVERSITY OF CHHATTISGARH: -

Chhattisgarh has traditionally been known as the Rice bowl of India. Centuries of Rice farming by indigenous communities have resulted in evolution of a rice diversity adapted to a variety of soil and micro ecosystems.

Of the total 42.2 million ha. area of rice in India, 3.9 m. ha. is in Chhattisgarh. rice is cultivated on about 85 percent of the net sown area in kharif season. The paddy diversity in Chhattisgarh is no less than one in the world; some unconfirmed reports put the paddy diversity of the State better than what is available in Philippines..

These rice varieties vary in maturity period ranging from 55 days to more than 180 days; drought resistance; and water tolerance capacity. There are low rainfall area varieties to deep water ones with standing up to 10ft. of water, short rices of 50 cm. in height to tall ones i.e. more than 150 cm. The grains size also varies from short fine to long fine, long bold to short bold and round, oval ones, beaked and awned ones, awned with various colour sizes and shapes. The kernel may be coloured white, Dull white, Red Opaque White, the grain may be of various designs & shades like Yellow, Straw Golden, Red Black,

Brown, Purple, and blotches of various colours and the grains may be of various quality and scent, and protein content upto 14 %. The world' s largestrice " Dokra- Dokri" is found in Chhattisgarh.

CHARACTERISATION OF ACCESSIONS: -

The catalogue enlisting the characters of these accessions is under preparation. A very wide range of variability exists among various accessions. The range of variation for important quantitative characters is given in Table: 3.18. : -

Table: 3.18.
The Range Of Variation For Important Characters

S. No.	Character	Minimum Value (Accession)	Maximum Value (Accession)
1.	Days to 50% flowering	45.0 (Sathia)	136.0 (Korma)
2.	Plant height (cm)	48.0 (Satha Shah)	189.0 (Gangabali)
3.	Panicle length (cm)	12.6 (Banda)	35.0 (Dongargondi)
4.	Tiller No./plant	3.0 (Sathia)	13.0 (B:421)
5.	Grain length (mm)	4.2 (Sathia)	13.7 (Dokri Dokra)
6.	Grain width (mm)	1.8 (Basik)	3.8 (Dumarla)
7.	1000 grain weight (g)	5.7 (Badshahbhog)	51.4 (Hathi Panjara)
8.	Plant yield (g)	1.5 (Sathka)	31.8 (Aolesar)

OTHER AGRO GENETIC RESOURCES IN CHHATTISGARH: -

As would be evident from the Tables given below apart from rice, there is wide diversity of Millets (Coarse grains), Oilseeds and Pulses in the State.

Table: 3.19.

- **MILLETS (COARSE GRAINS):**

S. No.	Name of the Crop	Scientific Name	Common Name	Character Variation	Agroclimatic Zones
1.	Maize	*Zea mays*	Makka	Duration, seed colour, seed size, protein content, cob length, no. of cobs.	Bastar Plateau, Northern hills.
2.	Sorghum	*Sorghum bicolor*	Jowar	Plant height, duration, grain colour & size, ear characters, fodder quality, rabi/ kharif types.	Bastar plateau.
3.	Kodo millet	*Paspalum scrobiculatum*	Kodon	Plant pigmentation, tillering, duration, grain size.	Bastar plateau, Northern hills, Chhattisgarh plains.
4.	Little Millet	*Panicum miliare*	Kutki	Ear length, grain size, tillering.	Bastar plateau, Northern hills, Chhattisgarh plains.
5.	Common millet	*Panicum milliceum*	Cheena	Ear length, grain size, tillering.	Bastar plateau, northern hills, Chhattisgarh plains.
6.	Finger Millet	*Eleusine coracana*	Ragi, Mandia	Number of finger, duration, pigmentation, grain size.	Bastar plateau.
7.	Barnyard Millet	*Echinochloa frumentacea*	Sawan	Spike characters, grain colour, duration.	Bastar plateau.
8.	Italian Millet	*Setaria italica*	Kakun	Spike length, seed colour, tillering, duration.	Bastar plateau, Northern hills.

- **OILSEEDS: -**

Table: 3.20.

S. No.	Name of the Crop	Scientific Name	Common Name	Character Variation	Agroclimatic Zones
1.	Linseed	*Linum usitatissimum*	Alsi	Plant height, Duration, adaptability, no. of capsules, plant type, flower colour, seed colour.	Chhattisgarh plains
2.	Rapeseed-mustard	*Brassica spp.*	Toria, Sarson	Duration, Plant height, No. of capsules, adaptability, seed size	Bastar plateau, Northern hills.
3.	Niger	*Guizotia abyssinica*	Ramtil	Plant height, Number of capsules, seed size.	Bastar plateau, Northern hills.
4.	Sesame	*Sesamum indicum*	Til	Plant height, flower colour, seed size	Chhattisgarh plains.
5.	Safflower	*Casthamus tinctorius*	Kardi, Kusum	Seed size, duration, plant type	Chhattisgarh plains.
6.	Groundnut	*Arachis hypogea*	Mungphali, Phali	Seed colour, plant type seed size	Chhattisgarh plains.
7.	Castor	*Ricinus communis*	Arandi	Duration, Plant type, Seed size	Bastar Plateau, Chhattisgarh plains.
8.	Sunflower	*Helianthus annuus*	Surajmukhi	Adaptability, seed size	Chhattisgarh plains.

Table: 3.21.

PULSES: -

S.	Name of the	Scientific	Common	Character Variation	Agroclimatic

No.	Crop	Name	Name		Zones
1.	Green gram	*Vigna mungo*	Moong	Duration, Plant type, Seed size & colour, Clustering, Pod length, Adaptability	Bastar plateau, Chhattisgarh plains Northern Hills
2.	Black gram	*Vigna radiata*	Urad	Duration, Plant type, Seed size & colour, Dustering, Pod length, Adaptability (Utera)	Bastar plateau, Chhattisgarh plains and Northern hills
3.	Grass pea	*Lathyrus sativus*	Lakh, Lakhri	Seed, size, Shape, Adaptability, Wild species, ODAP content, Duration	Chhattisgarh plains, Northern hills
4.	Chickpea	*Cicer arietinum*	Chana	Types (Deshi, Kabuli, Gulabi), Seed colour, Size, Shape, Duration, Adaptability, Habit	All agroclimatic zones of C.G.
5.	Horse gram	*Dolichus biflorus*	Kulthi	Plant type, Seed colour, Seed size, Flower colour, Adaptability	Bastar plateau, Northern hills
6.	Lentil	*Lens esculentus*	Masoor	Seed shape, colour and size	Chhattisgarh plains
7.	Rice bean	*Vigna umbellata*	Sutari bean	Habit, duration, seed size, colour, wild species, pest and disease resistance	Bastar plateau, Northern hills
8.	Popat bean	*Dolichus spp.*	Popat	Plant height, seed size & colour, shape, adaptability	Chhattisgarh plains

HORTICULTURE: -

Table :- 3.22.
Indigenous Tuber Crops found in Bastar Division.

S.No	English Name	Botanical Name	Hindi Name	Local Name	Area	Sowing Period	Harvesting / Digging Period	Production Capacity (In Tones/ Ha.)	Uses
1	2	3	4	5	6	7	8	9	10
1.	Kasava	*Manihot esculenta*	Tapioca	Alookanda	East Abhujmad, North Abhujmad, South Abhujmad	May-June	March- May	10-20	As vegetable
2.	Greater yam	*Dioscoria alata*	Ratalu	Nagarkanda	Whole Bastar	June-July	After 2-5 Years in March-April (Only Aerial Tuber)	20-40	Boiled vegetable
3.	Aerial yam	*D. bulbifera* *D.alata* *D.alata*	Gol Ratalu	Dangkanda/ Bhaisdethi, Banskanda	Whole Bastar	June-July	March-April (Only Aerial Tuber)	10-15 - 15-25	As vegetable - As vegetable
4.	Sweet Potato	*Ipomoea batata*	Shakarkand	Kalmalkanda	Whole Bastar	June-July	Nov.-Dec.	4-6	Vegetable and as Fruit
5.	Elephant footyam	*Amorphophalus campanulatus*	Suran	Jimmykanda or Barhakand	Jagdalpur, South Bastar	May-June	After 2 years	5-15 Kg/ Plant.	As vegetable
6.	Arun	*Colacasia isculanta*	Arbi or Ghuiya	Kochai	Whole Bastar	June-July	Feb. / March	5-6	As vegetable
7.	Ginger	*Zingiber officinale*	Adarak	Aada	South & East Bastar	June-July	March/ April	5-15	As species
8.	Turmeric	*Curcuma longa*	Haldi	Hardi	South & East Bastar	June-July	March/ April	5-10	As species

Source : Dr. Nanda, Soil Scientist Baster, Chhattisgarh

Table: 3.23.
Useful Edible Tubers in Bastar Division

S.No.	English Name	Botanical Name	Hindi Name	Local Name	Area	Main Features	Production Capacity (Per plant)	Uses
1	2	3	4	5	6	7	8	9
(A) Wild Tubers of Dioscoria species								
1.	Biteryam	*D.dumatoram*	Kadava Ratalu	Pitkanda	In Sal and Tendu Forest near rivers	1-2 Tuber, Mesocarp Yellow- Red	200-1000	As Chips
2.	Trifoliate yam	*D.pentakila*	Surenda	Bharakanda	In Sal Forest near rivers.	1-2 Tuber, Mesocarp fleshy	200-2000	Used in roasted form.
3.	---------	Unknown species	Targariya	Targariyakanda	In Sal Forest near rivers.	Long Roots, Soft Mesocarp	100-500	As Vegetables
4.	---------	Unknown species	Dori	Dorikanda	In Sal Forest near rivers.	Long Roots, Soft Mesocarp	100-500	Used after boiling
5.	--------	Unknown species	-----	Sikkakanda	In the forests of Sal/ Arjun/ Silyari/ Teak.	Tubers are formed at 1 Meter depth.	1000-2000	Used after boiling
6.	--------	*D.hispida*	Bechandi	Kulihakanda	On Hills.	1-3 Tuber, Green Stem, Stems having thorns, Poisonous Tuber	500-1000	As Chips
(B) Other Useful Tubers in the Forest								
1.	Tikhur	*Zingiber roseaum*	Tikhur	Tikhur	In Sal Forest near rivers.	Like Turmeric, 3 Feet in Height, Fruits are Red and Yellow	500	User in powdered form.
2.	Keth	*Costus speciosus*	Keth	Keaukanda	In Sal Forest near rivers.	White Flower, Tubers are like Ginger	500-2000	As Vegetable
3.	Teniya	*Xanthosoma sp.*	Wild Tuber	Dhova	In shadow areas or Marshy areas.	Like Arabi, Banda	500-1500	As Vegetable
4.	Didari	*Pueraria tuberosa*	------	Vidarikand	Sukama, Bijapur, Abujhmad.	-----	25-30 Kg/ Ha.	As Medicine

Source: Dr. Nanda, Soil Scientist Baster, Chhattisgarh

LIVESTOCK DIVERSITY IN CHHATTISGARH: -

Livestock is an integral component of agriculture in Chhattisgarh and make multifaceted contributions to the growth and development of the agricultural sector. The Status of Livestock resources in the State have been shown in Tables below.

Table: 3.24.

ANIMAL RESOURCES

Animal	Breed	Area	Traits Variability
Cattle	**Sahiwal (Originally From Pakistan)**	**Through Out Chhattisgarh**	**Size, Colour, Conformation Milk Production, Fat Percentage, Growth Rate.**
Buffalo	**Nagpuri**	**Rajnandgaon, Durg & other Chhattisgarh region**	**Horn structure, skin colour, other Chhattisgarh region milk production, conformation.**
	Murrah & Nilli – Ravi (Originally from Haryana)	**All over Chhattisgarh**	**Horn structure, milk production, skin colour.**
Goat	**Bengal goat**	**Ambikapur, Raigarh, Bilaspur, Durg, & Other parts of Chhattisgarh region.**	**Skin colour, kidding interval, and age of first calving, growth rate delicious meat quality.**
Pig	**No recognised breeds in Chhattisgarh dominated area.**	**Desi animals found throughout of Chhattisgarh abundantly in tribal.**	**Bristles size, colour, conformation, prolificacy, growth rate, low meat fat.**
Rabbit	**No recognised breeds in Chhattisgarh**	**Wild breeds found allover Chhattisgarh**	**Skin colour, wood production, growth rate, litter size.**
Poultry	**Aseel**	**Bastar and adjoining areas.**	**Skin colour, fighting ability delicious meat , quality.**
Wild Animal Resource	**Tiger, Panther, Cheetal, Sambhar, Nilgai, Four homed antelope, Barking, Deer, Wild boar, Wild Cat, Jackal, Fox, Hyena, Chinkara, Beer, Otter, Porcupine, Langur, Wild Dog (Dhole), Gaur, Wild Buffalo, Monkey, Blacktouck. Hare, Peacock, Quail, Crane, Stork, Weaver bird, Jungle fowl, Phthonm, Crocodile and many other Wild animal resource.**	**Throughout with area specified Chhattisgarh**	**Traits vary according to individual wild animal.**
Laboratory Animal (Rat, Mouse)	**Wild**	**Throughout Chhattisgarh**	**Widely used in Laboratory & other bio medical research, variation among breed, colour, growth, rate, litter, size, and longevity.**

Table: 3.25.

Disrtict-Wise Livestock Population In Chhattisgarh

S.No.	District	Cattle	Buffalo	Sheep	Goat	Pig	Others	Total	Poultry
01	Raipur	1073425	236459	34924	150464	12914	1298257	1706443	716209
02	Mahasamund	373933	1036991	100070	50626	5660	23283	1590563	238739
03	Dhamtari	22299145	82953	8054	405000	4528	10627	810307	190991
04	Durg	948736	187432	23231	144719	8997	454	1313569	53285
05	Rajnadgaon	591000	113000	11900	127000	13700	-	856600	339000
06	Kawardha	22123	65350	5159	47516	5090	700	145938	43821
07	Bilaspur	613257	167981	11888	121345	9980	-	924451	447598
08	Janjgir	446641	126534	13630	87548	4906	-	679259	21404
09	Korba	255079	89127	1987	38757	2666	-	387616	110189
10	Raigarh	450000	60000	18000	140000	57000	-	725000	300000
11	Jaspurnagar	374000	45000	16000	170000	56700	-	661700	305000
12	Sarguja	1189815	245667	9227	445186	53163	-	1943058	761489
13	Korea	241960	56002	34	84872	2884	-	385752	131823
14	Bastar	488678	107811	21221	147980	76565	-	842255	595381
15	Kanker	305290	52987	4885	101176	49135	21	513494	234645
16	Dantewada	513465	42098	6139	203555	85496	-	850753	415335
	Total	8186547	2715392	286349	2465744	449384	233342	14336758	5383476

STATUS OF MUSHROOM DIVERSITY IN CHHATTISGARH: -

Sporadic attempts have been made in the past to collect, conserve, identify and maintain the mushroom flora available so for. These efforts were made under All India Coordinated Mushroom Improvement Project of ICAR operating in Indira Gandhi Agricultural University, Raipur since 1988. Survey for collection of mushroom flora was carried out in different parts of Chhattisgarh viz.,, Raipur, Bilaspur, Ambikapur, Raigarh, Jagdalpur districts. Some of species were collected, identified and deposited at National Research Center for Mushroom, Solan (H.P.). About 83 mushroom flora were collected and preserved in formalin. The mushroom flora commonly encountered during survey was: Agaricus sp. Tuber sp., Russula, Boletus, Volvariella, Lactarius, Lepiota etc.

- **FLESHY FUNGI COLLECTED FROM CHHATTISGARH DURING KHARIF, 1997: -**
- **FLESHY FUNGI FROM CHHATTISGARH COLLECTED DURING KHARIF, 2000: -**
- **FLESHY FUNGI FROM CHHATTISGARH COLLECTED DURING KHARIF, 2001 : -**

STATUS OF WETLAND ECO-SYSTEM: -

State of Chhattisgarh has rich biodiversity in its water bodies available in form of its Perennial Rivers, Streams, Reservoirs, Subterranean aquatic systems as well as traditional dug, wells; domestic ponds.

There are 14,677 irrigation reservoirs (80,760 ha) and 45,250 village ponds and tanks (63,498 ha) Thus total 1,44,258 ha. Area is under the aquatic resources of the State. Besides this 3,575 Km long rivers (viz, Mahanadi, Sondhur, Indravati. etc) along with their tributaries also flow in the State.

AQUATIC BIODIVERSITY: -

Though, not much of research and documentation of existing flora and fauna in these wetlands has been done in the State, but preliminary documentation done in major rivers by ZSI and few domestic ponds of the State by the IGAU, Raipur does provide an insight into the diverse aquatic flora and fauna in these wetlands.

☞ FISH BIODIVERSITY: -

In the year 1974 and 1978-79, the Directorate of Fisheries GoMP made inventory of fishes in Rivers Mahanadi and Hasdeo and the total number of fish species recorded were 60. Later in 1987, Sehgal while surveying the sport Fisheries in India recorded Mahasheer in the Rivers Hasdeo, Mahanadi, Maniari, Seonath and Indravati in the Chhattisgarh region. **In the River Indravati, Vardia (1991) made a survey of fish fauna and recorded 49 species.** Not the least even hypogean fishes are found in this region.

Detailed and listing of fish diverstiy as per serveys done by ZSI, Culcutta is given in Annexure 3.10 in Vil. III of the CBSAP.

STATUS OF GROUND WATER DIVERSITY: -

Chhattisgarh State is underlain by rock types of different geological ages ranging from Azoic to Quaternary. All these geological formations have different hydro-geological characteristics, which control ground water occurrence, movement and availability. The distribution of Geological provinces in the State has been shown on the map in Fig: 3.5.

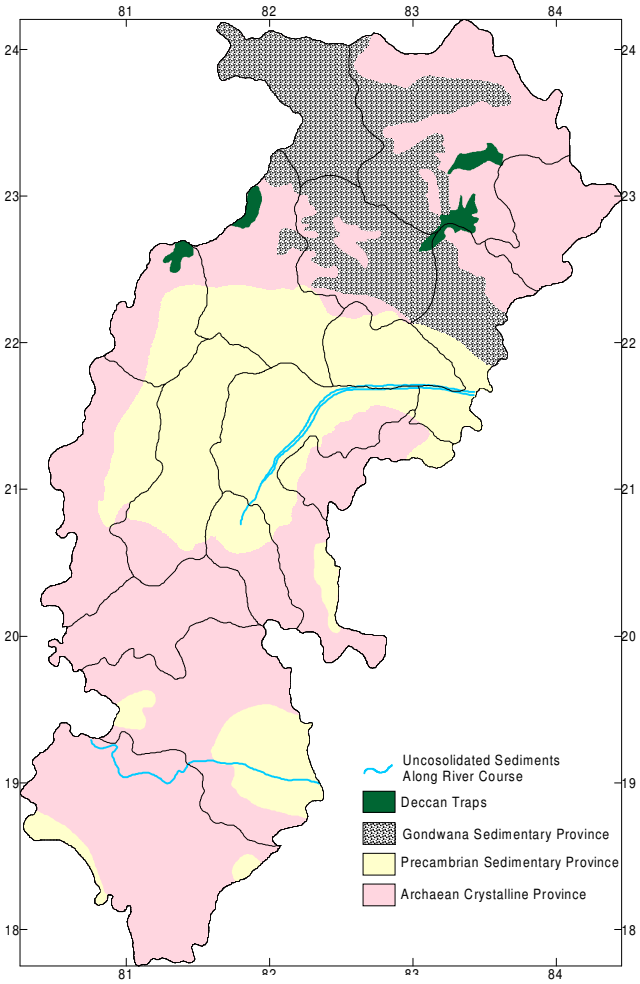

Fig: 3.5.

Proterozoic sedimentaries having high yield potential up to 25lps have been delineated in the central part of Rajnandgaon district; northern part of Durg district (Saja, Bemetera and Nawagarh blocks); Simga block of Raipur district; Mungeli, Patharia and Takhatpur blocks of Bilaspur district; Baramkela and Pussaur blocks of Raigarh district & Jagdalpur and Lohandigoda blocks of Bastar district.

Zones having yield potential upto 10 lps have also been demarcated in the southern parts of Rajnandgaon district, south west part of Raipur district,Dhamtari block of Dhamtari district, parts of Malkharoda, Pamgarh and Akaltara blocks of Janjgir-Champa district; parts of Bhanpuri, Lohandigoda and Darbha blocks of Bastar district; Belha block of Bilaspur district: Tamnar,Gharghoda and Dharamjaigarh blocks of Raigarh district; Baikunthpur and Sonhat blocks of Koriya district and Ambikapur block of Sarguja district. Rest of the areas have yield potential up to only 5 lps.

Discharge as high as 40 lps has been recorded in boreholes drilled by CGWB at Bishrampur and Rohra in Raipur district, Sargipal and Neganar in Bastar district.

BIODIVERSITY PROFILE OF UNIQUE BIO-CULTURAL ECOSYSTEMS IN CHHATTISGARH STATE

The State of Chhattisgarh being a forest-dominated region occupies a special place due to its natural beauty and bicultural heritage. But few unique ecosystems wherein the ecological as well as cultural diversity has been preserved in its wilderness due to the strong bicultural linkages built up due to co-existence between the species and man; have been identified and an insight into these Bicultural Ecosystems is presented here.

A. KURSCHEL VALLEY: -

This valley lies in the northwestern part of Matle reserve in Sonpur range of Narayanpur Forest Division.

General Character of the Habitat and Communities: -Kurschel valley is narrow sheltered valley, surrounded on three sides-in north, east and south by high ridges and by a buffer belt of Gudabeda Protected Forest in west. The valley is about 9.5 Kms long and 2.5 Kms wide; the widest point being 4 kms wide in west. Kurschel nala runs east –west and after leaving the valley, it runs north of Indravati River. Highest altitude is 839 meters MSL in east on ridge, while lowest altitude is 480 meters MSL on valley floor in west. The soil is shallow to moderately deep lateritic on upper slopes, but on lower slopes and along the valley floor, the soil is deep alluvial. The pH of the soil varies from 6.1 to 6.4.

The Kurschel valley lies in the tension belt where north eastern limit of teak zone and south western limit of Sal zone overlap each other. East of the valley teak forest is rarely noticed except for scattered trees or very small patches. Similarly Sal forest is altogether absent in west of the valley.

The first thing that strikes a visitor in the valley is the height of the trees. All along the valley floor, the crop is generally of Site quality I.A. Large number of large sized mature and over mature trees are seen, some measuring upto 5 metres in girth and height of 40 metres and more. The staff "Mamma" and "Bhanja" has lovingly named two such trees. Major part of the valley is covered with miscellaneous forests. Floristic diversity has been shown as **Annexure 3.14. in Vol. III of the CBSAP.**

B. SANNA (ERSTWHILE HOR. OF KHUDIA ZAMINDARI):

SITUATION	-	NORTH- WEST OF JASHPUR NAGAR -51 KM
LATITUDE	-	23°05116" N; Long 83°48' 29" E.
ALTITUDE	-	841 MT above M.S.L.
HIGHEST PLACE	-	1136 MT above M.S.L.
	-	1077 MT above M.S.L. (**RANDRATAT)**
	-	1098 MT above M.S.L. (**RAUNIPAT**)
PAT	-	Large Plateau

		Pandrapat derives it' s name from its frosty nature in winter.
TEMP	-	MAX 34°-38° Cel. MIN- 1°- 5° Cel.
RANIFALL	-	95-100 CM; RAINS- HEAVY HEAVY FROST IN WINTERS.
SOIL	-	LATERITIC, SANDY LOAM
ROCK	-	GRANITE TRAP, GNEISS WITH QUARTZ, SCHIST
RIVERS	-	It originates in pandrapat near Ranijhula, other major rivers are Bamhni and Sonmuth
FOREST CROP	-	Sal principal spp., TUN (Toona ciliata) spp. along river banks and other species Dhawda, Saja, Bija,Myrobalans, Haldu, Kasai, Tendu, Char, Tinsa, Saliha, Kusum, Bar, Pipal, Gular, Pakar, Bhilwa, Ghont, Mahua.
MFP	-	Sal Seed, Tendu Leaves. Dhawai Flower. Myrobalans, Tendu, Chironji.
CLIMBERS	-	Mahul, palas, Ramdatun, Gathiakand, Patal Kumda.
WEEDS	-	Flemingra chhappar, Lantana camara, Chhind, Nyctanthis arbortristis (Harsingar), Dhawai.
WILDLIFE	-	Panther, Bear, Chital, Barking Deer, Wild Boar, Sonkutta, Redface Monkey, Blackfaced Langoor, Hyena.
BIRDS	-	Peacock, Jungle Fowl, Black Grey Patridge, Common GreyHorn Bill.
REPTILES	-	Python, Cobra, Rat Snake, Krait, Viper .
TRIBES	-	Pahadi Korwa – Endangered Dehari Korwa - Less Oraon - Majority
CULTIVATION	-	Shifting Type amongst Pahadi Korwa while others are more or less settled type .
CROPS	-	Makai, Kodo, Kutki, Jatangi. Sarson. Tau. Arhar.
DIET	-	Pahadi Korwas - Tubers, Rice, Hunting
DRINKS	-	Rice Bear (Handia) Mahua (Less)

FESTIVALS	-	Sama or Sarul (Worship of Deity in Sal Groves)- month of Chaitra onwards; Madai in winters, Karma after rains, Nuakhai after Dusshera.
MARRIAGES	-	Groom side bears the expenses. In Korwas married couples live separately. Oraons, live in Joint Family. Korwas keep menstruating woman out of house.
DEATH	-	Korwas bury the Dead. Oraons Burn the Dead. Korwas leave the house in which death occurs.

C. ACHANAKMAR WILD LIFE SANCTUARY, BILASPUR: -

It is situated in the lap of Maikal ranges; which lies in the Lormi block of Bilaspur Distt. The area endows a rich pool of germplasm and this reputation of it fetched it to be recognized as a Wild Life Sanctuary on 28thJune 1978 .It embraces an area of 553.286 sq. km. It lies on the North -West of Bilaspur forest division and occupies a Southern position to that of Amarkantak plateau .The arms of the locale extends from $22^0$24' to $22^0$35' N -longitude; and $81^0$34' to $81^0$35' E Latitude.

The christening of the place owes to the name of the village lying within the green limits of the area i.e Achanakmar. In English the term Achanakmar means "sudden attack". It is undulating and it is interspersed with small rivulets and rivers The area is 70% hilly and 30% plains .

☙ RICHNESS OF BIODIVERSITY IN THE AREA:

The sanctuary owns a special forest of geomorphological and ecological characters unparallel to other area .The variety and variability occupying the ecological complexes, in the area has high intrinsic values. In 1902; folk around claimed have observed white tiger within the limits, which is restricted only to Bandhavgarh area of Madhya Pradesh presently. Area has diversified edaphic conditions amongst which lateritic yellow soil is predominant.

☙ WHY IT IS A SPECIAL TYPE OF ECOSYSTEM?

(i) The area represents a more stable climate, therefore local species continue to live there itself, Hence richness of organism is saved.

(ii) Warm temperatures and high humidity supports greater diversity of species in the area.

(iii) Owing to greater pressure from pests, parasites and diseases; no single species dominate rather an opportunity for many species to co-exist is prevalent in the area.

(iv) Rate of out crossing (among organisms) is high. Thus increasing the frequency of genetic variation.

(v) The area receives more solar energy throughout the year, thus increased productivity and greater resource base, supports a wider range of genepool.

(vi) Watershed of river Maniyari, which is a part of Mahanadi basin quenches the habitat with several nallas and water holes for e.g Junapani, Sahebpani, Jaimangalpani, Jain chhar nala, Raja khola etc. There are about 15 salt lakes. Thus a variety of microclimate supports the same.

(vii) Area is a good combination of many types of ecosystem viz. Grass, meadows, marshy, pond, river ecosystems eventually makes it an ecological complex. Therefore species like mouse Deer is still successfully surviving in this specialized ecosystem. Moreover gigantic Sal trees; largest ever seen in Chhattisgarh, shows the luxuriance of the system.

☙ ECOLOGICAL PREMISES OF ACHANAKMAR:

The area enclosing the sanctuary of Lormi region is a good habitat for tiger (*Panthera tigris*) and Bison but a continuous change occurs in the surrounding areas like -Sarasdol, Jalda , Bidawal, Chhaparwa etc . **The summary of flora and faunal wealth of Achnakamar is given in Annexure 3.15. in Vol. III of the CBSAP.**

D. KANGER VALLEY NATIONAL PARK: -

The Park, is located at a distance of 27 km. from the famous seat of tribal culture, Jagdalpur (Chhattisgarh). The Park is full of rich floral and faunal biodiversity, streams, falls, valleys, lakes, limestone caves etc. and thus presents variety of ecosystems like wild, subterranean, and Aquatic (Ponds, Lakes, Falls) at one place.

The legendary Kanger River valley runs from West to East almost bisecting the Park into two halves. The average width of the Park (north to south) is 6 km. while the average length (west to east) is 34 km. The area of the Park is 200 Sq.Km. Entire Park constitutes core area and

there is no buffer zone. Nearly 50 villages located outside touch the outskirts of the Park while one forest village viz. Kotumsar lies within the core area of the Park.

☙ UNIQUE SPOTS: -

- **DANDAK CAVE: –**

Dandak cave, discovered in 1995, is 200 m. long and 15 to 20 m. deep. The cave has two compartments. When entered, the first one presents a view of a big ' Assembly Hall' containing huge pristine dripstone structures. To enter the second compartment, one has to almost crawl on knees. A well like structure amidst deep darkness welcomes visitors here. After the well, beautiful stalactite and stalagmite formations appear.

- **KOTUMSAR CAVE: –**

Discovered in 1900, this cave was surveyed by Dr. Shankar Tiwari in 1951. The leading way inside the cave is 330 m. long and 20 m. to 72 m. wide. Limestone structures called stalactite (one hanging from the roof) and stalagmite (one deposited on the floor) are major attractions. Numerous depressions at cave floor constitute small ponds that harbour *' blind*fish and frogs. In addition to this, many insects, reptiles, spiders, bats, crickets exist inside the cave.

- **KAILASH CAVE: –**

The cave is 200 m. long and its depth varies from 35 to 50 m. A big ' Court Hall' inside the cave has its interior adorned with several attractive formations of limestone and dripstone. Another point inside the cave produces musical sound when a limestone structure is gently tapped.

- **TIRATHGARH FALL -**

At Tirathgarh, a splendid waterfall is more than 50 m. in three stages of falling of water. All stages are now accessible through concrete staircase.

- **BHAINSA DARHA -**

This is a lake covering an area of 4 hectare. The lake is fed by water from Kanger River. It has beautiful bamboo forests in its surrounding. This ' Darha' (lake) is a natural habitat for crocodile and turtles. In the east direction, the lake merges into Kolab (Shabri) river.

- **KANGER DHARA -**

  At Kanger Dhara, the Kanger Valley turns into a mini water fall.

E. INDRAVATI NATIONAL PARK: -

The Indravati Tiger Reserve is situated in the western part of Bastar district. In the east it is bounded by Borudi river joining the Indravati river and Jagdalpur – Bhopalpattanam road respectively. The Indravati river lies in the northern side and also in the western side where it forms the inter state boundary with Maharashtra.

The total area of the Tiger Reserve is 2799.086 Km^2 with a core area of 1258.372 km^2. The buffer zone of 1540 km^2 in the eastern and southern side included in the tiger reserve enjoys the status of game sanctuary.

FAUNA: -

Due to sparce population and large chunks of forest the wildlife was practically undisturbed here. In the past there was abundance of wild animals in the area. The area Kutru was famous for wild Buffalo and Bison. It is also once stated that Rhinoceros was also found in the south of Indravati river. **The Faunal wealth of Indravati National Park is given as Annexure 3.16. in Vol. III of the CBSAP.**

F. FUTKA MOUNTAIN (DISTT. KORBA): -

Futka Mountain is situated at the North of Korba City at the distance of 20 Km. It encompasses forest area of 17716.22 Hact. Its height varies from 3,000 feet to 3,500 feet and is full of several small hillocks and deep valleys. Whole area is covered with Sal and Mixed forests. Valleys are inaccessible. Mountains are extended upto Hazaribagh starting from North upto Baro

Mountain, Mainpat, Begasa in the South-East direction. There is no settlement in the area, but in the middle of it we have village named as Dutinagar. Now, top of hills are barren due to the Bauxite mining done by BALCO in these years. At present elephants from the Orissa and Jharkand are roaming in the area.

The most attractive mountain of the areas is Laddi (meaning marshy) which has comparatively less height than the other mountains in the South. The mountain due to typical geological formation remains moist and muddy throughout the year.

There has been no documentation done of the flora & fauna in this region but certain unique floral and faunal species have been observed in the area.

The locals of the area have confirmed the occurrence of a special snake called PAHARCHITTI said to grow up to 40 feet length. The Nature Club, Bilaspur working in the area has undertaken special studies which reveal that probably this snake is morphologically nearer to two varieties of Pythons i.e. Rock Python and Reticulated Python. This snake has been sighted by Range Officer Shri. V. Nath, in 1999.

G. **SITARAMPUR, JOKAPAT, LAHSUNPAT, SHANKARGARH IN SARGUJA DISTT.: -**

The above area falls at an approximate distance of 50 to 70 Kms. from Ambikapur, the district headquarter of Surguja. The area is spread over an area of approx. 30-50 square Km. This area is unique and unparallel from Bio-Diversity point of view.

Fig: Perwadih, Semarsot, Tahsil- Pal.

The Semarsot Wild Life Sanctuary has a big valley of rich flora & fauna of great academic, aesthetic and economical value encircled with different hill ranges, ranging in height exceeding 1000mts with various igneous and metamorphic rocks.

Fig : Hot Stream, Tatapani, Balrampur.

One unique type of reptile like ground lizard of green colour called as "Hathi Tatinga" in local language, which is on the verge of extinction in Mainpat area, was sighted by forest guard of East Surguja one month back in this area.

Fig: Pavai Fall, Semarsot, Tahsil- Pal

The rivers of the area has varieties of local fishes like "Suili Fish", "Jhinga Fish", "Gina Fish" & "Mungri Fish" etc. From this area we can visit the peculiar patch of "Ajrungarh" forest block. This area has a big patch with a number of unique <u>Pterocarpus marsupium</u> (Bija) trees.

On the hills of this area and some nearby forest of Shankargarh there was a good forest of special Bamboo called "<u>Dongi Bans</u>" or "<u>Sinduri Bans</u>".

In Semarsot area there is village called "Asnatalla", where special tribe "Nagesia" live in their traditional culture and life style. This village is the origin of "Sendur river", a famous perennial river of Surguja district. In the same patch there is a hamlet of special tribe "Kodaku". In winter season they celebrate a special function on the pattern of "Bhagoria" of Bastar district.

Fig: Deepadih, Shankargarh, Tahsil- Kusmi

H. ABUJHMAR BIOCULTURAL RESERVE: -

Abujhmar is remote and an under developed area of district Bastar. Anthropologists have studied the whole demography of Abujhmarian' s in detail. It is believed that glimpses of ancient culture can still be witnessed amongst the tribal communities of Abujhmar. Madia tribals residing in the geographical limits of Abujhmar are nouned as Abujhmaria. The area has 12 forest villages. The total population is 2030 with 299 families, all of them scheduled tribes expect for 5 families of blacksmiths. Baudhchaitanya temple in Bhangapal (700 A.D.) and Shiv temple of 10 - 11th Century A.D have been excavated in Chhote Dongar region of Abujhmar. There are no evidences of architecture; after 11th Century A.D in the region.

Abujhmarias live very close to nature and have developed their life style on minimum requirements. Forest dependent lifestyle motivates them to lead a simple and natural life. "Mar" in "Gondi" language means "Hill". That' s why tribals settled in the hills of Antagarh-Narayanpur tehsil of Bastar district are called "Abujhmaria" and those living in plains are called "Dandami-madia". Main festival of Abujhmarias is "Kadsar" which is celebrated in summer. "Madai" is also organized on this day. Tribals from all villages come with different type of flags representing local deities. Dance named "Kadsar" is also performed on this occasion "Gaur Dance" of "Dandami - maria" is very famous for its lyrics and rhythm. Both males and females participate in it. Males wear bison horns while dancing, while females dance in slow rhythmic tone separately in a semicircle.

Birth, marriages and death ceremonies are major cultural events of "Gonds" which are still celebrated in traditional way. Marriages are performed mainly in three ways i.e. kidnapping, arranged or love marriages. Wine, flesh are extensively used in marriage ceremonies of gonds. Gonds also have a post death meal culture. "Death Pillars" takes the highest rank in Madia culture. Totem in form of Snake, Tortoise, Goat etc. do depict either evolutionary or diety fundamentalism. The death pillars always have engravings of Sun, Moon, Hills, Forests, Rivers, Wild animals, Domestic cattle' s, Farming Marriages and war.

The core of the Maria philosophy is their sensitivity towards the interrelationships between nature and environment. Art also is well explicated in death pillars. Most of the objects depicted on these pillars are front facing and mobile objects are shown in high relief series in horizontal way. Pillar design is quadriedged with a small pot on the top of it. Madias by profession are mainly formers, livestock, breeders and hunters. They have a fairly good

knowledge of edible wild tubers; NTFP and medicinal herbs found in forests. They treat the sick with the help of knowledge passed on from their forefathers. They still believe that invisible power and ill-sonls to be the cause of every disease and thus treat these diseases either by sacrificing on deity worship as directed by Sirha-Gunia (Knowledged person).

Reversal of nature is not seen in Madias culture because they still recognize Mother Nature as a pillar of their culture. This is reflected in their worship of earth, tree and water in their traditional way. According to their belief, their local deities reside on trees. "Deogudi" is the most sacred place in the village where stone, engraved; status of local deities and their "Trishul" are kept for worship.

Jhum or shifting cultivation once traditional activities of Marias has gradually disappeared and now have adopted settled farming. Their farming pattern is very sustainable and conservation oriented. Varieties of same accession is sown at many places so that in the event of sudden failure of crop at one place; some productivity is retrieved from other places. This clearly depicts the level of their understanding about nature and sustainable utilization of available bio-resources. By adopting crop rotation of its own kind; they raise wild varieties of paddy of short as well as long duration at the same time, so as to recover some percentage of crop even in the adverse climatic conditions. This clearly shows that they prefer an average production crop over high yielding varieties, since it is time tested. Owing to lesser availability of land, they sow only those varieties, which not only requires lesser inputs but whose production even in minimum quantity would also satisfy their needs. One such example is "Dhan Miri" a variety of chilli. One piece of this chilli is sufficient to satisfy the Chilli needs for a diet of 10-15 adults. They also grow one special variety of pod (Sem) whose size may be small and also has lesser flesh but has large number of seeds which are used as pulse in the summers.

Conserving bio-diversity and nature is an art, amongst Maria' s which has been passed on through generations. Hen for example, is not only an item of sacrifice or food but is a domestic pest friend also. Hens select harmful insects, digs them from court yard and eats them keeping disease away. Hens of the area have adopted themselves to the heat of summer and high humidity of rainy season. These birds also have swift movements to get rid of sudden attacks of snake, dog, cat or jackal.

I. MAINPAT BIOCULTURAL RESERVE: -

Mainpat Plateau is situated in Sarguja District and is famous for its typical topography. The extension of this plateau is 12 Kms X 29 Kms. It' s height varies from 500 m to 1152m. above MSL. Mainpat can be easily distinguished into two areas**, first low lying area and second upper plateau area.** Lower plateau area is at the 541.378 meters above MSL, while upper plateau is situated at 1075.683 meters from MSL. The Highest point of Mainpat is 1152 meters. It separates Pandrapat from itself by a norrow of Mand River.

"Pat" is the local word for plateau. Besides Mainpat, there are other pats also in the Sarguja Distt. These pats have remained a shield of protection for ages. Besides protection, they control cold waves to a certain limit. This pat is the protective wall for the area in vicinity against the warm currents as well as cold waves flowing from Northeast.

Locals residing here are Oraons, Majhi, Majhwaar, Korwa, who do not use agriculture hybrid seeds in the farming. Oraons is the dominant population here. This tribe is hardworking and cooperative. The Oraons are dependent on agriculture and livestock for livelihood security. They also have accquired expertise in earthen potteries. The people dwelling here worship Mahadev, Bhoot-pret, Nasa, Devata, Dhodi & Bang. They celebrate festivals like Dhasahara, Dabou, Nava, Adhe, Gholtha, & Navami etc.

In 1962, the refugees from the Tibet were settled down here and these refugees have influenced the economy of the pat to a fare extent. These refugees have learnt to coexist with the natives. The Tibets have highly technical expertise in making wool carpets. Selling pamarian pups is also an added economic activity by the Tibetans society. They have gradually taken up farming also now –a-days. Budha Temple of Mainpat is also a point of attraction. Tibetan culture is evident in every corner of Mainpat. Mainpat is virtually an oasis of Budha culture in the ocean of Oraons. This is a very high-ranking tourist place in the State.

The floral and faunal diversity as well as local cultural diversity is under great threat in Mainpat due to Bauxite Mining.

J. SACRED GROVES: -

- One such significant tradition of nature worship is that of dedicating and according protection of patches of forests to ancestral spirits/deities. These vegetation patches have been designated as "Sacred Groves" (SGs). Although there is variation in the way groves have been described/defined, most of the scholars emphasise the natural climax nature of the vegetation and the preservation of vegetation through local taboos and sanctions that entail spiritual and ecological values. Thus SGs are segments of landscape, containing vegetation and other forms of life and geographical features that are delimited and protected by human societies under the belief that to keep them in a relatively undisturbed state is an expression of important relationship to the divine or to nature (Hughes and Chandran 1998). Diverse cultures perceive this relationship in different ways, and institutionalise various rules of behaviors (taboos) in regard to the sacred space and its elements. But wherever SGc occur, they are of an immense culture and ecological interest.
- That the size of the groves varies considerably from a cluster of a few trees to several hectares.
- It appears that in terms of the legal tenurial rights, the sacred groves fall under three categories:
    - Under the control of State forest department;
    - Under the control of revenue and other government departments; and privately owned.
- In terms of management of the sacred groves, i.e. upkeep, protection, performance of rituals and festival and harvesting of biomass etc., also there exists vast variations.
- A random literature search reveals that by and large a majority of the sacred groves are associated with female deities.
- That women are not permitted into the groves after attaining puberty Roy (1912) while describing sacred groves, known as S*arana* or J*aher* among the Oraon of Chottanagpur, mentioned that the main festival associated with S*arna* or S*aherul.* However, women are not allowed in the S*arana*, but take part in dance at the akhara which is located close to the grove.
- There is a general belief that biomass resources from the sacred groves are not harvested. This is certainly true in many sacred groves found across the country.

☞ SACRED GROVES AS COMMON PROPERTY RESOURCE: -

From the foregone description, the following main points emerge regarding SGs in India:

1. The institution of SG is rather ancient and probably dates back to the pre-agrarian hunting stage;
2. SGs are found widely distributed in many parts if the country;
3. The Number of SGs in India is likely to be between 100,000 and 150,000;
4. The estimated area covered by SGs is likely to be between 1-2 percent of the total area of the country;
5. Although SGs are found among both tribal and non-tribal populations, it seems the association of a particular type of SGs is stronger among the tribal;
6. There exists vast variation in the legal status and management of SGs in the country;
7. The institution of SGs serves multifarious function-Cultural, Social economic, Health psychological, Religious and Political;
8. SGs usually represent climax vegetation, are rich in floral and faunal biodiversity, often harbour rare, endangered and keystone species, and perform a variety of vital ecological functions.

Use rights: as noted earlier, a wide variety exists in terms of ownership of SGs in the country;

- **SGs owned and managed by single or joint family:** Such groves are found mostly in Kerala and Bastar district of Chhattisgarh. It may be noted here that in these groves both land fauna and flora belong to the families. These are thus examples of privately owned and managed groves.
- **SGs managed by communities:** There are numerous SGs where although the land usually is owned by the Forest Department or the Revenue Department, or other State agencies, the right of use of resources and management rest with the communities. Such groves could be owned and managed by a clan, different ethnic group in a village or the entire village. These are the classic examples of community-managed SGs.

Boundary condition or the exclusion principle: on the basis of this principle at least three types of SGs are observed;

1. A village having only one SG. In such cases the whole village is affiliated to the grove. Occasionally a village may have more than one grove (serving different purpose), in such situation also the whole village is affiliated to both (or more) the

groves. Persons from other villages cannot be affiliated to such village-owned and managed groves;

2. Sometimes in multi-ethnic villages each ethnic group may have a separate grove of its own. In other words, each ethnic group manages its own SG; and
3. Sometimes people from neighbouring villages may participate in a village having SG. Such a situation occurs when the neighbouring villages do not have their own SGs and have moved out from the parent village to establish new villages/hamlets.

It is thus seen that all SGs have well-defined boundary rules.

Use rules: There are well- established rules in terms of use of resources

- Broadly speaking two types (although there is scope to further refine this) of use patterns are witnessed:
  a. Groves from where collection of any from of biomass is forbidden and;
  b. Groves where dead wood, leaf litter, medicinal plant and others NTFP are harvested. In other words, from groves of type
     - ✓ No tangible economic benefits are derived, while from the type
     - ✓ Some tangible economic benefits are derived.

From the foregone description and analysis, it is evident the institution of sacred groves is not a homogeneous category, and instead encompasses a variety of system ranging from truly privately owned and managed groves to community-owned and managed groves

In this regard SGs, therefore, differ markedly from other CPRs. In fact a majority of SGs provide a variety of strictly speaking, non-economic functions-cultural, social, political and religious-to the individuals, clan and communities. It is highly noteworthy, as noted earlier, that a number of ceremonies are performed and festivals held annually in the groves. All household affiliated to grove contribute their share in cash for the purchase of sacrificial animal and other materials. Thus, in fact, instead of deriving any economic benefits the community spends a considerable amount to propitiate the deity.

Fig: 3.6.

Therefore, SGs should not be viewed as CPRs providing tangible economic benefits to the community but instead providing a common socio-religious space which the community user

to establish cohesiveness, identity, solidarity and well being of the inhabitants as also of crop and animals.

As noted earlier, irrespective of the type, all SGs harbour varying degrees of natural biodiversity. The biodiversity in the groves is preserved on religious grounds and not because of economic benefits. However, several studies show that because of the weakening of traditional religious beliefs, the cultural and biological integrity of many groves is threatened.

Details of scared groves of Jashpur the is given Annexure 3.17. in Vol. III of the CBSAP.

CHAPTER – IV

THREATS / PROBLEMS RELATED TO BIODIVERSITY

Besides natural cause these are certain manmade causes too, which are responsible for depletion or at least scrinking quantity / quality of bio-resource. They are being discuss in detail component wise :-

WILD LAND DIVERSITY

MAJOR THREATS

- **One of the major causes for the loss of biological diversity in the Wild Lands has been the depletion of vegetative cover in order to expand agriculture.**
- **The collection of fuel wood; uncontrolled grazing for sustenance, food security as well as income generation, and ever growing population has led to an increased rate of consumption of bio-resources.**
- **Most of the biodiversity rich forests of the State also have enormous mineral wealth potential. Exploiting this potential by opening new mines & mineral based industries in the recent past has led to destruction of rich habitats.**
- **Diversion of forest lands for non-forestry purpose like Minor & Major irrigation projects; Hydro-electric Power Projects Roads; Industrial Estates & other development projects.**
- **Legislative settlement of encroachments on forest lands for 2 periods pre-1976 & pre-1980 period (this land hunger goes on in the post 1980 period too.)**
- **Though illegal, but continuing practice of shifting cultivation in the forest lands in many parts of the State.**
- **Release of toxic affluent both in Water & Air due to urbanization and Industrialization especially Mining based; has seriously affected the regeneration status & growth of Biodiversity.**
- **Spread of invasive weeds like Parthenium, Lantana, Eupatorium has posed serious hindrance in germination and growth of indigenous species.**
- **Traditional but destructive collection practices of NTFP' s & Medicinal plants and removal of roots /base of products. Like collection of; tubers, roots of Palas, Bark of Arjun , Fruits and seeds of Char.**

- **Traditional practices of faunal collections for meeting protein requirements.**
- **Loss of Soil cover due to degradation of forest cover in 40% of the State' s managed forests and inadequate emphasis on Watershed Management.**
- **Problems with natural regeneration of Sal forests.**
- **Repeated man made fires.**
- **Epidemics affecting forest strands and fauna.**
- **No comprehensive land use policy.**
- **Inadequate investments in the forestry sector.**
- **Resulting in Loss of productivity, lowering of water table & change in drainage pattern in the forest areas due to Mining activities.**

Bastar, Dantewada, Kanker, Korba, Kawardha, Bilaspur, Jashpur, Raigarh, Surguja and Manendragarh districts are rich repository of biodiversity and incidentally rich in minerals also. With the increasing demands on the "mining sector", mining activity would be a serious threat to Wild biodiversity.

Manendragarh, Surguja, Jashpur, Korba, Bilaspur and Raigarh districts of the State have witnessed installation of thermal power plants, and many more such plants are in the pipeline. The thermal emissions and fly-ash would pose a serious threat to Wild biodiversity.

ROOT CAUSES OF LOSS: -

- Difference in perceptions between primary and end users regarding exploitation of bio-resources.
- Lack of awareness regarding sustainability of Bio-resources amongst users.
- Weak enforcement of preventive laws.
- Profit motives taking a priority amongst middle men of NTFP and other produces
- Breakdown of traditional C.P.R. based institutional regimes due to various policy interventions.
- Indiscriminate and destructive exploitation of Bio-resource engraved in certain cultural practices like shifting cultivation, Commune-hunting (parad), Use of saplings as fuel wood for cooking, rearing of unproductive livestock primarily for social status & its unregulated grazing.

PROTECTED AREAS (PAs): -

The Threats detailed above hold good for Protected Areas also, but some causes that need special mention with respect to PAs are listed below:

P.A. NETWORK THREATS

1. **Impending settlement of rights and rationalization of boundaries.**
2. **Small size of PAs degradation and fragmentation of corridors in between them.**
3. **Increasing ecological isolation of PAs, leading to genetic separation and loss of biodiversity and genetic vigor.**
4. **Poaching**
5. **Increased craze for wild fauna meat by urban population.**

THREATS TO MATERIAL OF TRADITIONAL HEALTH CARE – (Medicinal Plants Diversity)

- **Traditional healing knowledge has largely remained undocumented. It has been observed that even leaching down of this knowledge into next generation has been quite rare. Therefore, these traditional skills are doomed to get lost even faster than the herbal plants themselves.**
- **Traditional healing in distant forest areas has come under pressure by introduction of synthetic Tablets/ Capsules. This course of events has greatly affected the prestige of local healers. Thus, existing and often equally effective traditional equivalents have been forced into disuse and oblivion.**
- **The continuing disruption and loss of indigenous cultures, which often hold the key to find new medicinal plants.**
- **Natural drugs and medicinal plants along with other NTFP' s already yield important economic returns. They compare favorably in monetary terms with cash cropping; and thus contribute in providing better prospects for its non-sustainable use.**
- **Destruction of natural habitats due to the growth of settlements, biotic pressures; diversion of wild lands for various kinds of development projects; excessive use of chemical fertilizer and pesticides in the adjoining croplands.**
- **Lack of proper resource inventory and mapping so as to obtain a clear picture of the available medicinal plants in different parts of the State along with their existing regeneration status.**

- **Unavailability of suitable agro-cultivation techniques especially in rain-fed conditions for some of the medicinal plants for viable commercial cultivation.**
- **Virtual non-existence of appropriate & strong intellectual property rights regimes to safe guard the interests of local tribal.**
- **Lack of documentation of non-sustainable & destructive ways of exploitation of herbal plants by.**
- **No forward or backward positive linkage between primary producers and the end users.**
- **No value addition in herbal plants takes place and only the raw material is being over exploited by the users without any investment on their part for the conservation and development of medicinal plants.**
- **Medicinal plants suffer from ecological scarcity due to their endemic nature. They also suffer from economic scarcity due to (i) non-availability of substitutes (ii) the type of diseases/ disorders cured**
- **The transaction costs of educating the public with regard to medicinal plants are prohibitive since (a) cost of convincing the public regarding the medicinal value of plants native to their habitat and (b) cost of educating regarding uses of medicinal plants are both colossal.**
- **The survival value of medicinal plants and their knowledge is directly related to the survival value of common property resources.**
- **The demand for medicinal plants is the factor (derived) demand for medicinal plant products.**
- **It is not as much the physical availability of medicinal plants as the knowledge of medicinal plants (source of availability, identification, recognition, belief and end use) which is eroding and vanishing.**
- **Natural factors – forest fire, grazing and other calamities- are the causes of degradation of medicinal plants in the heavily wooded forests rather than anthropocentric forces.**
- **Majorities of the weeds in non-forest areas have medicinal properties, till date which are not gathered to augment the supplies of medicinal plants and incomes of farmers.**
- **Majorities of the endemic medicinal plants are economic substitutes for other medicinal plants.**

- **Only a fraction of tropical flora has been thoroughly analyzed for their pharmacological activity.**
- **Traditional healing in distant forest areas has come under pressure from novel diseases such as influenza and tuberculosis, that have often revealed the superiority of white man' s capsules.**
- **Replacement of plant products by chemical drugs in the mainstream medicine .**

THREATS TO WET LANDS: -

- **All aquatic systems, being an integral part of their watersheds, receive their water moving through the surrounding terrestrial landscape.**
- **Without their respective watersheds, the waterbodies have no existence. Further, all watershed- based human activities exert demand on water and or contribute to the degradation of water quality (influx of silt, nutrients and other pollutants from land with surface or subsurface runoff) and affect the amount of water in the system through reduced flows and increasing siltation of the water body.**
- **Multiple uses and demands on water differ from the multiple uses of terrestrial resources. Many of the multiple uses of water are quite incompatible with each other. The demands for various uses are often met without proper allocation.**
- **Consumptive uses such as drinking water supply, irrigation and industrial use adversely affect the availability (e.g. for fisheries, and hydropower generation) besides degrading the water quality indirectly (waste inflow/discharge).**
- **Non-consumptive uses such as fisheries and aquaculture, bathing and recreating, and transport render the water quality unfit for drinking supplies and increase the costs of treatment,**

As it would be evident from the flow diagram given below; these multiple demands on water have direct consequences for the availability and quality of water for all the biological resources.

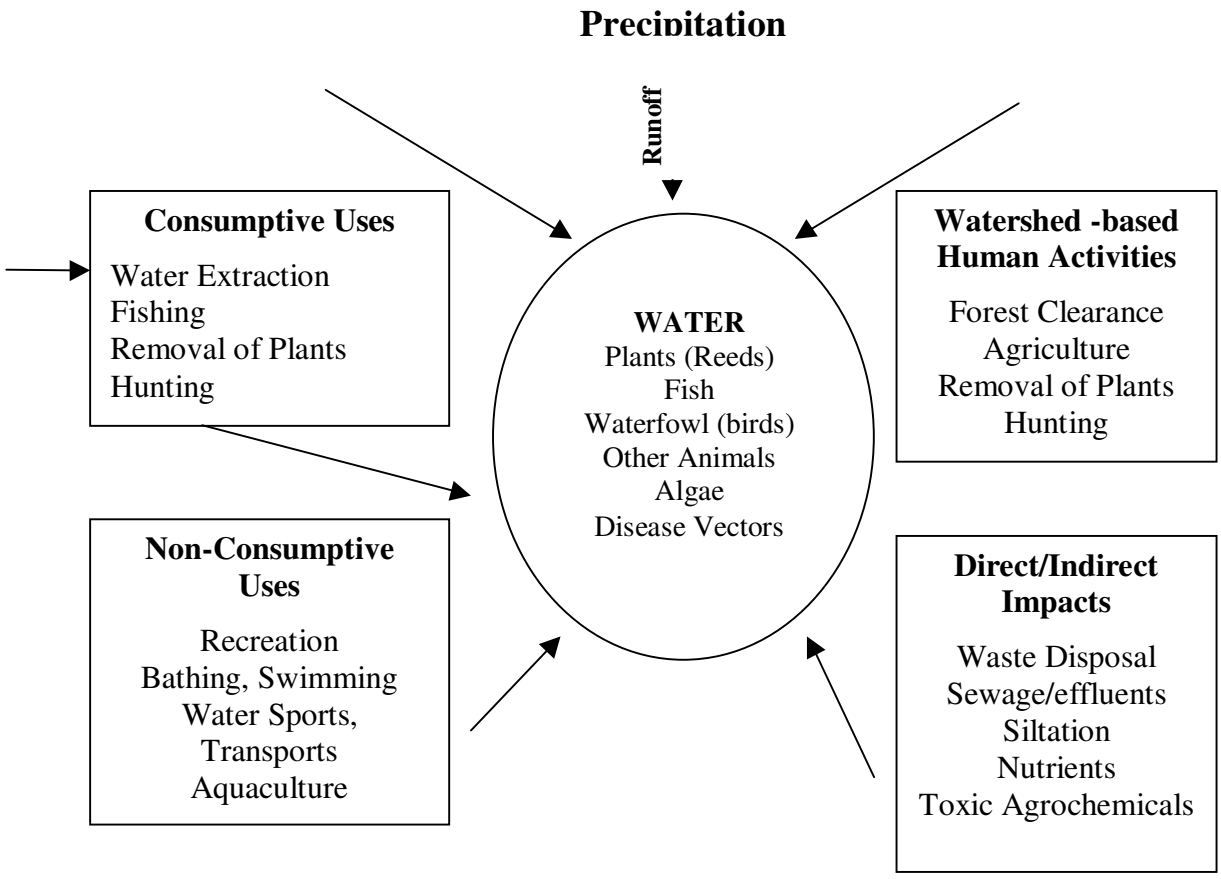

Fig: 4.1.

Impacts of consumptive and non-consumptive uses of aquatic resources and the human activities in their watershed on various aquatic resources

- **All Water-bodies are subjected to natural processes of change, though over different time scales. The ponds get filled with incoming sediments and organic matter and become shallower or turn into dry uplands. Rivers often meander due to the deposition of alluvial mineral matter, leave cut-off portions of their channels, and sometimes change their course completely.**
- **However, various anthropogenic activities in and around the waterbody and in the entire watershed cause rapid degradation and loss of these aquatic resources (Gopal 1995).**

- **Rapid losses occur by draining and/ or filling of the waterbody in order to reclaim land for economically more lucrative uses (residential, industrial and commercial).**
- **Diversion of flows for irrigation, channelization and construction of dams have converted the rivers and streams into reservoirs or dried them up. These activities directly reduce the river floodplains and alter their vegetation and fauna.**
- **Intense human activity, especially deforestation and agriculture, on a large scale throughout the watershed of the waterbody results in the erosion of sediments and increased runoff which carries the nutrients and other agro-chemicals to the waterbodies. This leads to their rapid siltation and eutrophication with consequences for both the aquatic plant and animal communities**
- **Over-exploitation of resources, particularly of biological resources such as food, feed, fibre and fuel, causes not only degradation of other aquatic resources but many organisms may be lost for ever. Overgrazing by domestic cattle adversely affects the stream bank integrity, increasing siltation and runoff with a consequent loss of fish in the river**
- **The disposal of partly treated or untreated domestic sewage and release of toxic industrial effluents (also other organic and toxic wastes) especially from open cast Coal, Iron & Bauxite Mines affect the water quality and the organisms. The eutrophication often results in excessive growth of undesirable aquatic vegetation which has adverse consequences for many uses of the aquatic resource.**
- **The waterbodies often support a variety of organisms (Insects, molluscs, leeches, etc.) which are vectors of important human pathogens. The use of herbicides and pesticides to control nuisance growth of weeds and disease vectors within the waterbody and or in its watershed is another major cause of degradation.**

THREATS TO SACRED GROVES – (Source: Malhotra K.C. and field observations in Jashpur Distt.)

This ancient and wide spread institution shows signs of weakening in terms of both cultural and biological integrity in of the State. The nature and extent of threats are often region- and even grove- specific, as summarised below:

- **Commercial Forestry:** Over the past two centuries, in many parts of the country the local people have lost their customary rights of forest management to the government. Many sacred groves were destroyed under commercial forestry operations.

- **Development projects:** Some of the sacred groves that fell under government vested lands were destroyed when townships grew. Railroads and high-ways have also taken the toll of many sacred groves. Others disappeared under mining and industrial operations. Still others were flooded by big dam projects.
- **Shift in belief system:** In some cases, conversion to other religions has resulted in the degradation of sacred groves.
- **Pilgrimage and tourism:** The integrity of many groves has suffered due to the influx of large number of pilgrims and tourists.
- **Removal of biomass:** In many sacred groves, removal of biomass and cattle grazing is permitted. in some selected areas Continuation of these practices over generations has resulted in the dwindling of the groves.
- **Encroachment:** Many instances are reported where groves have been encroached by local communities for change of belief and / or by various government line departments as well as by people migrating from out side.
- **Modernisation and market forces:** The most recent threat to scares groves comes from the process of modernisation. Local traditions are being challenged by westernised urban cultures. Modern education system fails to instil respect for local traditions. As a result, the institution of sacred groves is losing its cultural importance for the younger generation of local people . The spread of market economy has resulted in the denial and erosion of separate identities of local communities. The lure of short- term commercial gains has prompted destruction of traditional resource base, including the sacred groves.

ROOT CAUSE FOR DECLINE OF BIODIVERSITY IN CPRs

- Erosion of Social sanctions and community authority to protect common resources, regulate their use and develop them.
- Village panchayats failed to ensure people' s participation for common resource management.
- Disregard of local knowledge and institutional factors, user needs and perceptions.
- Common pool Resources development as part of development projects, decided by state agencies with no local stakes.
- Acceptance of CPRs as open access resource i.e. no collective efforts to enforce user obligations, regulations.
- Opportunity cost of labor lower than value of products of degraded wetlands.
- No other private cost involved of resource use.

- Rehabilitation and sustainable use of C.P.R. becomes more difficult especially when the policy environments and the present process of economic transformation are not congenial for them.
- The means of alternative sources of livelihood are not expanding rapidly enough to take the pressure off the land.
- "Exogenous" development with outside commercial interests being the agents of development – a process of commoditisation of a collective resource used earlier outside the market frame work takes place.
- Loss of " Social capital ability to act jointly ".

THREATS TO DOMESTIC BIODIVERSITY:

- Over emphasis of Govt. policies on introducing high yielding varieties and improved farming practices.
- Increased use of fertilizers and pesticides leading to decline in Agro-biodiversity as well as adjoining wild Biodiversity.
- Development of uniform cultivars, grown in uniform environments. The spread of these cultivars is leading to an erosion of primitive crop genetic variety.
- Scientific community doesn't gather enough feed back from grass root level regarding efficiency of local crops.
- Small land holdings.
- Lack of crop security from domestic livestock & thus find single crop of rice is the best alternative.
- Tribals being poor cannot afforded to use modern technologies of cultivation.
- Traditional cultivation of tubers and vegetables is losing ground since being sensitive to various fungal diseases, quality & quantity is under threat.

THREATS TO LIVE STOCK:

- Small holders rarely apply scientific technology for breeding, feeding, health care, or management. There are unable to isolate or suitably care for sick animals.
- The farmers control the feeding or movements of their animals. Thus, the animals are exposed to diseases and environmental stress.
- A number of technologies that are technically feasible under experimental conditions do not find wide acceptance among the final users because a majority of **the users are** either

unaware of the technologies or unable to meet the requirements to make the technologies a success.

- High cost of available technologies.
- Lack of training in the proper use of technology.
- Absence of field-testing and refinement of technology.
- Inadequacy of veterinary facility for livestock in rural areas.
- Lack of adequate, organized processing and marketing facilities for animals product.
- It is tribal dietary habit to consume meat in their food. So their animals serve as a source of flesh to them and not to mention, as the source of animal protein.
- The livestock and birds are the source of cash to the tribals at the time of economic crisis.
- Tribals are reluctant to consume cattle / buffalo milk and they rear cattle for obtaining bulls for draft purpose and to some extent flesh and skin. This indicates that they are not utilization animals full potential. They are either ignorant or not concerned about sale value of milk.

THREATS TO GROUND WATER -

- Due to shift in water use from dug wells to hand pump/ bore well the management of dug wells is neglected. Most of the dug wells are unused or underutilized and are converted into dustbin. The dug well due to bad management either collapses or filled by domestic waste, becoming a source of pollution in shallow zone/ ecosystem. This is equally true for urban and rural areas.
- Dug wells not under use for considerable period get clogged as there is no circulation of water making it a storage of stagnant water, breeding germs and insects.
- In the absence of firm legal measures, large number of irrigation wells are being drilled with close spacing, causing interference and induced cone of depression. This leaves the shallow hand pump zone dry in the area of higher discharge.
- Spring water is a good source of drinking and irrigation. Springs are poorly managed presently in the state. Construction of proper outlet channel and storage system downstream at least in perennial springs provides energy free source of good quality water in the state at many places.
- Mining of economic and non-economic minerals beyond water table or sub surface mining (as coal) causes heavy pumping. Since mining comes under separate ministry, the lack of coordination or law enforcement is noticed in mining sector.

CHAPTER – V

STAKE HOLDERS/ACTORS AND THEIR ROLES RELEVANT TO BIODIVERSITY

INTRODUCTION: -

Actors and Stakeholders are two separate categories of people with almost identical impact on bio-resources. The only difference between the two is the cause that initiates impact on bio-resources. Reason for Govt. institutions could be the mandate the policies have, for the improvement of the productivity of the bio-resources for welfare of people; whereas for NGOs it could be the sharing of knowledge by creating awareness amongst locals; for Head loaders, Grazirers, NTFP Collectors, it could be a question of survival and for private sector it could be the sheer economics at the cost of environment. So in Bio-diversity parlance, the two categories seem to be interchangeable. To enhance or to control any Biodiversity related activity, we need to analyze the acts of actors / stakeholders responsible for it, so as to appraise the pace of conservation of bio-resources first, and then to ensure its sustainable utilization for the livelihood securities of actors itself.

NATURE OF ACTORS: -

Actors are of two types: Actors of First category are those who support and participate in the conservation of the Biodiversity of an area and Second category are those, whose acts cause degradation of biodiversity.

While planning for the conservation and utilisation of bio-resources, roles of both the categories need to be analyzed. The Actors of 1st category would provide lessons for the policy makers to prepare legal and policy frame work for the active participation of these Actors; where as unsustainable activities of IInd category of Actors need to be documented; and then controlled through mass awareness. Both these categories have been dealt below but let's analyze the IInd category first.

Irrespective of loss of Bio-resource in terms of quantum & diversity; the IInd category actors can create loss either almost immediately, or after a lapse of time. These Actors must be dealt in the tone they exist. We can subdivide them into.

(A) Direct

(B) Indirect

(A) Direct: - Whose acts degrade BD directly and immediately. These acts if continued uncontrolled for a long time, would show definite ill-effects and

(B) Indirect: - Whose acts though seem to be totally harmless as on today but are definitely going to create threat to the concerned bio-resource in near future.

Some of the Actors responsible for their negative impact on Biodiversity under various ecosystem both directly or indirectly are enlisted in Table 5.1: -

Table- 5.1.

Ecosystem	Component of System	Actors	
		Direct	Indirect
A) Wild	Forests, P.A. Network; Grass lands	Head Loader, Encroacher, Grazier, Low cost labour involved in illicit felling, Forest based rural populations; Commune hunters and mining & mining based industries.	Developmental agencies esp. PWD, Irrigation, Industries & Power.
	Herbal plants and NTFP.	Local healers, Herb-Collectors, & NTFP collectors.	Kochias (link-men of Herbal plants NTFP), shop keeper of rural areas, Directorate of Indian Systems of Medicine, Herbal based National & Multinational. Companies through their agents.
	Entomology	Insect-eater community	Government Deptt.
	Ornithology	Pardhis	Government Deptt.
B) Domestic	Agro-Biodiversity	1. Agriculture Deptt. 2. Scientific Community. 3. Farmers	Pesticide/insecticides suppliers & Mandi Management.
	Livestock	Society (For Social Customs regarding Live-stock); Deptt. of Animal Husbandry	Contractors, Scientific Community.
C) Aquatic	Wet-lands	Fisheries Deptt., Fishermen	Contractors, Consumers, Scientific Community.
D) Hill		Graziers, Mining Industry, Shifting cultivators	Deptt. Of Soil Conservation; Rural Development, Rural Engineering Services; Panchayats.
E) Subterranean		Scientific Community, Bio Pirates	Tourists

SWOT ANALYSIS OF DIRECT ACTORS
(Whose acts affect BD directly)

Strength	-	Nearness to bio-resource.
	-	The first stakeholder.
	-	Can be most effective agency for any task being performed in the area.
	-	Protection of the linked bio-resource can be addressed best
	-	Can be the best judge for the fluctuations in quality/quantity of bio-resource of the area.
Weakness	-	Dependent to such an extent on the bio-resource, that even over-exploitation of BD seems to be perceived as a survival need.
	-	Non-access to the various welfare programmes being performed by local government.
	-	In general lack of awareness.
	-	Economic status of the category is subsistence; thus are very prone to small incentives given by local smugglers.
Opportunity	-	If these stakeholders can be involved in planning & implementation, task can be completed early. Awareness in these actors can be very useful for protection of BD of the area.
Ex. Forest Ecosystem Threats	-	Head loaders fell the promising pole crop and the established regeneration.
	-	Graziers become the agency for trampling of unestablished regeneration.
	-	Forest land encroachers (Inclusive of shifting cultivation), use the most fertile forestland & accelerate the pace of soil loss pushing the area to be barren.

CROSS-SECTORAL INTEGRATION OF THREATS TO BIO-DIVERSITY: -

Certain key Government organisations, whose individual acts influence biodiversity, have been discussed in tabular format from Tables.

Table- 5.2.

Actor: - Agriculture Dept.

Its role in the Context of BD Conservation	Ongoing activities that have influence on BD	On going activities that have negative effect on BD	Root causes of loss of BD	Actions/goals proposed that could help in achieving Conservation of BD	Indicators
1	2	3	4	5	6
Promotion to Increase Agriculture production	• Introduction of Integrated Pest management System on pilot basis in the district	• Thrust on chemical farming and HYV seeds and crop monoculture has progressively reduced soil fertility, destroyed soil biota; increased nutrient deficiency in soil, has contaminated waterways. • Crops monocultures have led to increased crop susceptibility against the attack of pests. Overall effect has reduced diversity of crops as farmers in good number of villages abandoned a wide variety of traditional crops in favour of HYV and monoculture has led to increased dependency of farmers on outside support. • Loss of folder due to non	Monolithic management (Centralized population dynamics related to resources, intolerance towards consumption habits; global issues, Money market. Attempt to find as nick fix rotation leaders to devaluation of traditional cropping pattern.	Switch over to organic farming in the areas in the district with rich local bio-diversity treasure: • Documentation characterization & selection trials of local BD. • Introduction of registration system for encouraging protection of local land races and incentive system must be generated for in-situ conservation. • IPM be applied. • PDS be analyzed for local crops. • Decentralization of local seeds. • Strengthening Community seed banks. • Community awareness movements.	• Understanding the loss of Agro BD. • National priorities be linked with global issues.

(Table5.2.....Continue)

Its role in the Context of BD Conservation	Ongoing activities that have influence on BD	On going activities that have negative effect on BD	Root causes of loss of BD	Actions/goals proposed that could help in achieving Conservation of BD	Indicators
1	2	3	4	5	6
		cultivation of Coarse Grain Crops. • Loans and insurance are not available for coarse grains.		• Higher Minimum support price for the local crops especially millets, pulses etc. • Reorient the current cropping pattern in the State. • To put the traditional crops like millets at par with paddy and give proper remuneration. • Greater emphasis on development of the allied sectors, especially animal husbandry. • Improving productivity through extension services Provide access to information – ➢ Agriculture biotechnology- ➢ Education and Training, Research and Development. ➢ Irrigation and water management.	

Table-5.3

Actor: - Veterinary Deptt.

Its role in the Context of BDC	Ongoing activities that have influence on BD	On going activities that have negative effect on BD	Root causes of loss of BD	Actions/goals proposed that could help in achieving COB	Indicators
1	2	3	4	5	6
Have the mandate to provide support for animal heath and increase in production of animal products	Health care being provided by the deptt. to the animals.	Thrust on increase in milk production in cattle has reduced the diversity of races and the variety of livestock adapted to the local conditions. Focus on exotic birds in poultry.	• Livestock being maintained for social status & not as a BD resource. • Stress on Single species production processes or on promoting a handful of genetic varieties across large areas have led to erosion of livestock.	• Need to bring back the focus on the indigenous breed to increase milk production as well as betterment of draught power of so called non descript breed in the distt. • Introduction of time bound programme to characterize local livestock.	• Vigour of grazing lands. • Vigour of livestock. • Awareness for upkeep of local livestock in public.

Table-5.4.

Actor: - Fisheries Deptt.

Its role in the Context of BDC	Ongoing activities that have influence on BD	On going activities that have negative effect on BD	Root causes of loss of BD	Actions/goals proposed that could help in achieving COB	Indicators
1	2	3	4	5	6
Provide fingerlings and fish seed to stock the artificial and natural water bodies so as to increase fish production.		• Excessive focus on carps • (both major and minor) thereby undermining the diversity of local indigenous fish fauna. • Restocking of natural streams with the carps can seriously hamper the diversity of aquatic fauna.	• Fishes considered only to be food not a component of aquatic BD. • Local germplasm conservation not taken as priority.	• Help the aquaculturists in obtaining the proper seeds for stocking. • Help the aquaculturists in transporting and marketing of the aquaculture products. • Essentially the species must be protected during their breeding season. • Observation of the breeding / close seasons. • Hunting / Fishing strictly prohibited in the " Sanctuaries. "	• Knowledge of sustainable harvesting limits of aquatic fauna to locals.

Table-5.5.

Actor: - Mining and Mining Based Industries: -

Its role in the Context of Bio-Diversity Conservation	Ongoing activities that have influence on Bio-Diversity	On going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-Diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity	Indicators
1	2	3	4	5	6
Being the integral part of the State' s Industrial Activity but at the same time if not controlled can cause irreparable damage to B.D.	Demand for B. D. rich forest lands is increasing substantially after the State formation for both mining and mining based industries without systematic E.I.A. of Individual projects.	1. Release of toxic effluents both in Air & Water . 2. Seriously affecting the regeneration status. 3. Clear felling the forest areas for open cast mines is the most serious threat to B.D. loss for ever.	1. 44% of geographical areas of the State Under forests. 2. Most of the mineral rich areas are also B.D. rich areas.	1. Eco fragile Zones for no-mining or mining related Industrial activity to be declared. 2. E.P.A. regulations to be strictly enforced with deterrent actions on violation. 3. Introduction of Green Eco-friendly Mining Technologies. 4. Hills above 750m elevation be declared sanctum sanctorum for any development activity. 5. Powers of EPA monitoring be given to Nodal Officer, FCA, 80.	

Table-5.6.

Actor: - Forest Department

Its role in the Context of Bio-Diversity Conservation	Major ongoing activities that have influence on Bio-Diversity	Major on going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-Diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity	Indicators
1	2	3	4	5	6
Being the store houses of maximum Biodiversity in the State, it' s conservation, improvement in productivity and its ecologically sustainable management holds the key to the preservation of BD.	• Being managed by highly skilled officers • People' s participation being pursued vigorously. • Linkage of forest BD with the livelihood security being ensured in new State' s Forest policy & as well as in its implementation.	• Increased human population leading to increased demand for timber & fuel • Increased livestock population with no Commune grazing; cause greatest impact on natural regeneration of forest area. • Encroachments on forest lands for sustenance. • Diversion of forest lands for non forestry purposes esp. Mining & Power • Non sustainable exploitation practices adopted in the collection of NTFP' s & Medicinal plants.	• Breakdown of C.P.R. regimes & Institutions due to population pressures. • Inherent Non-sustainable Bio-resource exploitation practices. • Heavy economic dependence on C.P.R.	• Forest considered an environment treasure: People and stakeholders partnership in management part assured. • Forest Policy already amended. • Allotment of funds for trust building activities in the villages vicinity to forest. • Allotment to every components of working plan. So, as to ensure regeneration. • Establishment of People' s Protected Areas.	1. Increase in Forest cover per unit area 2. Improvement in regeneration status of both micro & macro flora & fauna. 3. Improvement in species diversity 4. Reappearance of endangered & threatened species.

Table-5.7.

Actor: - NTFP & Medicinal Plants based Health Care.

Its role in the Context of Bio-Diversity Conservation	Ongoing activities that have influence on Bio-Diversity	On going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity	Indicators
1	2	3	4	5	6
Linked strongly with livelihood security so can act as mean to conserve Bio-Diversity.	• Regulations for collection and reimbursement of produces • Collection done by local residents only	• In discriminate exploitation of raw material with less time for recupement. • Traditional Health care system receive marginalized policy and financial support from national agencies, either for conserving its bio resources or for maintaining its indigenous knowledge base.	• Govt. policy ignoring role of MFP as inevitable component of silviculture & environment. • No systematic exploitation plan for NTFPs. • No legal barriers to ban middlemen. • Lack of political will. • Market Strategy not available. • Traditional carriers of folk medicine based health traditions maintained the knowledge as on oral tradition purely empirical in nature.	• Creation of P.P.A' s. • Documentation of available microflora. • Involvement of local communities in Conservation & then utilization of these microflora. • Creating awareness first & then stopping exploitative & Unsustainable Harvesting practices. • Declaration of Green & Red Species. • Introduction of Deferred Rotational exploitation. • Creating Markets for preventing exploitation. • Need for greater Ethno-botanical Research for the Discovery of new Crude Drugs. Recognition of Indigenous Intellectual Property Rights	Improvements in the status of NTFP' s & other medicinal plants in individual units.

(Table5.7.....Continue)

Its role in the Context of Bio-Diversity Conservation	Ongoing activities that have influence on Bio-Diversity	On going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity	Indicators
1	2	3	4	5	6
				• Documentation of availability of similar active plant components among different species so as to delimit the use of threatened species by identified substitutes.	

Table-5.8.

Actor: - Protected Area Management

Its role in the Context of Bio-Diversity Conservation	Ongoing activities that have influence on Bio-Diversity Conservation	On going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-Diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity	Indicators
1	2	3	4	5	6
• Special status provided to the protection of flora and fauna • Store houses for the rich flora and fauna diversity • Predominantly inhabited by highly ecosystem-dependent people.	• Over emphasis on protection alone • State Govt. involved in sacrificing notified PAs • A centralized, bureaucracy-dominated approach to conservation. • The central Govt. in unable wield its environmental clout as before due to new political dynamics.	• Habitat manipulation in PAs prohibited leading to loss of Biodiversity • Govt. controls are generally loosening under the impact of private corporate sector. • Man – Wild fauna conflicts on the rise • Neglect to faunal BD in the non-PA areas.	• People living inside PAs and on its fringes have been denied access to the resources inside PA. • Restrictions on hunting have denied communities a means of self-defence against wild animals which attack livestock or humans and damage crops. • Neglect of the enormous knowledge of ecosystems and wildlife that local communities have. • Conventional conservation dogma has not even been based, often, on sound scientific grounding.	• A blanket policy for total ban on any human intervention either way is unscientific and potentially detrimental to conservation objectives. • Need to protect both wild life and human rights • To rationalize displacement of communities inside the PAs in the name of conservation. • To protect threatened species even against use in traditional practices. • Ensure sustainable livelihood rights. • The substantial knowledge among the villagers could be critical in batter management of PAs. • Far more openness is needed in the official system to recognize existing institution amongst local communities, and strengthen them towards meeting the needs of conservation and livelihood security.	• Improvement in the Floral and Faunal diversity • Improvement in the habitat • Improvement in the rapid development of peripheries of PAs.

Table- 5.9.

Actor: - Urban Population/ Department/Mission concerned with water uses (eg. watershed mission, RES Deptt., Agriculture Deptt.)

Role of actor in Context of Bio-Diversity Conservation	Major ongoing activities that have influence on Bio-Diversity	Major on going activities that have negative effect on Bio-Diversity	Root causes of loss of Bio-Diversity	Actions/goals proposed that could help in achieving Conservation of Bio-Diversity
1	2	3	4	5
Linked with water of surface as well as Ground water	• Availability of water for crops. • Water availability for natural Bio-resources • Augmenting under-ground water for domestic purpose. • Gram Panchayats are working for management of surface water	• Lack of full proof policy as regards Ground water usage. • Unplanned unjustified usage of water. • No legal checks on excess water use • Lack of proper level of awareness in public.	• Unsustainable harvest practices • Water, Not in priority of civil society. • Policies & laws not prioritizing the issue • Over-centralization of decision-making. • Lack of administrative coordination.	• Agriculture department to coordinate with the GW Board and to collect advice of harvest calendar. • Strict law enforcement on Ground water matters.

DISCUSSION ON SOME SPECIFIC ACTORS: -

MAJOR ACTORS IN GROUND WATER DIVERSITY: -

Water forms a life line for all living beings. Ground water is the main source of drinking water in the state. It has involved individuals, Governmental and non-governmental organizations, industries and other sectors both in urban and rural areas. The Rabi crop in the state is mainly dependent on the ground water. As stated earlier, the canal system in the state is supporting the Kharif crop only. The tanks and other surface water sources have only limited and site specific potential. The omni presence of ground water has made it a common commodity for use by one and all.

Water being the state subject is governed by state government agencies. The various government organizations involved in ground water sector in the State are:

- **Development related Agencies: -**
  - (i) Ground Water Survey Division
  - (ii) Rajiv Gandhi Watershed Development Mission
  - (iii) Rural Engineering Department
  - (iv) Agriculture Department
  - (v) Janpad Panchayat/Nagar Panchayat/ Municipalities/Municipal Corporations
  - (vi) Forest Department
- **Environment related Agencies: -**
- **Law Enforcement Agencies: -**

SCIENTIFIC COMMUNITY: -

Obviously, Scientific Community of any nation has a professional mandate of improving the economic scenario of the motherland. The local genes, whether of animals or plants are crossed with genetically modified genes to enhance the quality of local genes to boost the economy. Govt. of India, as well as State Policies dictated that Economics in case of Agriculture, Livestock & other domestic BD components should have an upper hand than the conservation of local germplasm. This has endangered the local varieties and we have many examples of local varieties getting extinct. No doubt some times, such scientific experiments enhance the power of persistence of local genes too. Research in these components had not been focused on the documentation, identification of local BD' s strengths.

POLITICIANS: -

Lack or existence of strong political will, can create or harm a Biodiversity friendly environment. These actors if sensitized optimally can build effective laws, acts, and regulations to protect the B.D. These actors through strong influence on their voters along with their own in-depth knowledge of B.D. related issues; management problems; can play an all-important role in B.D. Conservation.

CIVIL SOCIETIES: -

Govt. of Chhattisgarh has already drawn an ambitious programme to involve Community Based organisation (CBOs) and NGOs in preparing " Jan Rapats".

In the forth coming World Bank Project on community participation in the forestry sector, the participation of civil society in planning, generating mass awareness as well as implementation of the certain components of the project has already been envisaged in the Policy.

DOCUMENT: -

The CBSAP in all its proposed strategies for various Biodiversity components in Chapter-VIII has clearly depicted the role of Civil Society wherever he necessary.

It is being observed that certain Citizen groups and NGOs tend to demand the execution of certain people based performance, which are highly technical in nature. The State needs these organizations to play a role in the mass awareness programmes launched by the State Govt. since these agencies with their committed and motivated workforce are better equipped to execute this job and government personnel are neither trained adequately in this field, nor have a prioritized mind set for this job.

LOCAL COMMUNITIES: -

The State has a rich traditional culture, wherein the local committees have been playing a major role in the conservation of bio-resource by developing informal but participatory institutional mechanisms. But over a period of time, due to the population pressures and shrinkage of natural resources, the perception of the local communities has seen a changed mindset. The result has been the ecological poverty and the local communities' alienation from the bio-resource. This has resulted in conversion of many of these communities into actors, whose mindset is purely economic, and thus leading to destruction or over exploitation of these bio-resource.

Local healers, NTFP collectors, graziers, and kochias are actors, whose profit- oriented activities are potential danger to the conservation of the Bio-diversity.

But at the same time certain policy **initiatives like JFM**, profit sharing in **NTFP collection** with the collectors themselves, and Pani- pachayats etc. have rejuvenated the **conservation** oriented mindset of these communities and the **results are to be seen every where**.

EVACUATION OF FOREST ENCROACHMENTS BY SOCIAL PRESSURE.....: -

This is an age- old practice of encroaching forestlands illegally, for cultivation by the small farmers and landless persons, since the fertility of these forestlands is excellent. The Forest Department, while implementing people participation programme of JFM through VFC & FPC has started motivating the committees to take up the job of protecting and rejuvenating their allotted forests to an extent not seen in the recent past. This is visible in the excellent achievements made by the FPCs in South Kondagaon Division of the State.

In this division, more than 11 acres of forestland in Compartment No. P-773, 9 acres of forestland in Compartment No. 934, 25 Hact. of forestland in Comptt. No. P 922 and 10 Hact. of forest land in Comptt. P 756 were illegally encroached by 9, 4, 13 and 4 encroachers respectively. The department taking legal action against these encroachments issued Preliminary Offence Reports (PORs) and these cases were taken to the Court of Law also. Hon' ble Court of Kondagoan ordered a fine of Rs. 200/- each on the 9 encroachers of Compartment No. P-773 and incase of non-deposit of the fine, a simple imprisonment for one month. Surprisingly all the 9 encroachers deposited fine of Rs. 200/-each.

In this backdrop seeing the encroachments not being vacated, the initiative were taken by FPCs Baniyagaon, Botikanera, Sonabaal, Mawdiguda to create an environment to get these encroached lands vacated and plant up these vacated forest lands. On Jan3rd to Jan5th 2002, and again on Feb 4th to7th 2002, the encroachments were evacuated by FPCs members of Baniagaon and Botikanera with the active participation of the forest deptt.. Mr. R.K. Tiwari Range Forest Officer, Kondagaon was the spirit behind motivating the FPC members. There was a strong resistance by the encroachers even leading to law and order situation many a times.

On many occasions, the efforts of the FPCs were met with violent crowds of encroachers especially by the female encroachers, Sukdai Bai notably being the most active female member. This did not deter the samiti members who, along with the support given by the forest department; finally succeeded in convincing the encroachers to vacate the forestlands.

Overall 115 Hact. of forestland illegally encroached by villagers, has been evacuated by the FPCs of South Kondagoan Division. This whole exercise of evacuation had active political support from M.L.A. Bhanpuri Mr. Antu Ram Kashyap, Mr. Madan Poyam, Janpad Chairman Kondagaon, and Mrs. Vedvati Markam and Mrs. Neera Netam, both members of Jila Panchyat, Jagdalpur.

Doodgaon 29-12-2001

Doodgaon 29-12-2001

Doodgaon 30-01-2002

Doodgaon 30-01-2002

Botikanera 07-02-2002

Botikanera 07-02-2002

Botikanera 07-02-2002

Botikanera 07-02-2002

WHERE THERE IS A WILL, THERE IS A WAY.....:-

(Creating Irrigation Facilities in 150 acres by diverting the flow of Dangarh Nala.)

In order to fulfill the mandate of welfare State, the State government usually launch programmes for the people of the land. But, there are still committed and dedicated people who are work alcoholics and excel in commune jobs irrespective of govt. initiatives.

Shri. Brijlal Sahu, an eminent personality of the village KUDARI DALLI of Durg district, is one such person. In 1964-65 KUDARI DALLI had a population of 650 with most of them belonging to disprevileged class. Village of KUDARI DALLI faced a severe draught in 1964, when Sahu was a young fellow. He offered to divert the channel of Dangarhnala towards their fields.

The rest of the village made a mockery of his wish. But he started this hard task, by building a country bund extending from mid hill area upto the bank of nala. From this country bund, drains made up of twigs, bamboos with leaves of teak pasted with clay, were used to transfer water from Dangarhnala to the fields of " Kudaridalli". These drains were maintained by changing the biomass based skeleton every week.

During the first decade, only 20 acres of land got irrigated. Later with increasing participation by fellow villagers, area under irrigation increased till 1986. It was then, when villagers started thinking of diverting the flow of Dangarh Nala , for which a dam from the center of the hill to one corner made up of boulders was constructed. Then slowly the process of bifurcating the hill was started in such a way so that the water so diverted gets distributed through channels connected upto their fields. Shri. Jhumuklal,(70) says "Without using new modern techniques, villagers with the help of conventional techniques only, cut the hill to ease the water-way. No explosives were used to blast the hill".

Villagers of KUDARI DALLI completed the task by spending Rs. 13 lakhs in last 4 decades,(Starting from the year 1964) which is approximately 1/8th of the normal government budget required to do the same physical task. According to National Agriculture Board for Rural Development (NABARD) sources, an expenditure of more than Rs. 75000/- per acre is needed to create irrigation facilities. In the year 2000, the villagers have converted the original temporary country bund into masonry one. The overflow from the masonry dam has been directed towards the original nala to recharge the ground water.

URBAN SOCIETY: -

Generally it is seen, that this sector of the society, either do not have time to ponder over the environmental issues, or have adopted a life style which is more materialistic in nature which exerts stress on the delicate environmental balance.

Many of the activities like- excessive utilization of GW resource, building activities, unconcerned attitude towards pollution, negligence in both solid and liquid sewage disposal etc; adopted by this community, needs to be monitored and controlled.

With the pace of industrialization picking up in the new State, the process of urbanization would get speeded up. This would put more stress on the urban environment, and thus the role of urban community in preserving the urban environment becomes critical.

CHAPTER – VI

ON-GOING BIO-DIVERSITY RELATED INITIATIVES IN THE STATE OF CHHATTISGARH

The State of Chhattisgarh, though received its Statehood on the first day of Nov 2000 1st of November 2000, but in a short span of time only enunciated a series of policy measures which would directly or indirectly lead to conservation of Biodiversity in the State.

Formulation of a pragmatic & implement able Chhattisgarh Biodiversity Strategy and Action Plan (CBSAP) itself provides a good measure of sincerity, commitment and initiative on the part of State Govt. to conserve Biodiversity.

In order to the steer the State on the path of speedy and equitable development; the Hon' ble Chief Minister got prepared a document*"VISION 2012*" enlisting priorities in each development sector of the State' s economy to achieve "-------- *we see a State and its people empowered with the options to choose their own destiny, with specific reference to their way of life and greater interaction and integration with other states and peoples of the world."*

To realise this ambitious yet attainable vision, the State has set for itself specific goals and priorities as follows: -

Goal # 1 : Unlocking the value of our natural assets
Goal # 2 : Initiating the process of building world class physical infrastructure
Goal # 3 : Investing in the most precious resource of all – our human capital

These Goals and priorities have been depicted in form of flow diagram in Fig 6.1. : -

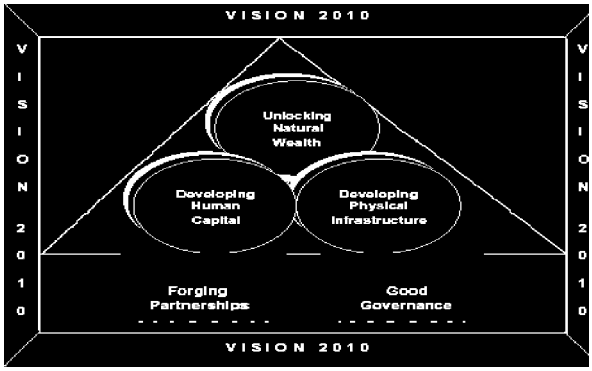

Fig: 6.1

The State recognizes this historic opportunity and the immense responsibility along with the challenges it faces in ensuring balanced economic and social development.

The State recognises that specific initiatives will have to be taken by it to break the vicious cycle that has hitherto hampered social and economic progress. These include:

Initiative # 1 : **Strengthening and adhering to the principles of good governance in terms of complete transparency, efficiency and accountability**.

Initiative # 2 : **Forging partnerships with national and international agencies for a best practice led approach to socio-economic development.**

HIGHLIGHTS OF STATE' S VISION: -

FOREST SECTOR: -

Forests contribute more to the environment than most other natural resources. Since forests cover a large portion of land in the State, and is also one of the primary sources of livelihood for most tribals in the State, harnessing its true potential is a key imperative for development in Chhattisgarh.

☙ **TARGETS: –-**

In order to address this imperative, the State has set for itself the following targets:

- **Achieve a fivefold increase in the revenue from minor forest produce to reach approximately Rs10,000 million.**
- **Develop 100% of the degraded forest area.**
- **Strengthen the co-operative network of the State.**

AGRICULTURE AND ALLIED SECTORS: -

An improvement in agriculture and its allied sectors would help raise the income levels of the people dependent on this sector. This would thus create a large market within the State that would spur and sustain the economic growth in other sectors.

☙ **TARGETS: –**

In order to improve the fortunes of agriculture and allied sectors, the State has set the following targets for itself:

- **Reorient the current cropping pattern in the State.**
- **Increase the contribution of agriculture to the State NSDP by over 50% over the next 10 years.**
- **Increased yield in line with the increase in cropping intensity.**
- **Move from single cropping to multiple cropping with focus on cash crops.**
- **Greater emphasis on development of the allied sectors, especially animal husbandry.**

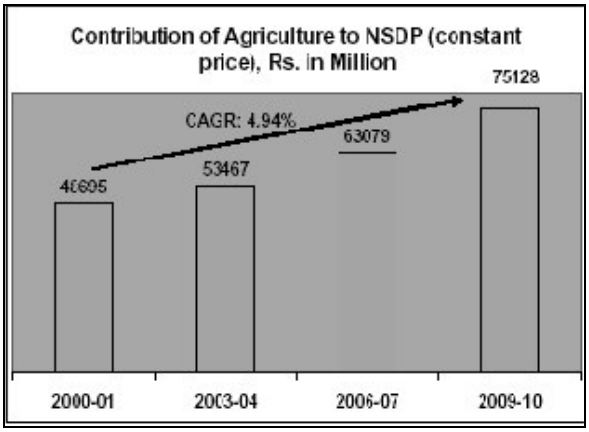

Fig: 6.2.

WATER RESOURCE SECTOR: -

TARGETS –

In order to tap the complete potential of the water resources sector and ensure that it contributes to economic and social development, the State has set the following targets:

- **200 percent increase in the created irrigation potential.**
- **100 percent coverage of safe drinking water supply. All villages in the State to have at least one perennial source of water supply.**
- **Tariff rationalization – to cover at least the entire operation and maintenance cost.**

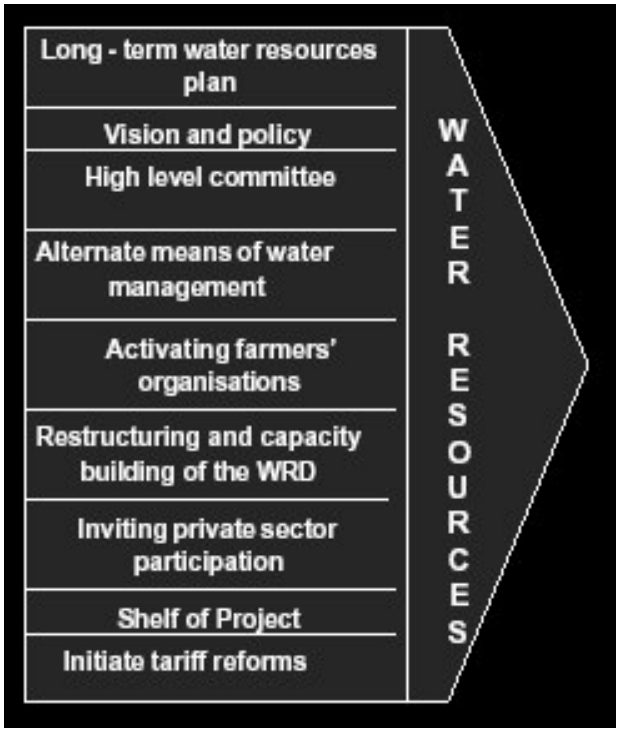

Fig: 6.3.

- **Coverage of urban water service to meet prescribed norms. For example 140 Liters Per Capita per Day (LPCD) for cities possessing sewerage facilities.**

MINING SECTOR: -

- **TARGETS –**

In order to harness the potential of this sector, the State has set for itself the following targets:

- **Double the contribution of minerals to the NSDP from the current level of Rs.12, 000 million.**
- **Ensure occupation and shelter to all tribals affected by mineral exploring activities.**

The overall objective of the policy initiatives would be to ensure that scientific exploration techniques are employed to optimally utilize its mineral wealth. **This together with ensuring mine safety measures and minimizing the adverse effects of mining on the environment would put the State on the path of sustainable mining practices.**

- **PREPARE A MINING PLAN: -**

The State would prepare a long-term mining plan that would: -

Map the potential mining sites completely Prioritise mining areas based on potential, suitability to cluster mining, small scale mining etc., density of forest cover and existing infrastructure.

TOURISM SECTOR:

- **DEVELOP ECOTOURISM: -**

Endowed with an extensive forest cover and a rich cultural heritage, Chhattisgarh has the potential for further developing its tourism industry. **The primary objective of the Government of Chhattisgarh is to promote *Sustainable Tourism*- a scientifically based approach to the planning, management and development of sustainable tourism products and activities in the region.**

The State would undertake an extensive exercise of marketing tourism in the state starting with the theme of Eco-tourism. The state with its rich and diverse flora and fauna will be positioned as an Eco tourism destination as well. **Bastar District has been identified as**

one of the richest bio-diversity zones after the African countries. Certain Indian rare species and varieties of plants and trees are found here. **Bastar along with the neighboring districts of Dantewada and Kanker will be promoted as destinations for Eco-tourism.**

The State would launch entrepreneurship development and self-employment programs for providing various tourist facilities. The emphasis would be on strengthening small and medium enterprises, particularly micro enterprises to enable them to successfully engage in the tourism industry.

INDIVIDUAL SECTORAL POLICY INITIATIVES: -

Based on the VISION 2012, Biodiversity related Govt. Departments have formulated their specific Sectoral State Policies. Biodiversity relevant statements of few of these Sectoral Policies are given below: -

ENVIRONMENT POLICY FEATURES: -

- **Ensuring sustainable development with an emphasis on social and intergenerational equity.**
- **Enhancing environmental performance as a means of competitive advantage for the State.**
- **Improving the quality of life of Citizens.**

ENVIRONMENTAL RESOURCE PLANNING: -

The Government will focus on sustainable management of essential ecological processes and life support systems. This would ensure sustainable and rational utilisation, conservation and integrated environmental management, within all areas viz. land, air, water, forests,; bio-diversity, minerals, industry, agriculture as well as urban planning and transport.

COLLABORATIVE GOVERNANCE AND MARKET BASED MECHANISM:

As the implementation of the Environmental Policy is the responsibility of various Departments, the requirements of the environmental policy would be integrated with the policies of Water Resources, Forest, Road, Transport, Housing, Industry & Mining departments. **Measures will be undertaken wherever reasonable and practical, and with due regard to public interest, to ensure that the costs of environmental degradation are borne by the person(s) responsible for the degradation.**

CULTURE POLICY FEATURES: -

- **The State will not set up artificial boundaries between classical, folk, tribal, visual and performing metropolitan and rural arts. It will recognize and respect the transitions and bridges among these.**
- **The State will promote textual as well as non-textual traditions, collection and documentation of tangible objects as well as recollection of intangible traditions, their ex-situ display as well as in situ revitalization.**
- **The State will be a catalytic agent, to support and advance the traditional connection among communities, between their life and their arts, and between forms and functions of these arts. It will respect and nourish culture as essential to eco-specific development strategies of communities, geared to resource management and subsistence. It will recognize culture as an essential ingredient in development. Effort will be made to recognize, embed and develop the cultural component in the programs of all Govt. departments, as culture is a component of all departments of life.**
- **Culture impact assessment will be embedded as a component in the formulation and implementation of mega developmental projects.**
- The unique identity and polyvalence of the culture of Chhattisgarh will be promoted alongside its relationships and exchanges with cultural provinces and neighborhoods of adjacent State of Chhattisgarh. The community cultural identity and landscape of Chhattisgarh will be presented in the national and global perspective.
- Bridges will be developed among dialects, and scripts will be developed for unscripted dialects. **Relations will be promoted with hill and forest based communities from the newly formed States, and from other States of the Country, and with indigenous tribal and analogous communities from other parts of the world.**

URBAN DEVELOPMENT POLICY FEATURES: -

The key elements would be:

- **SEWERAGE: -**

Creation of decentralized sewerage and wastewater treatment system wherever possible. Mandatory decentralized sewerage and wastewater treatment facility in housing colonies.

Encourage public participation (co-funding) in small improvement project like desilting of sewers, cleaning of garbage etc.

- **SANITATION:**
  - **ULB' s to prepare a master plan for solid waste management.**
  - **Segregation of waste into bio-degradable and non –degradable at the source of generation to be encouraged.**
  - **" Polluter pays" principle to be strongly enforced with heavy fines for public littering.**
  - **Bio-medical and industrial waste to be disposed according to pollution control norms. Licenses and permits of commercial establishment to be subject to following sanitary disposal practices.**
  - **Landfill sites to be identified for each ULB and options for Joint disposal facilities for adjacent ULBs to be explored.**

- **INTEGRATED ENVIRONMENTAL MANAGEMENT: -**

The Govt. would ensure preserving of the urban environment through adoption of a multi-pronged approach. The specific steps would include:

- Ecologically and environmentally sensitive sites to be examined and suitably protected
- Preparing an integrated Environmental Action Plan for the State. Controlling indiscriminate exploitation of ground water through introduction of ground water regulation. Developing provisions in building by laws to enforce rainwater harvesting and earthquake resistant technique.
- Protection of green belt and regeneration of unutilised and waste land into parks and green area.

HOUSING POLICY FEATURES: -

- **A manual will be prepared to promote low cost housing. The manual would provide options of environmentally sustainable construction, which would be both low cost as well as use building materials and techniques that minimize environmental pollution.**
- **Fly-ash based industries to be promoted.**

- **Enforcing and implementing disaster resistant construction technologies and environmentally sound practices such as water harvesting.**
- **Low cost housing made with locally available material would be promoted. Model Eco-villages will be setup with locally available materials.**
- **Recycled building materials would be promoted for developing housing for low-income individuals. Partnerships would be established among building contractors, manufactures and distributors for constructing houses from recycled building material.**

FOREST POLICY FEATURES: -

Chhattisgarh is probably the first State in the Country which released its own State Forest Policy in October, 2001 i.e. with in 11 months after the State' s declaration. The new Policy is keeping the following basic objectives in mind: -

BASIC OBJECTIVES: -

- **Unlocking of the vast array of forest resources on sustainable basis for enhanced well-being of local people by converting these open access resources (OAR) into community controlled, prioritized, protected and managed resources.**
- **A shift in accent from major to minor forest produces, from crown to multi tier forestry and from flagship species to smaller denizens of the forests.**
- Maintenance of environmental stability through preservation and where necessary, restoration of ecological balance that has been adversely disturbed by serious depletion of forests in the state.
- **Conserving the Bio- cultural heritage of the state by preserving the biologically rich natural forests that provide the essential cultural milieu to the tribals of the state.**
- **Checking the denudation of forests and soil erosion in the catchment area of the rivers, and reservoirs for soil and water conservation; mitigating the floods and droughts; recharging of water bodies, aquifers and for the retardation of siltation of the reservoirs.**

- **Increasing the forest / tree cover in forest deficient districts through afforestation and agro forestry/ farm forestry programmes, especially on all denuded, degraded and unproductive lands.**
- **Meeting the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal population with due regard to the carrying capacity of the forests.**
- **The derivation of direct economic benefit from the forests of the state shall be subordinated to the requirements of the environmental stability and maintenance of ecological balance in the state.**
- **Creating appropriate policy and legal framework for the achievement of these objectives.**
- **The State Forest Policy is unique in itself as would be evident from the salient features enlisted below: -**

ESSENTIALS OF FOREST MANAGEMENT

- **Existing forests and forestlands should be fully protected and their productivity increased. It is necessary to promote efficient methods of timber harvest and utilisation to maximize economic returns from the forests.**
- **The network of national parks, sanctuaries, biosphere reserves and other protected areas should be strengthened and extended adequately for the conservation of total bio cultural diversity in the state.**
- **Targeting on broad range of goods and services in terms of physical, material, human, social, cultural and environmental assets in conjunction with appropriate entitlement regime, People' s Protected Area (PPA) envisions a proactive and people' s friendly framework to ensure long term protection and maintenance of biological diversity and providing at the same time a sustainable flow of natural products and services to meet local community needs. Therefore, a network of PPAs should be established as poor people' s pool of assets for strengthening livelihood security of forest dwellers.**
- **Provision of sufficient fodder, fuel and small timber to local people, especially in areas adjoining forests, is necessary to prevent further depletion of forests beyond their sustainable capacity. As fuel wood continues to be the predominant source of**

domestic energy in rural areas, the programme of afforestation should be intensified with special emphasis on augmenting fuel wood production to meet the requirements of the people. Furthermore, to reduce the pressure on forests due to increasing demand for fuelwood, its substitution by alternative sources of energy should be promoted.

- **Minor Forest Produce (MFP) including medicinal plants provide sustenance to the tribal population and to other communities residing in and around the forests. Such produce should be protected, improved and their non-destructive harvesting methods enhanced with due regard to providing employment and income generation opportunities to the dependent people. MFP is the major source of livelihood of tribals and other forest based rural communities. Therefore, rather than exporting MFP in raw form, efforts should be made, as far as possible, to promote processing and value addition of the same, at the local level.**
- **Supply of timber and poles to urban centers from non-forest sources is necessary to reduce pressure on natural forests. Therefore, state government should encourage agro-forestry, farm forestry and on-farm cultivation of timber trees.**
- **Establishment of appropriate instruments including policy and legislative measures to protect the rich bio -cultural heritage of the state in view of increasing threats of bio piracy and infringement of IPR (Intellectual Property Rights) from within and outside the state.**
- **All forest areas in the state should be managed in accordance with a duly approved management/working plan.**

☙ CONSERVATION OF MEDICINAL PLANTS BEING USED FOR HEALTH CARE IN TRADITIONAL WAY: -

Forests have been the source of invaluable medicinal plants since the time man realized their preventive and curative properties and started using them for human health cover. In view of the richness of medicinal and herbal plants in the state, a mechanism should be developed for in-situ and ex-situ conservation, domestication and non- destructive harvesting with the active support from local people including traditional healers and vaidyas. The socio-cultural, spiritual and medicinal arena of the rural populace particularly the tribal should form the backbone of community based conservation and utilisation of medicinal and herbal plants.

In the above context, the Directorate of Indian Systems of Medicine has taken initiative and till date it has listed out local healers already working in all the 16 districts in Chhattisgarh is given in the Annexure 6.1 Vol.III. After this, Directorate has started listing of the medicinal herbs being used by local healers as medicines and the ways of using it. Till end of July 2002, Directorate had updated the list to the approx. 300 species. This the figure for 10 districts, local healers from Dantewada and Jagdalpur have refused to open their treasure of knowledge.

(Source : Information given by the Director, Indian Systems of Medicines Raipur on Telephone.)

- **BIO- CULTURAL DIVERSITY CONSERVATION: -**

The State is extremely rich in its bio cultural diversity. This diversity should be preserved through action as under:

- **Intensification of surveys and inventorization of bio- cultural resources in different parts of the state. The survey should include information on the distribution pattern of various species \ population \ communities and the status of ethno- biologically important groups.**
- **Conservation of biodiversity through the establishment of a representative network of protected areas including Biosphere Reserves, National Parks, Sanctuaries, Gene conservation centers, and People's Protected Area. Such areas should cover sites of exceptional taxonomic and ecological value in terms of flora and fauna with adequate emphasis on the lower vertebrate, invertebrate and micro flora, which are important for the maintenance of healthy ecosystems. Tribals and the rural people displaced if any, due to creation of such national parks \ biosphere reserves \ or gene conservation centers should be fully and properly rehabilitated on such sites and in such manner that their standard of living after the rehabilitation is markedly improved.**
- **Legal and administrative measures should be taken for the protection of state' s bio cultural diversity against bio piracy and for sustainable use of plant and animal genetic resources. Intellectual property rights (IPR) of the people of the state specially the tribal should be zealously guarded. Domesticated species \ varieties of plants and animals should be conserved as an integral part of the state' s rich genetic diversity.**
- **Crucial corridors between national parks, sanctuaries, forests and other protected areas should be identified and notified for linking them to maintain**

genetic continuity of flora and fauna. Such areas should be managed with prescriptions favouring wildlife requirements like the retention of snags, natural gaps, grassy areas, special lithic habitats, caves, cliffs, den sites and water bodies etc.

- **Modern techniques of ex-situ conservation like ' tissue culture' and biotechnology should be promoted for the preservation of endangered and threatened species of wild flora and fauna.**
- **Mono-culture and planting of exotic floral species should be avoided unless sufficient experimentation on strict scientific lines has established their usefulness. Exotic faunal species should not be introduced into the forests of the state.**
- **Tribals and other indigenous people of the state, residing in and around forest areas, with rich cultural traditions and practices, should be encouraged to maintain their unique relationship with the forests for mutual benefit. Unique geographical and cultural landscapes existing in protected areas should be managed keeping in view the conservation of bio- cultural diversity of the state.**

☙ FOREST BASED INDUSTRIES: -

In consonance with the National Forest Policy 1988, forest based industries should be encouraged to produce their own raw material through private forestry and to use alternative raw material.

- **No forest based enterprise, except that at the village or cottage level, should be allowed in future without a proper ecological, cultural and social impact assessment. The fuel, fodder and timber requirements of the local population should not be sacrificed for raw material supplies to such enterprises.**
- **Direct relationship between forest based industry and farmers should be encouraged to meet the raw material requirements of the industry. This industry-farmer collaboration should in no way be allowed to result in diversion of prime agricultural lands and displacement of small and marginal farmers.**
- **The bio- mass resources of the state should not be subsidized to the industry, which should be encouraged, to the extent possible, to use alternative non-forest raw material.**

- **Allotment of land to the industry should be subject to land ceiling and other land laws of the state. Such industry should not in any way be allowed to adversely affect the socio-cultural traditions of the tribals and other communities living in the state.**
- **Appropriate institutional and technological systems should be developed to enable rural artisans to sustain their biomass-based crafts and enterprise.**

☙ FOREST DEPTT. INITIATIVES: -

The initiatives taken by the State in formulating a people oriented Forest Policy have not ended here; since the State from its limited financial resources has started implementing the various facets of its policy in all sincerity. Some of the salient Actions initiated in the Forestry sector after in the State formulation are enlisted below: -

☙ PARTICIPATORY FOREST MANAGEMENT IN CHHATTISGARH:

To translate the forest policy issues regarding participatory management into action; the **Govt. of Chhattisgarh passed a J.F.M. Resolution in October 2001** (Copy enclosed as Annexure 6.2 in Vol.III). Though the JFM movement began in the State in early nineties, but after the formation of the independent State; it has received impetus.

By the end of Dec. 2001, 3190 Village Forest Committees, 3057 Forest Protection Committees, and 165 Eco-development Committees; in total 6412 Societies are protecting 28.38 lakh ha. Forest Area. This shows that roughly 17 % of the total forest area of the State is under Participatory Forest Management. The JFM has so far involved 7,36,328 members in 3.75 lakh families spread over 7388 villages across the State.

☙ PEOPLE' S PROTECTED AREA (PPA): -

As an initiative, the concept of Peoples Protected Area (PPA) has emerged as the vision of the Chhattisgarh State. It involves a proactive and people friendly management systems, wherein protected areas are managed by the people for the people; therefore called Peoples Protected Area. The emphasis in People' s Protected Area is on initiating a proactive and

people' s friendly management system as mentioned earlier**The broad guiding principles of PPA are:**

- **Highest respect and concern for people and their traditional knowledge**
- **Care and share**
- **Capacity building at all levels**
- **Up gradation of local technologies including Information Technology**

To translate these noble principles in to reality following strategies have been adapted.

- **Community Based Participatory Mapping , Resource Assessment and Management Plan**
- **In -situ / Ex-situ Conservation.**
- **Non Destructive Harvesting Practice**
- **Processing, Value Addition and Marketing**
- **Entrepreneurship Development**
- **Equitable Benefit Sharing**
- **Gender Sensitivity**
- **Improved Food Security and Health Cover**
- **Enabling Policy and Legal Framework**

To begin with, the Forest Department has established PPA' s in 9 Forest Divisions of the State namely Dhamatri, Jagdalpur, East Bhanupratappur, Bilaspur, Marwahi, Dharmjaygarh, East Sarguja, Korea and Durg of the State. Total coverage would be 5000 ha. over a period of 5 years in each division, on the basis of these division experiences and availability of funds more and more areas of the state will be covered under this scheme.

HERBAL STATE:

Hon' ble Chief Minister declared the State of Chhattisgarh as a Herbal Stateon 4th July 2001. The Scheme would be executed by Chhattisgarh State Minor Forest Produce Federation and the departments of Rural Development, Industries, Agriculture, Health and Rural Industries would provide all the necessary support to the Forest department.

Under the scheme People' s Protected Areas (Medicinal Plant Reserves) have been created in Dantewada, Sukma, East Raipur, Bijapur, Kondagaon, Narayanpur, Kanker, West Bhanupratappur, North Sarjuga, Jashpur, Manendragarh, Rajnandgaon, Raigarh & Korba forest divisions of the State. for the conservation, development, collection, value addition and Improvements in the marketing of the Medicinal plants.

Functions of such reserves are: -

- **Documentation of all Herbal & non-herbal microflora with the assistance of local healers.**
- **To ensure a continued supply of plants for traditional health care practitioners & their patients.**
- **In-situ conservation of all herbal plants.**
- **Ex-situ conservation of endangered herbal plants.**
- **Documentation, identifying local traditional healers & using their services to propagate traditional system of Medicinal through Deptt. run herbal dispensaries.**
- **Trust building tasks in the local communities linked with the PPA' s.**

In order to Plan, Implement and Monitor the progress of Herbal State Scheme, the State has constituted a State level "CHHATTISGARH MEDICINAL PLANT BOARD".

PROTECTED AREA NETWORK INITIATIVES:

- **Anti-poaching squads have been positioned at vulnerable areas in Raipur, Bilaspur, Jagdalpur and Surguja.**
- **State level Tiger Cell has been created wherein Police and Forest Department would work in coordination to control poaching.**
- **State Wild life Board constituted with an objective to monitor the conservation and development efforts in the P.A.' s.**
- **GOI(MoEF) has been approached by the State Government to include it' s 3 Sanctuaries i.e. Udanti, Sitanadi & Achanakmar under "Project Tiger".**

- **Proposal of extension/New PA Creation has been**
- **Ecotourism has been started in Kanger Valley National Park (Distt. Bastar), and Barnwapara(Distt. Raipur), Achanakmar (Distt. Bilaspur) Wild Life Sanctuaries.**
- ***"Hill Myna"* has been declared as State Bird. It has been planned to conduct a survey to find out its distribution, threats to its survival and species recovery.**
- ***"Wild Buffalo"* has been declared as State Animal.**
- **Central Zoo Authority has been approached for the grant of recognition to Nandan Van in Raipur Distt. as Zoo.**
- **Looking into the rising Man-Elephant Conflict in the Districts of Raigarh, Bilaspur, Sarguja, Jashpur & Korba; initiatives have been taken by the State at the GOI level to include Chhattisgarh State under "Project Elephant".**
- **Efforts are on to create a *"Biosphere Reserve* " comprising areas adjoining Amarkantak in the Chhattisgarh State.**

As per the protected area network document of Wildlife Institute of India (2000); extensions/new PA creation have been proposed in the following areas of the state:

S.No	Name	Proposal	Area (in sq.km.)
1	Bhaiamagarh	Extn.	61
2	Kawardha	New PA	200
3	Badalkhol	Extn.	50
4	Gollapalli	New PA	300
5	Sitanadi	Extn.	100
6	Hasdeo basin	New PA	200

REGULATION OF TRANSIT OF FOREST PRODUCE: -

The State after its formation in order to regulate the transit of forest produce, has framed Chhattisgarh Transit (Forest Produce) Rules, 2001 under the India Forest Act, 1927 wide notification date 25-08-2001. under this rules the transit of certain species has been eased out in the following two ways -

(A) Species whose Timber and Fuel would not require any Transit Pass:-

Common Name	Botanical Name
Cusuarina	**Casuarina equisetifolia**
Subabul	**Leucinea spp.**
Poplar	**Populus spp.**
Israili Babul	**Acacia tortilis**
Vilayati Babul	**Prosopis juliflora**
Manzium	**Acacia manzium**

(B) Species whose Timber / Fuel would require Transit Permission only from Panchyats:-

Common Name	Botanical Name
Babul	**Acacia hilotica**
Siris	**Albizzia spp.**
Neem	**Azadrechta Indica**
Ber	**Zizyphus spp.**
Palas	**Butea monosperma**
Jamun	**Syzygium cumini**
Reunjha	**Acacia leucophloea**

The Detailed Notification is enclosed as Annexure 6.3 in Volume III of the CBSAP.

AMENDMENTS IN THE CHHATTISGARH LAND REVENUE CODE, 1959:

The State Govt. implementing the directions of Hon' ble Supreme Court, has made amendments in the existing rules under Land Revenue Code vide Notification dated 1st April, 2002; in order to regulate felling and transit of trees on Bhumiswami lands as well as Revenue lands.

Detailed Notification is enclosed as Annexure 6.4 in Volume III of the CBSAP.

INITIATIVES FROM CIVIL SOCIETIES: -

PEOPLE' S REPORT(*JAN-RAPAT*): -

On 1st of November, 2001; villages in Chhattisgarh, numbering over eighteen thousand, have embarked on a campaign to prepare their own Jan-Rapats (People' s Reports) People themselves would not only document the human development status of each village- and, in that sense would serve as a Human Development Report for each village – but would also prepare the inventory on resident natural, physical and human resources leading to community action in development. The preparation of People' s Reports would be an elaborate exercise in participatory study, analysis and documentation. In one sense, it marries the concepts of people' s planning and human development reports.

SCIENTIFIC AND EDUCATIONAL INSTITUTIONS INVOLVED IN BIODIVERSITY RELATED RESEARCH AND CONSERVATION: -

Table :- 6.3.

S.No.	Name of Institute	Place
1.	Pt. Ravishankar Shukla University	Raipur
2.	Guru Ghasidas University	Bilaspur
3.	Indira Gandhi Agriculture University	Raipur
4.	Deptt. of Science and Technology	Raipur
5.	Indira Gandhi Sangeet University	Khairagarh
6.	Chhattisgarh Environmental Conservation Board	Raipur
7.	Central Ground Water Board (Regional Office)	Raipur
8.	Guru Ghasidas Manav Sangrahalaya	Raipur
9.	Directorate of Indian Systems of Medicine & Homeopathy.	Raipur
10.	Government Ayurvedic College	Raipur
11.	Homeopathy College	Raipur
12.	Govt. Ayurvedic Pharmacy	Raipur
13.	Khadi and Village Industries Commission, (Regional Office)	Raipur
14.	Govt. Veterinary College	Durg
15.	Chhattisgarh Minor Forest Produce Federation,	Raipur
16.	Chhattisgarh Forest Development Corporation	Raipur

☞ ECO-CLUBS FORMED IN 100 SCHOOLS, COLLEGES: -

With the aim to create environmental awareness among people, over hundred Eco Clubs are being formed in more than 100 schools and colleges of Chhattisgarh in the current academic session to spread the message of environment protection. The State government has taken the decision to constitute 600 Eco Clubs in all the districts across the State so that environmental awareness could be taken to the society through children and that the kids understand the importance of environmental conservation. Following the directive, 100 such clubs have already been formed. The Environment and Urban Administration department has conveyed that the Eco-Clubs are being constituted to spread the message of environmental protection. Holding rallies, discussions, debates and symposia awareness would be created.

CORPORATE SECTOR INITIATIVES: -

INDUSTRIAL SECTOR:

Source:- Vision 2012, Govt. Of Chhattisgarh.

Chhattisgarh possesses some of the requisites for being an economic powerhouse in the country- a strong natural resources base, a peaceful workforce, surplus power and the locational advantage of being closer to the markets of eastern and western India. However, the State has not yet been able to leverage these strengths to its fullest. Also in order to realise the true potential of the natural resources in the State, it is important to focus on value added industries.

The State recognizes the above along with the fact that its industrial sector would be a driver in fuelling economic growth in the future.

☞ TARGETS –

In line with Vision 2012, the State has set for itself the following targets:

- **The growth in the industrial sector by the year 2009-10 would be 11.5% (CAGR)**

With the improvement of the infrastructure and the industrial climate in the state the industrial GSDP would increase progressively over the next ten years as illustrated in the Fig: - 6.4.

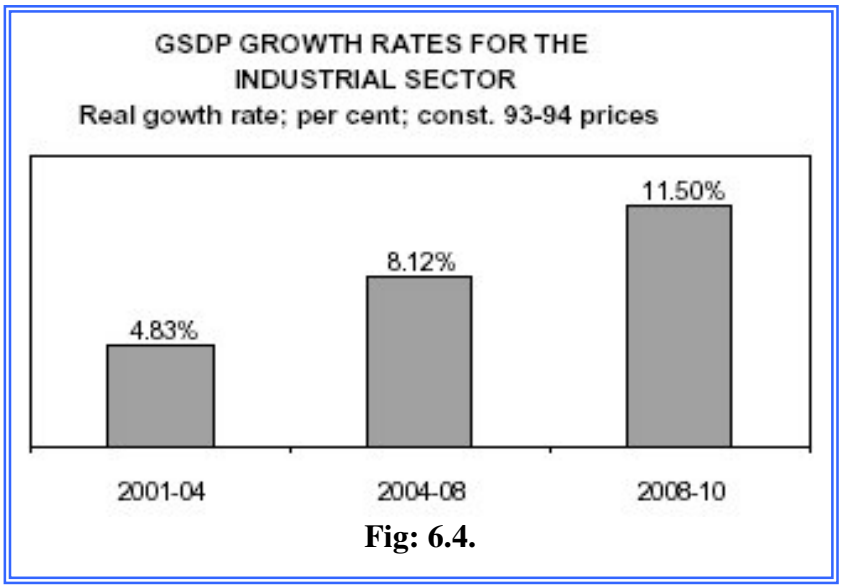

Fig: 6.4.

- **Attracting investments in excess of Rs. 250,000 million in the industrial sector over the next 10 years: -**

For the industrial GSDP to double by the year 2009-10, investments in excess of Rs 250,000 million has to be made in the industrial sector.

- **ACTION PLAN: -**

In order to achieve its stated objectives and address the current issues, the State has identified some specific strategies discussed below:

- **FOCUSING ON SPECIFIC INDUSTRIES: -**

Growth in the future would revolve around specific industries, which would build on Chhattisgarh's strengths as a resource base and the opportunities provided by these sectors in the future. The following sectors have been identified as the 'thrust' areas for the future:

- **Agro and forest-based industries**
- **Mineral based industries**
- **Small & Medium Enterprises (SMEs) and the Small scale and cottage industries**.

- **AGRO AND FOREST BASED INDUSTRIES:**

Chhattisgarh would exploit its strengths as a predominantly agrarian economy and a State rich in bio-diversity to create more wealth for itself by developing value-added agro and forest based industries. The focus would be on horticulture, food processing, oil-seeds, cotton,

sugar, cereals, spices and floriculture. The focus on the forest based industries would be the Sal, herb, olive, bran and aonla processing industries. The specific strategies for developing this sector are discussed below:

- ***Mapping the potential of growth:***

The potential for the growth of agro and forest based industries would be identified in each district of the State. This would be done considering the climatic and the soil conditions. The bio-diversity of the forests would be mapped by the systematic classification of the rare flora and fauna.

- ***Developing industry specific infrastructure:***

The industry specific infrastructure facility would include setting up sector specific industrial parks like an agro-industrial park or herbal villages. Developing other infrastructure facilities would include setting up of cold storage facilities at the district level, developing cold storage chains that would link warehouses to cold storage facilities for perishable horticulture and food products and forest produces, in the rural areas, facilities to sort, dry and pack the agro based products etc.

- ***Forming policies to induce growth:***

The existing policies would be modified to facilitate growth in the sector. For instance, the State would consider reformulating the agriculture land-ceiling act to attract private industries in the Agro-industrial sector. It would consider making Chhattisgarh Agro Industrial Development Corporation the sole agency providing licenses, providing technical assistance and training to the farmers. **Creating a regulatory framework and encouraging competition in MFP procurement while protecting tribal interests would also be undertaken.**

- ***Strengthening the marketing base:***

Setting up an agricultural marketing board would strengthen the State's marketing mechanism. The market information system would be improved by the e-governance initiatives of the government to provide market-related information like price, demand, etc., to the farmer regarding the agro-based products across the *mandi*s in the State.

❖ MINERAL BASED INDUSTRIES:

Mineral-based industries in Chhattisgarh would be developed to increase the revenues for the State. The main thrust industries in this sector would be the core industries such as steel, cement, aluminium and value added industries such as gems and jewellery Industry.

ACHIEVING THE BEST ENVIRONMENTAL STANDARDS WHILE PURSUING INDUSTRIAL DEVELOPMENT

The State realises that industrial development cannot be sustained in the long run without safeguarding the environment**. Hence, to ensure sustainable economic development, the State would strive to achieve the best environmental standards.**

The State would enforce strict environmental standards prescribed by the **Chhattisgarh Environmental Conservation Board** for which the following measures would be undertaken:

- **Strengthening the machinery of the Chhattisgarh Environmental Conservation Board**
- **Tightening the implementation of the environmental laws and**
- **Supporting the setting up of common effluent treatment plants and facilities for collection and disposal of effluents and hazardous wastes.**

In order to encourage environment consciousness the State would give special incentives to the industrial units accredited with the ISO 14000 certification.

CHAPTER-VII

GAP ANALYSIS

INTRODUCTION: -

Without resolving certain basic conflicts given below in the various Bio-diversity sectors, sustainable Biodiversity conservation and flow of current and future benefits from these conservation efforts to the Biodiversity dependent populations can not be achieved.

- **POPULATION Vs ENVIRONMENT.**
- **SUSTENANCE INCREASE GAP INCOME Vs COMMERCIALISATION**
- **SURPLUS Vs SURVIVAL.**
- **NISTAR RIGHTS Vs CONSERVATION.**
- **ECONOMIC Vs ECOLOGICAL EXTERNALITIES.**
- **BIO-RESOURCE BASED SUBSISTENCE ECONOMY Vs MARKET ECONOMY.**
- **GLOBAL RESOURCES Vs LOCAL RESOURCES.**
- **WILD LIFE Vs PEOPLE.**
- **CPR Vs SOCIAL CAPITAL.**
- **MARKET AND NON MARKET SHORT TERM GOALS Vs LONG TERM ENVIRONMENT GOALS.**
- **BONAFIDE USERS Vs RESOURCE ABUSERS.**
- **LAND REFORMS Vs BIO-RESOURCES.**
- **CUSTOMARY MANAGEMENT Vs FORMAL MANAGEMENT.**
- **TRADITIONAL DECISON MAKING Vs PANCHAYATI RAJ.**
- **LOCAL, TRADITIONAL AND INNOVATIVE TECHNOLOGIES Vs CAPITAL INTENSIVE TECHNOLOGIES.**
- **ECOLOGICAL POVERTY Vs ECONOMIC POVERTY.**

Based on the above key conflict areas, it is necessary to probe into the existing Gaps

- **IN VISION,**
- **INFORMATION,**
- **INSTITUTIONAL AND HUMAN CAPACITY,**
- **POLICY, LEGAL STRUCTURES AND IMPLEMENTATION ;**

In order to build up site & sector specific strategies and action points, each of these gaps in individual biodiversity sectors have been analysed in brief in the following paras: -

GAPS IN VISION:

WILD ECOSYSTEM: -

- Mismatching of Govt. initiatives & mindset of Bio-resource dependent populations with regard to biodiversity conservation related issues.
- Over utilisation of bio-resources both for bonafide sustenance needs by local populations as well as income generation needs for a bare- minimum survival.
- Exploiting the Bio-resources to meet the sustenance needs by the poorest without having much knowledge of sustainable limits of exploitation.
- Traditional ways of over-exploiting bio-resources both due to zero costs involved in collection as well as in order to have quicker income generation; time saving & easier ways of harvesting are adopted without being aware of its ill effects on the sustainability of the Bio-resource.

Ex :- Forests of Chhattisgarh face local community induced forest fires thrice. First, at the time of pruning Tendu trees to get fresh flush of Tendu leaves (for Bidi making) , second for mahua seed collection and lastly for Sal seed collection. It becomes very irk same task force for Forest Department.

- Perception of a Common Property Resource as an Open Access Resource by marginalised population without any accountability for its sustainability.
- Legislative advocacy for settlement of forest encroachments has infact acted as an incentive for the increased incidences of encroachments on forest lands.
- Tendency among lower forest functionaries to hide the illicit felling; forest fire & forest encroachment incidences in the forest areas to avoid administrative action against them.
- Branding of local, indigenous wild biodiversity resources as " Common Heritage" where as commercial units (GMO' s) produced through the very use of these indigenous resources become "Private object" available on purchase.
- Despite of enormous scientific data available on the well established wild life management practices for the betterment of both fauna and its habitat; Indian wild life

bureaucracy is still very protective in nature and not ready to venture into experiments with such management practices especially related to Habitat Management.

- Non-Permission of implementation of peoples participation management in PAs inside PAs has led to further alienation of local populations inside PAs, causing threat to the very existence of PAs.
- A big gap exists when we appraise the perceptions of policy managers and communities dependent on bio-resource residing in forests. Insect collector and consumer community takes these insects as a small food article, whereas govt. initiative regarding their R&D is quite back seated. Knowing that the oldest class on globe and covering the lions share in distribution geographically and number wise also, entomology is yet to come in focus of policy managers.

DOMESTIC ECOSYSTEM :-

- **AGRO: -**

- Perception of the Govt. machinery to enhance economic well-being of the rural populations by providing HYV intensive management related packages without making adequate arrangements about the financial constraints existing at the level of small, marginal farmers.

- **LIVESTOCK: -**

- Better faith of scientific community in the economic viability of exotic.
- Govt. initiatives for the progressive improvement in the production potential over a period of time are an in-built insecurity for the survival of local breeds. It has been contended that exotic breeds with superior productivity or crosses are less adaptable than the indigenous breeds; yet they have better survival value in the production system owing to higher monetary return.

The majority of indigenous livestock breeds have genetic attributes like better capacity to withstand drought, superior resistance to tropical diseases, and better capacity to utilize coarse forages. Despite this, low productivity diminishes their survival value necessitating conservation.

- The Convention on Biological Diversity recognizes that the local communities are the real custodians of biological diversity and have vital stakes in conservation. At present, many financial institutions provide incentives and loans for the rearing of exotic or high-yielding crossbreeds, but do not provide similar assistance for indigenous stocks.

- Farmers may practice free grazing only because they have the opportunity to do so. **They are not interested in more productive animals except for a few that they can feed with their home-produced crop residues.** Low productivity becomes a problem when local animals can no longer be free grazed, and farmers are forced to stall-feed them.

  Stall-fed, high-producing breeds are not necessarily always more profitable economically than free range grazed, local breeds. Farmers might opt for a system with a high degree of stall-feeding because it is economically more productive than free grazing (a positive choice) or because the circumstances preclude the option of free grazing (a negative choice). Also, farmers who practice free grazing might do so because they have no other option (a negative choice), or because they have nothing to gain from converting to a stall-feeding regime (a positive choice for free grazing).

Before designing or recommending new technologies, it is important that scientists understand the farmer's viewpoint. Stall-feeding is assumed to be economically better than free grazing. This is because stall-fed animals are usually of better genotype, and produce more milk than free grazing animals. In this sense, improved breeds are considered to be more productive.

On the other hand, the decisions of farmers are based on the output per unit of capital (and labor), and influenced by their resource endowments, and the constraints/ opportunities existing in the surroundings. For example, an investment of Rs 20 thousand to buy 20 local cattle that are free grazed at limited labor costs may well be only as productive as spending the equivalent amount on the purchase of one buffalo. Although the latter yields more milk per head than the local breed, it may not be as profitable as 20 local cows.

SURFACE WATER:

- Both the irrigation agency and the farmers are apprehend each others about any change in the existing management practices of irrigation water in the command areas.
- The State has been planning and constructing irrigation projects and also controlling all the operations of water distribution; maintenance etc; where as farmers are not required

to put any effort and hence have litte incentive for any collective action in improving water management.

GAPS IN INFORMATION:

WILD ECOSYSTEM (INCLUDING WETLANDS)

- Electronic data base of forest habitats.
- Electronic data base of aquatic habitats.
- Inventory of folk and other public domain knowledge of uses of biodiversity.
- The baseline data on species and genetic diversity, particularly intra specific diversity, and their macro and micro -habitats is inadequate. There are many areas in the State, which are probably rich in repositories of endemic species, whose detailed survey can update the no. of individuals with regards to their location, distribution, description, status, and their local uses, if any.
- Documentation of Macro and Micro floral and faunal species both in terms of recognition and status is incomplete.
- Identification of insects causing epidemics affecting forest sub ecosystems has not been studied in detail.
- Impact of NTFP (levels of exploitation, exploitation practices, regeneration levels, sustainability factor) that are both legally and illegally harvested on the faunal sustainability is still to be assessed.
- The State does not have any real climatic climax type of grasslands. Grasslands further can be divided into grasslands in forest areas and grasslands outside forest areas. But unfortunately the acreage data with respect to these categories as well as their productivity is wanted.
- Local traditional knowledge in terms of status of Sacred Groves (SG' s) as well as their socio-cultural linkages with the Bio-resources is largely undiscovered.
- Lack of effective and comprehensive inventories especially in medicinal plants is a great risk to counter the patent claims. So a wider and more rigorous documentation of community based inventories including this vital component in terms of economic sustainability of locals in the State is must.
- Traditional; oral & ethno botanical knowledge is mostly undocumented.
- There is no authentic database of Traditional healers practicing in the State along with their healing practices.
- The Study of clinical - efficacy of every herbal remedy used locally too, is missing.

- The status of ecological succession in the various forest sub ecosystems has not been explored in order to understand the biological viability of these ecosystems.
- Detailed Inventory and Monitoring of impact of Exotic Invasive species on the Bio-diversity Components.
- Documentation of traditional systems of management of knowledge of uses of biodiversity.
- Documentation of traditional conservation sustainable practices.
- Documentation of traditional conservation non sustainable practices.
- No comprehensive Geographical information systems for ecological habitats.

DOMESTIC ECOSYSTEM : -

- **AGRO**

- Strong database is not available so as to compare pre-development activities with the present day post-development changes .
- A large gap exists between resources, Govt. agencies and communities.
- Information gathered by researchers is scattered.
- The Indigenous Traditional Knowledge (ITK) is not property documented.
- The thrust in the Research and Development had been mainly on crops of economic importance and thus certain local crops have been neglected.
- The State' s rich germplasm in Agriculture especially rice and pulses, millets & tubers has not been preserved, documented and registered in the gene bank within the State.

Agro- Entomological gaps: -

Agro-ecosystem		Gap to be filled
I.	**Agronomical crops**	
	Cereals, pulses, oilseeds, major & minor millets, sugar crops, fibre crops.	**Proper documentation of natural enemies associated with all major & minor pests needs proper identification, documentation & conservation.**
II.	**Agro-forestry**	
	Including major agro-forestry plants.	**Major and Minor insects are to be documented with their natural enemies.**

Agro-ecosystem		Gap to be filled
III.	**Horticultural crops vegetables, species, plantation crops & medicinal plants.**	**The status of natural enemies of all major & minor insects needs proper documentation. The insect scenario of medicinal plants needs proper documentation along with the status of natural enemies of insects.**

☙ LIVESTOCK

- Breed substitution or modification by crossbreeding gained prominence in cattle and some other domestic species. These strategies enhanced production but could not attain the established long-term goals. Effects of these developments on native breeds have not been analyzed meticulously, but these are among the causal factors responsible for endangerment of native germplasm.
- There are huge and progressively widening gaps between supply and demand of feed for livestock.

☙ HORTICULTURE: -

- Germplasm regarding elite trees like tamarind are yet to collected.
- Distinct types of trees of sulfi and tadi, jackfruit, mango, chirounji may be identified and collection of germplasm of these trees is urgently required within 2 years as several important trees of above mentioned crops are being vanished.
- In case of Ivy-gourd, distinct types were collected under IGAU from an area of Abhujmar Amongst germplasm collected by IGAU; Ac.5, Ac.6, Ac.48 and Ac.52 were found promising, but these lines need massive extension programme.
- Substantial number of tuber crops are being grown in the State. Many of them are yet to be identified for their economic value.

☙ GROUND WATER

This is one of the major and most important gap in the ground water development sector. This can be broadly divided into:

a) Data Gaps and
b) Gap in the data Collection / Methodology.

a) Data Gaps: -

Ground water is a freely accessible resource and hence no permission is required for its withdrawal or construction of any number of abstraction structures. Due to this fact there are no reliable data on the number of the abstraction structures, its command, the quantum of Ground water withdrawn, crops grown, periodicity of irrigation and nature etc. Another matter of concern is that there are no data on the structures constructed by affluent farmers, industrialists etc.

b) Gap In Data Collection / Methodology:

The surface water data is collected and maintained on basin/sub basin wise, whereas that of ground water is available with respect to administrative divisions like block, mandal, tehsil, district etc. Since Ground water also follows the natural boundary; the data has to be collected and maintained on water shed/basin wise boundaries.

GAPS IN POLICY, LEGAL STURCTURES AND IMPLEMENTATION:

General: -

The new patent laws and issues relating to intellectual property rights have neither been properly understood nor assessed in relation to their impact on domestic genetic resources. The laws on domesticated biodiversity animals are inadequate and are not strictly observed in the absence of stringent punitive measures. These laws should cover all aspects of conservation such as benefit sharing, transfer, acquisition, accession, generation and sharing of information, and misuse and abuse of domestic biodiversity animals. Currently misuse, overexploitation, and non-judicious utilization of domestic genetic resources are rampant. The following aspects require examination from the legal standpoint:

- **Laws regarding trusteeship/ownership of domestic genetic resources in gene banks outside the country.**
- **Laws prohibiting/permitting use of genetic resources/material, and punitive measures for infringements.**
- **Terms, conditions, rights, and obligations in such transactions involving third parties and further transfer of genetic resources.**
- **Transfer of genetic resources for commercial use and research – rights and obligations, and benefit sharing.**

- **Laws on the piracy and acquisition of classified data on domestic genetic resources.**
- **Regulations on networking with global agencies.**
- **Legal guidelines on negotiations for bilateral agreements.**
- **Legal frameworks for the establishment and working of databanks.**
- **Laws regarding benefit sharing by parties and local communities.**
- **Rules and monetary obligations of non-governmental organizations (NGOs) handling floral and faunal genetic resource conservation programs.**
- **Laws covering breed registration societies and other similar organizations.**

WILD ECOSYSTEM: -

- Indigenous plant species are threatened by the introduction of G.M.O.' s (Genetically Modified- Organisms); whose long term effects on the environment are not yet known. No laws on Bio-safety exist.
- No State laws to put a stop to biopiracy by Multinationals especially for rich Herbal Biodiversity in the State.
- Definition of IPR is built around patents (i.e. TRIPS) & it rejects the informal and often unrecorded knowledge systems of traditional communities. No legal protection to the indigenous knowledge systems is essential since undocumented knowledge is not being accepted to be in public domain.
- Absence of any legislation for stopping bio-prospecting in the State other than by National level Organisations like ZSI, NBRI, TFRI, SFRI etc or by the scientific community of the State itself.
- Lack of legislation to deal with the external agents so as to take first the prior consent of locals and then sharing of profits in case some one wishes to use their resources commercially.
- No comprehensive State legislation to regulate, access, and facilitate and economic benefits of local bio-resources for all sector of society with special attention to local & indigenous communities.
- Lack of clear strategy to make knowledge from locals accessible so as to protect their interests; since the knowledge so gained is so sensitive that publishing it without adequate protection would lead to misuse.
- Wild life conservation and its management in Non-PA areas are on the low priority agenda of the State.

- Forest encroachments and its settlement has been a critical factor responsible for the loss of biodiversity in forest ecosystems. The National laws like Forest Conservation Act, 1980 and Indian Forest Act, 1927 do exist but their implementation is gradually weakening due to complex socio-politico environment. Barring few provisions, these laws don' t have enough punitive measures for infringements.
- Providing administrative control of wild life sanctuaries in the State with the Territorial Divisions could create priority gaps in terms of attention for wild life conservation.
- Investment hunger in PAs in comparison to the Non-PAs. The States have a typical mindset to depend totally on GOI funds for investments in P.A.s where allocation of funds from the State treasury is bare minimum.
- Degradation and fragmentation of habitats in Corridors around P.A.s. is occurring due to lack of proper policy.
- Statutory provisions of Wildlife Protection Act, 1972 regarding relocation of local populations from within PAs by settlement of rights is still to be implemented.
- Stratification done in National parks from management view point; doesn' t exist in Wild Life Sanctuaries.
- Implementations of land reforms have so far proved regressive in effect causing curtailment of CPR areas. It has also reduced local control of local resources.
- Undeclared policy of privatization of common resources has caused erosion of social sanction and community authority to protect common resources.

GROUND WATER: -

- The State Govt. does not have a suitable State water policy in accordance with the National Water Policy.
- The under utilization of ground water is mostly due to the very nature of public irrigation investment policy. The medium and major irrigation sector gets over whelming priority in public irrigation investments which undermines the roles of traditionally managed schemes by farmers including tanks, wells and other abstraction structures.
- The present Govt. policy for change in the crop rotation without considering the implication on the ground water scenario may lead to serious repercussions in the minor irrigation sector of the State. The “Indira Gaon Ganga Yojna” envisages

withdrawal of water from deeper aquifers and putting it in the ponds/surface bodies. This ultimately will result in the drying up of the deeper aquifers.

DOMESTIC ECOSYSTEM

☙ LIVESTOCK: -

The State of Chhattisgarh is bestowed with a livestock population which is predominately free grazed in the wild ecosystems causing maximum damage to the Biodiversity in the forests. Different departments control different categories of land e.g. revenue land, and culturable wastelands; Reserve & Protected Forests for grazing. Some legal and policy issues in this regard have been highlighted below :-

• LAND CEILING ACT: -

The ceiling of irrigated land in Chhattisgarh is 7.3 ha for two crops a year, and 10.9 ha for one crop a year where as the ceiling for dry land is 21.9 ha in State. Many large landowners do not want to opt for a second crop, as that will reduce the amount of land they can own. Where as the small & marginal farmers don' t have the capacity to go for IInd crop due to non-availability of Irrigation. According to government officials this failure or reluctance to have a second crop leaves a lot of land area uncultivated and promotes free grazing. However, the Ceiling Act is not a major factor, as only a few farmers possess more than 7.3 ha of land. Irrigation facilities have been designed for *rabi* (dry season) crops only. Another reason is failure to popularize short duration *kharif* (wet season) crops. The lack of fodder in summer due to Non production of *zaid* (summer) crop is mainly due to a lack of irrigation. At present, only small areas of vegetables are grown during summer, which do not provide any crop residues.

☙ FORESTS AND WASTELAND POLICY: -

Increasing the productivity of revenue wastelands; "Charnois" and degraded forest, is complex as different government departments control these lands due to encroachments, and state government policy to distribute common lands to landless people, the area under village common land in the State has greatly reduced.

☙ FODDER POLICY

The NCA recommended identification of grass species suitable for wastelands and development of technologies for improving productivity of such lands. The Commission observed that high-yielding nutritious fodder crops should compete favorably with any food or cash crop. This policy was not coupled with similar suitable policies (such as credit facilities and provision of bulls in the villages for crossing) in other departments for replacement of unproductive livestock by high-yielding breeds.

☙ GRAZING POLICY

In the absence of a State Grazing policy, only forest regulations cover grazing restrictions, and these often contradicts the fodder policy. All these factors has led to an imbalance between grazing pressure and carrying capacity of grazing lands.

INSTITUTIONAL ARRANGEMENTS AND HUMAN CAPACITY: -

☙ WILD ECOSYSTEM: -

- No institutional or informal mechanism to ensure that profits from use of biodiversity percolate down to the indigenous communities. Collection of Tendu leaves through MFP Societies could become a trendsetter.
- Use of biotechnology in the State is at bare minimum level and thus not in a position to protect the local Biodiversity from the onslaught of biopiracy.
- No mechanisms in place to monitor the grant of Intellectual Property (I.P.) protection on biological resources and associated knowledge gained from the State.
- No system or measures such as registration of local knowledge at local, district level and development of a sui- generis system for I.P. protection of such knowledge.
- No incentive mechanisms to local communities to protect & preserve traditional knowledge, innovations and practices. These incentives can be in the form of a part of the profits accruing from the commercialisation of these resources and knowledge systems.
- Non availability of young, energetic and technically trained man power for Wild Life Management, Forest Protection etc.
- People' s participation in forest protection and management has still not reached a level of satisfaction.

POLICY, LEGAL STRUCTURES AND IMPLEMENTATION: -

Gaps in existing policies and legal structures of the land are identified and relevant suggestions suiting to the present circumstances are made in the Strategy.....