

Annexure X – Biological Conservation Plan

BIOLOGICAL CONSERVATION PLAN

Biological resource based management is the application of scientific knowledge and technical skills to protect, conserve, limit, enhance, or create wildlife habitat as well as native medicinal observed flora within the study area. Biological management also includes implementing laws regulating the use, kinds, and amounts of biological resources which people can harvest. The availability of flora & fauna within the study area included spotted deer, black napped hare, Jackal and wild boar were a commonly sighted and sloth bear is occasionally seen in the forests as well as in the fringes of forest according to forest working plan.

1. CONSERVATION OF SCHEDULED FAUNA

As per Indian Wild Life (Protection) Act, 1972 the Sloth bear (*Melursus ursinus*) is protected under schedule – I and Indian Fox (*Vulpus beghalensis*), Jungle cat (*Felis chaus*) Common Langur (*Presbytis entellus*), Rhesus macaque (*Macaca mulata*), Common Mongoose (*Herpestes edwardsi*), Indian Cobra (*Naja naja*), Common Rat Snake (*Ptyas mucosus*) and Russell's viper (*Daboia russelli*) are categories under Schedule-II. The species wise conservation plan has been given below for Schedule II category to mitigating human and wild life conflict is taken care of in the proposed plan.

A. Conservation Measures for Sloth bear (*Melursus ursinus*) Schedule – I

1. Sloth bear (*Melursus ursinus*)

The sloth bear is a medium sized nocturnal animal with a long shaggy, black coat and a white crescent of hair on the chest. It inhabits hilly tracts moving to cooler parts in hot season. Bears are deep slumberous but have quick reflexes. Their front legs are bowed and the forefeet are turned inward. The claws are white and extraordinarily strong and on the forefeet it measures up to 15 cms. The sloth bear measures 55 to 85 cms at shoulder. The average length is 140 to 150 cms. Males weigh 125-145 kgs. Females weigh 54 kgs and above. The sloth bears have a whitish v-shaped breast patch and usually the muzzle and the tips of the feet are dirty white or yellowish. The lower lip is long and the hind legs short. The sloth bear is the most uncouth of all bears. Bears have small eyes, rather too small for their size. Their eyesight and sense of hearing are poor. As a result they lack the alertness of other animals. Mating time is usually in the hot weather. Gestation period is 5 months Bears have a strong maternal instinct. The cubs are carried on the mother's back. The mother gets furious and is quick to attack in their defense. The cubs live with the mother for 2-3 years till they attain maturity. Bears life span is about 40 years.

Habitat

Sloth bears have long snout and their lips are detached from the gum. Mobile and protrusible, lips are well adapted to the forceful intake and expulsion of air. Bears have a large protrusible tongue. The claws are longer in the fore feet than the hind and are good digging implements. The bear's palate is deeply concave. The gap between the teeth permits the passage of air as middle pair of incisors in the upper jaw is absent. The animal produces enough suction force to suck out termites from mounds.

Sloth bears are mainly nocturnal. Their sense of smell is well developed but their sight and hearing usually poor. They run away with human smell. But during accidental confrontation they defend and can cause nasty injuries by its claws and teeth. Not much is known about social life of bears. Sightings indicate that they are either solitary, in pairs with opposite sex or mother with cubs. Sloth bears are usually restrictive in their movement during the rains as insect food is plentiful. Mating occurs mostly in June and 1-2 cubs, sometimes 3 are born 6-7 months later. Most cubs are dropped between December to January. Birth and rearing takes place in a cave or climber thickets. Cubs are

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blind for about 3 weeks. The cubs leave the den when about 2 months old and trail the mother. Males do not participate in parental care. Sloth bear leaves up to 40 years.

Habitat

Bears frequent drier and secondary forests but also found in dense forests. Rocky outcrops and grass lands are also preferred. The dentition indicates that bears are more herbivores and there is a departure from carnivory. In fact, they are omnivorous. Their diet includes largely insects and grubs which can be dug out from the ground or from the underneath of bark of standing trees or fallen logs. They eat termite and bee nests by suction and creating a vacuum in the nest by keeping snout close to the mound. Leaves, root, honey flowers (Mahua, Semul) and fruits (Ber, Tendu, Jamun, Baheda, Amla etc.) in season. Bears sometimes raid crop. There is no human casualty or grievous injury occurs due to bear attack in the study area. Bears disperse forest seeds from the fruit they eat and keep a control over termite population. In quest of food, bears may travel several km. Bears are endangered for their gall bladder and bile to which medicinal properties are attributed.

Threats to sloth bears in general

1. Sloth bears are threatened by poaching, mainly for gall bladders, bile to which medicinal properties are attributed and other body parts. Bears also sometimes killed as nuisances.
2. In India, the main threats are habitat degradation and fragmentation, poaching for gall bladders, human-bear conflicts and stealing of cubs (which require killing the mother) for training as "performing bears".
3. Habitat loss is a serious threat; populations are becoming fragmented as forested areas outside reserves and parks are lost, and the remaining populations may be too small to be viable.
4. Habitat degradation outside protected areas results in reduced available food for the bears, which then may be more likely to eat human associated foods such as sugarcane.
5. Threat due to disturbance and forest degradation, and further disturbance by people collecting forest products which are food items required by the bears. There are also pressures from grazing livestock and associated disturbance and vegetation degradation, and loss of forest as trees are cut for fuel and timber.

Threats to sloth bears in Study area

No perceptible direct threats were identified in the villages surveyed. Village residents are against hunting or poaching of the sloth bear. However, illicit cutting of trees in the forest floor, thus may create forest degradation within the forest area. This report aims to improve the habitat of sloth bears and boost to the surrounding environment.

B. Conservation Measures for Schedule – II species available in the area are;

2. Bengal fox (*Vulpes bengalensis*)

Geographical Distribution

The Indian fox (*Vulpes bengalensis*) is endemic to the Indian subcontinent. The species has a relatively wide distribution varying from the foothills of the Himalayas in Nepal to the southern tip of the Indian subcontinent. However nowhere in its range is the Indian fox abundant.

Habitat

The species largely occupies semi arid, flat to undulating terrain, scrub and grassland habitats, which are suitable for foraging and denning activities. The Biogeographic Zones 3 (Desert), 4 (Semiarid) and 6 (Deccan Peninsula) are believed to hold relatively high numbers. It avoids dense forests, steep

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terrain, tall grasslands and true deserts. In the Indian peninsula, the species is restricted to the plains and open scrub forest.

Food

The order Carnivora is well known for its wide dietetic characteristics. Indian fox has been reported as an omnivorous opportunistic canid. Their diet has been known to comprise of insects (grasshoppers, termites, beetles, scorpions, ants, and spiders), crustaceans, rodents including gerbils, field rats and mice, hares (*Lepus nigricollis*), birds and their eggs, fishes, ground lizards and rat snakes (*Ptyas mucosus*). Fruits consumed by the foxes included ber (*Ziziphus* spp.), neem (*Azadirachta indica*), mango (*Mangifera indica*), jamun (*Syzigium cumini*), banyan (*Ficus bengalensis*) and pods of *Cicer arietum* and *Cassia fistula*. etc., they have also been reported to feed on carcasses, and urban waste.

Behavior

They are mostly crepuscular and nocturnal in habits, foraging usually in the dark hours. Denning in the Indian fox is restricted to the pup rearing period. The Indian fox breeds from December to January. average litter size being two.

Life Span

6-8 years in captivity, 10-12 years also reported.

Threat

Wolves and feral dogs are major predators. Bengal foxes are susceptible to habitat loss and degradation, persecution, roadkills, and changes in native species dynamics due to pathogens or parasites. Bengal fox is hunted for sport and for its fur. Its body parts are used in traditional medicines. Although the Indian Fox is widespread, it occurs at low densities throughout its range, and populations can undergo major fluctuations due to prey availability. It is also quite sensitive to human modifications of its habitat. There are no known commercial uses for the Indian Fox, although there is limited localized trade for skin, tail, teeth and claws (for medicinal and charm purposes). There is no trade or potential for trade of the Indian Fox.

Conservation

The people living in the surrounding area and employees of the company are motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of poaching/hunting.

3. Langur (*Presbytis entellus*)

Langur (*Presbytis entellus*) is a lanky, long-tailed monkey with bushy eyebrows and a chin tuft. It has a small slender body with long tail and long hands.

Geographical Distribution

It is found in India, Tibet, Nepal, and Sri Lanka.

Habitat

It lives in humid forests, mangrove swamps, and wooded country.

Food

The Langur's main diet consists of leaves, seeds, grain fruit and berries. Their natural food consists of leaves, fruit and insects from time to time. Many primate species once considered herbivorous are now known to expand the animal-matter portion of their diet to high levels when it is possible to do so. The amount of insect matter in most primate diets is small, but may expand to more than 90% of the diet when insects are abundant and easily captured. Since palatable and accessible prey species

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often occur only seasonally, the amount of animal matter in primate diets can change dramatically throughout the year.

They are programmed to eat rapidly, often indiscriminately, depending upon bacteria in their fore-stomachs to break down any toxins they may have ingested. This is perhaps the reason for the wide success and distribution of this species. They also obtain salt, mineral and trace elements by licking rocks, termite mounds and salt licks. Being wasteful feeders, they drop large quantities of food to the forest floor, which is picked up by deer feeding below.

Behavior

Langurs live in groups; the group consists of many females and one or two dominant males. Males chase each other to defend their territory and to establish mating rights. Langurs don't like water and cannot swim. They can jump up to 10 meters, and cross small rivers and streams. They sleep on trees and come down to ground for foraging and to drink water. They are excellent climbers and can jump from tree to tree when threatened. Also they travel on ground from place to place in small groups.

Lifespan:

It has a lifespan of about 25 years.

Threats:

Leopards and sometimes tigers are the main threats to langurs. Leopards, using their speed and climbing ability can bring down the Langurs quite easily. Conspecific threat is an important selective pressure influencing langur group size and composition, suggesting that this selective pressure should be evaluated more widely as a factor influencing composition of animal groups. People's feelings, perceptions and attitudes toward them point to an incipient man-monkey conflict and erosion of conservation ethics. However, The Langur population in India is quite high and hence they are not so threatened.

Conservation:

The people living in the surrounding area and employees of the company will be motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of poaching/hunting.

4. Indian Cobra (*Naja naja*)

The cobra can be immediately distinguished from other land' snakes by the presence of a small 'cuneate' scale between the 4th and 5th infra labials. Rarely two may be present and very rarely the cuneate may be absent. Another distinguishing character is the periocular touching the intranasal, a character seen in two other species of Indian snakes also but the cobra can be separated from these in having the 3rd supralabial in contact with the eye. The hood is formed by the elongated ribs of the 3rd and the following 27 vertebrae, the 9th on the left and 10th on the right are the longest, the preceding and succeeding ribs shorten progressively giving an oval outline to the expanded hood. At rest the ribs lie along the length of the body, the overlying skin is but loosely attached. When erect the dorsal skin is stretched making the hood markings conspicuous and the head bent strongly at the atlas (1st vertebra) is carried at right angles to the hood. The hood when dilated is diagnostic, more so when the markings are visible. The markings may be absent and in death the hood may not be monstrable. The King Cobra has a well-developed hood and many other snakes have the ability to flatten the neck area to a more limited degree. Head depressed with short, rounded snout. Nostrils large, pupil round, at. Obvious swelling at the temporal region over the underlying poison glands. Head shields glossy, body with a more or less distinct groove down the spine.

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Habitat, distribution and status

Absent in arid deserts and in the hills above 1800 m. Occurs from Transcaspia in the north, through Indian subcontinent to southern China in the east and to the Philippines in the south. Andamans. & Sri Lanka.

Habits

Found almost anywhere, in heavy jungle, open cultivated land, in populated areas where old masonry constructions form ideal refuge. White ant nests, holes in the ground or the tangle of roots at the base of a tree are particularly favored. Frequently found near or in water and is a strong swimmer.

Usually not aggressive and often exceedingly timid but occasionally fierce and aggressive when disturbed. Young are much more dangerous than adults being more easily excited and ready to strike repeatedly and with determination. When alarmed it adopts the well-known pose with erect forebody and spread hood. The height to which the forebody is raised is approximately one-third the total length of the snake and forms the effective striking range. Whilst thus poised the snake sways backwards and forwards hissing in an explosive manner brief and high pitched during inhalation and longer, louder, lower pitched and intermittently explosive during exhalation. The throat is pouched; more so, during exhalation and the whole body is inflated. The tongue flickers in and out during inhalation and exhalation. The bite is often a mere snap but sometimes bites and hangs on and the jaws have to be forced open. Occasionally when the snake misses, the poison is ejected as a spray by the forceful thrust of the lunging snake. Usually more active and alert at night though hunts for food during the late afternoon and early evening.

Food

Cobra likes to feed rats, frogs and toads. Also takes birds, lizards, other snakes including other cobras and is an invertebrate egg stealer. Eggs are swallowed whole and digested in about 48 hours.

Breeding

Mating has been seen in January and the majority of eggs are laid in April/May but clutches have been obtained up to August. The period of gestation is about sixty-two days but may extend considerably. Eggs hatch in 48 to 69 days. Twelve to twenty two, in one instance 45 (36 fertile) eggs are deposited at a time. The eggs are soft-shelled elongate oval measuring 49 x 28 mm. The parents cohabit before pairing and the eggs are guarded by one or both. Both parents known to incubate. Hatchlings measure 250-280 mm at birth. The poison glands are active from birth.

Conservation

The people living in the surrounding area and employees of the company will be motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of poisoning/hunting.

5. DHAMAN (*Ptyas mucosus*)

Majority of adults vary from 1.65 to 2 m but specimens up to 3.52 m (11 ft 9 in.) have been recorded. Males are usually longer than females. In young, however, light bluish grey irregular crossbars are usually conspicuous inferiorly.

Habitat, distribution and status

Essentially a snake of the plains but has been recorded up to 1800 m. throughout The Indian subcontinent, Sri Lanka and Burma. In the west extends to Afghanistan and Turkistan. In the east to south China. Also reported from Java and Sumatra. A common snake in all parts of the country.

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Habits

Diurnal but in populated areas may not be commonly seen out during the day. Takes readily to water and swims vigorously with the head well above the water. Equally adept at climbing and is often seen on trees, has been reported to jump down from a height of 6 m when disturbed.

Normally tries to escape when sighted but if provoked and brought to bay attacks with courage and determination. When infuriated retracts and slightly erects the head and body into an S, compresses the body and with spine arched and the throat markedly pouched, strikes upwards. The tail tip is also rapidly vibrated.

Food

Eclectic in diet, devouring almost anything that chance brings within its reach but shows a marked preference for frogs and toads. When necessary the snake can exert considerable pressure to hold down its prey and can crush to death by pressing the prey against the ground with its body. Rats though preyed upon are not nearly as staple an article of diet as suggested by the snake's popular name. Lizards, birds and other small vertebrates are taken when available and the recorded food includes, geckos, toads, frogs, young pond turtles, nestling birds, skinks, agamid lizards, bats and snakes.

Breeding

The breeding season varies with the climate. In the Himalayas and the higher hills of the south young usually appear from May to August, rarely in September. In the plains it mates in May-June, lays eggs in August-September and young are born from late September to January. Eggs in a clutch vary from 6 to 14 in number. Glazed white in appearance equally domed at both sides and with a crisp, thick, parchment-like shell. Sticky when voided and adhere to each other. The female 'coils up with the eggs. Eggs measure 41-60 x 25-32 mm. Hatchlings measure 371 to 472 mm. One grew 3 cm in 20 days, though it had taken no food. The young apparently double their length in a year and continue this rate of growth the second year when they are about 125 mm in length. Sexually mature when they are about three years old. The Dhaman has lived in captivity for over 11 years. An unusual behavior, which has not been recorded in any other species of Indian snakes, is the 'Combat Dance', between males which twine around each other on the ground as well as when half erect. Most of the records of mating in literature relate to this behavior.

Miscellaneous

The Rat Snake used to be eaten in some parts of Malabar in Kerala, the snake being de-scaled by passing it tail first through a hole in a coconut shell. The head is discarded and the cooked flesh is served as "Parambu wala or Kara wala" = Land Cat fish. There is a persistent belief in many parts of the country that the rat snake is the male of the Cobra. Another erroneous belief is that it is addicted to sucking the teats of cows.

Conservation

The people living in the surrounding area and employees of the company will be motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of poisoning/hunting.

6. Russell's Viper (*Daboia russelli*)

Widely distributed but prefers open area. Indian subcontinent from Baluchistan in the west and Kashmir in the north to the eastern Himalayas and eastwards to Burma, Thailand, Indochina, Formosa. Indo-Australian Archipelago and Sri Lanka. In some parts of the country it is very common

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and rare in others. Uncommon It is not uncommon in inhabited areas, the attraction being the rodents commensally with man.

Habits

Normally sluggish and does not strike readily unless irritated when it bites with great malice. Usually it contends itself with hissing which once heard is not easily forgotten, the volume of sound exceeding that produced by any other snake. When striking it hurtles itself forward and may even leave the ground. Largely nocturnal, its movements are slow, never exceeding a crawl and if disturbed often prefer to maintain ground angrily hissing with heaving sides. The young are more prone to be aggressive and to bite. The main food is murid rodents. In captivity it has taken, in addition to rats and mice, squirrels, shrews, kittens, small birds, calotes, lizards and frogs. In captivity, many adults do not feed and one was recorded as not having fed for nearly five months.

Breeding

The Russell's viper is viviparous. Fertilized eggs develop a white envelope like eggs of other snakes but this envelope in advanced stages becomes a transparent membrane, which ruptures prior to delivery, or the young may be born in a caul. The envelope in unfertilized eggs remains white as in the early stages and these eggs are frequently voided along with the young giving rise to the belief that the snake is both ovi- and viviparous. Sacs with young measure 43 x 20 mm.

Gravid females have been obtained in all months of the year. Young are born between May and November with a peak period of birth in June and July. The gestation period exceeds six months. One of the most prolific of Indian snakes frequently producing thirty to forty young. The maximum recorded is sixty three but instances of a single fetus or less than twenty are known. Length at birth varies from 215 to 260 mm. smallest gravid female-recorded 1,015 mm about three years in age.

Conservation:

The people living in the surrounding area and employees of the company are motivated towards the protection of the animal. Motivation is leading to timely information to the concerned authorities about any threat to wild life or any cases of pouching/hunting.

2. CONSERVATION OF MEDICINAL PLANT

Complete protection of the forest area results in conservation of all types of flora found in the area. However, due to common habitat and niche of several species in the same area or overlapping to each other, complete closure of the area is neither possible nor advisable, as it can affect many species in negative manner. Thus along with the optimum protection measures propagation of species through the known nursery techniques is the only way of flora conservation.

Some important mendicinal plants have been recorded from the study site given in the table separately which needs special attention for their conservation.

TABLE 1
DETAILS OF IMPORTANT MEDICINAL VALUE PLANTS OBSERVED IN THE STUDY AREA
AROUND CG COAL & POWER LTD

S. No.	Botanical Name	Local Name	Family	Habit	Plot			
					Core	BF-1	BF-II	BF-III
1	<i>Acacia catechu</i> , wild	Khair	Leguminosae	T		*	*	
2	<i>Adina cordifolia</i> , Hook, F	Haldu/Kalmi	Rubiaceae	T		*	*	

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S. No.	Botanical Name	Local Name	Family	Habit	Plot			
					Core	BF-1	BF-II	BF-III
3	<i>Aegle marmelos</i> , Corr	Bel	Rutaceae	T		*	*	
4	<i>Ailanthus excelsa</i> Roxb.	Maharukh	Simarubiaceae	T		*	*	*
5	<i>Alangium-salvifolium</i> , (Lin.F.) Wang	Ankol	Cornaceae	T		*		
6	<i>Albizia lebbek</i> , Benth	Kala siris	Leguminosae	T		*	*	*
7	<i>Andrographis echinoides</i> (L.) Nees	Bhuineem	Acanthaceae	H				
8	<i>Annona squamosa</i> L.	Sheetaphal	Annonaceae	T		*	*	
9	<i>Azadirachta indica</i> , A. juss.	Neem	Meliaceae	T			*	*
10	<i>Boerhaavia diffusa</i> , Brandegeee	Punarnava	Nyctagenaceae	H	*	*	*	*
11	<i>Bombax ceiba</i> , Linn	Semal	Malvaceae	T		*	*	*
12	<i>Boswellia serrata</i> , Roxb.	Salai	Burseraceae	T		*	*	*
13	<i>Buchnanania lanzan</i> , Spreng	Achar	Anacardiaceae	T		*	*	*
14	<i>Calotropis-gigantea</i> , R. Br.	Aak	Asclepiadaceae	S		*		
15	<i>Cassia fistula</i> , Linn	Amaltas	Leguminosae	T	*	*	*	*
16	<i>Cassia tora</i> (L.) Roxb.	Charota	Fabaceae	H	*	*	*	*
17	<i>Celastrus paniculata</i> , Willd.	Penbeeja	Celastraceae	C		*	*	
18	<i>Convolvulus pluricaulis</i> Choisy	Sankhpuspi	Convolvulaceae	H	*			
19	<i>Cordia dichotoma</i> , Forest. P.	Lasoda	Boraginaaceae	T			*	
20	<i>Curculigo orchinoides</i> Gaertn.	Kali musli	Hydrophyllaceae	H		*	*	*
21	<i>Curcuma angustifolia</i> , Roxb.	Tikhur	Seitamineae	S		*		
22	<i>Curcuma aromatica</i> Salisb.	Ban haldi	Zingiberaceae	H		*		
23	<i>Cyperus scariosus</i> R.Br.	Motha	Cyperaceae	G			*	*
24	<i>Desmodium gangeticum</i> (L.) DC.	Salpan	Leguminosae	H		*	*	*
25	<i>Dioscorea belophylla</i> , Voigt.	Kadukanda	Dioscoreaceae	C		*		
26	<i>Dioscorea bulbifera</i> L.	Kadukanda	Dioscoreaceae	C			*	
27	<i>Ehretia laevis</i> , Roxb.	Dataranga	Boraginaceae	T			*	
28	<i>Elaeodendron glaucucum</i> , Pers.	Jamrasi	Celastraceae	T	*	*	*	*
29	<i>Elephantopus scaber</i> L.	Ban tambakhu	Asteraceae	H	*		*	*

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S. No.	Botanical Name	Local Name	Family	Habit	Plot			
					Core	BF-1	BF-II	BF-III
30	<i>Embelica officinalis</i> Caern.	Aonla	Euphorbiaceae	T		*	*	*
31	<i>Eranthemum purpureum</i> Wight ex Nees	Ban Tulsi	Acanthaceae	S		*	*	*
32	<i>Erythrina Indica</i> , Roxb.	Pangara	Leguminosae	T		*	*	*
33	<i>Evolvulus alsinoides</i> (L.) L.	Neelpuspi	Convolvulaceae	H	*			
34	<i>Gardenia gummigera</i> , Linn. F.	Dikamali	Rubiaceae	S		*		
35	<i>Gardenia latifolia</i> , Ait.	Papra	Rubiaceae	T		*		
36	<i>Gerwia hirsuta</i> , Vahl.	Gudsakari	Tiliaceae	S			*	*
37	<i>Grewia tiliaefolia</i> , Vahl.	Dhaman	Tiliaceae	T		*	*	
38	<i>Hemidesmus indicus</i> (L.) R. Br. ex Schult.	Anantmul	Apocynaceae	H	*	*	*	*
39	<i>Holarrhena antidysentrica</i> , Wall.	Koreya	Apocynaceae	S				*
40	<i>Nyctanthes arborescens</i> , Linn	Siharua	Oleaceae	T		*		*
41	<i>Phyllanthus amarus</i> Schumacher & Thonn.	Bhuiaonla	Euphorbiaceae	H		*	*	*
42	<i>Pongamia pinnata</i> , (Linn.) Pierre	Karanj	Leguminosae	T		*	*	*
43	<i>Pterocarpus marsupium</i> , Roxb.	Beeja	Leguminosae	T		*		*
44	<i>Randia dumetorum</i> , Lamk.	Mainphal	Rubiaceae	T	*	*	*	*
45	<i>Schleichera oleosa</i> (Lour) Oken.	Kusum	Sapindaceae	T		*	*	*
46	<i>Semecarpus anacardium</i> , Linn	Bhilwa	Anacardiaceae	T		*	*	*
47	<i>Sida acuta</i> Burm.f.	Bala	Malvaceae	H	*	*	*	*
48	<i>Sida cordifolia</i> L.	Bariyari	Malvaceae	H		*	*	*
49	<i>Sida rhombifolia</i> L.	Vishkhapari	Malvaceae	S	*	*	*	*
50	<i>Smilax zeylanica</i> , Linn	Ramdaton	Liliaceae	C		*	*	*
51	<i>Sterculia urens</i> Roxb.	Kullu	Sterculiaceae	T			*	*
52	<i>Stereospermum suaveolens</i> , D.C.	Garudphal	Bignoniaceae	T		*	*	
53	<i>Terminalia arjuna</i> , W. et A.	Koha	Combretaceae	T		*		
54	<i>Tephrosia purpurea</i> (L.) Pers	Sarphonka	Leguminosae	H				*
55	<i>Terminalia belerica</i> , Roxb.	Bahera	Combretaceae	T		*	*	*

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S. No.	Botanical Name	Local Name	Family	Habit	Plot			
					Core	BF-1	BF-II	BF-III
56	<i>Terminalia chebula</i> , retz.	Harra	Combretaceae	T		*		*
57	<i>Vitex negundo</i> , Linn.	Nirgundi	Verbenaceae	S				*
58	<i>Woodfordia fruticosa</i> , Kurtz.	Dhawai	Lytharceae	S				*
59	<i>Wrightia tinctoria</i> R.Br.	Dudhi	Apocynaceae	T		*	*	*

It is suggested that prefer these species in plantation and habitat evaluation programme and also take care in natural habitat.

3. CONSERVATION THROUGH HABITAT IMPROVEMENT AND AWARENESS

Conservation aspect for local birds

Habitat improvement programme will be undertaken through plantation of suitable tree species in the surrounding villages. While selecting the tree/ shrub species care shall be provided for beery plants which attract these birds. During summer period, villagers will be encouraged to use the old earthen pots to fill with water for drinking these birds.

Summer is the time when these birds are facing shortage of feeds, there by supplying he feed like Bajra, Jowar and Maize to the identified surrounding villages under conservation programme will suffice the problem of food shortage. The proponent can directly supply these feed to the villages directly or by funding to the NGOs active in this mission.

The activity of proposed project of M/s. C G Coal & Power Ltd. is committed to improve the prominence of schedule fauna in the surrounding area for that the following wildlife management plan is suggested.

Wildlife management consists of habitat evaluation and assessment, periodic vegetation and animal status monitoring, identification of habitat factors favorable to growth and which act against the population.

Welfare factors are promoted, decimating factors are arrested and limiting factors mitigated so that habitat carrying capacity is optimized and populations attain the saturation point intrinsic to the species.

Participation and support of local public to make the conservation plan work and outcome becomes sustainable.

However, protection of nature & environment and development of economy are not alternatives, not mutually exclusive. Both have to proceed hand in hand so that natural ecosystems are maintained or better, restored for uninterrupted flow of goods and services, on which human survival is dependent. Conscious of the above and in consonance with the statutory requirement, this conservation plan is made to mitigate the impact on flora & fauna of the study area.

The important objects of management are:-

i) To maintain the existing wildlife habitats in optimal state of productivity by alleviating the impairing forces.

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- ii) To restore degrading habitats and nurture biodiversity.
- iii) To protect the resident fauna and long ranging sloth bears.
- iv) To provide awareness among the public about wildlife.

Suggested interventions: Scientific data is available to show that 1 ha tropical dense forest has the capability to sequester 0.3 tonnes of CO₂ per day.

Protection Measures:

Block plantation: With a view to compensate for loss of habitats in and outside the protected area, plantation with species qualifying of suitable habitat and should have medicinal value will be taken up within the protected forest, government waste lands and in vacant places like embankment of irrigation Canals, river banks, vacant space within the study area etc. as proposed in the management plan. Nursery raised seedlings in poly pots @ 1200 seedlings per ha will be planted in previously excavated and treated pits. Nine months to one and half year old seedlings will be used depending on growth characters.

Pits will be dug of 45 cm. cube in September-October when soil is still moist and allowed to wither. To each pit a basketful of farm yard manure/compost and 30 gm basal dose of NPK will be added before planting to improve soil texture and nutrient status. Half-moon trenches will be made on uphill side of sloping land or saucer made in flat land to conserve moisture. Mulching will be done after first soil working/weeding in 1m radius to improve soil moisture and minimize weed growth. Plantation will be watered as and when required.

As a preventive against termite, 20 gm of neem cake will be added around each plant. Plantation will be kept properly weeded; fire may protect and will be stone-wall fenced against cattle for 5 years till rise above browsable height.

Plan period: The plan is for a 5 year period as wildlife management plan.

Provision of Plantation & Water hole creation

Provision should be made to create facilities like water hole and plantation of fruit bearing trees. Sloth bears seek out honeycombs and fruit trees. Thus, especially Moha, Jamun, Guava, Mango, Neem, Ber & *Jangle jelebee*, etc. which acts as a food for Sloth bears and certain thick plantation barriers along the forest boundary mostly opposite to the villages which lies near the vicinity of forest area.

Indigenous misc. species adaptable to the site and recommended as below:

- 1) Haldu (*Adina cordifolia*)
- 2) Bel (*Aegle marmelos*)
- 3) Jamun (*Syzygium cumini*)
- 4) Pyara (*Psidium guajava*)
- 5) Mango (*Mangifera indica*)
- 6) Sissoo (*Dalbergia sissoo*)
- 7) Mohua (*Madhuca longifolia*)
- 8) Neem (*Azadirachta indica*)
- 9) Gambhar (*Gmelina arborea*)
- 10) Khajur (*Phoenix sylvestris*)
- 11) *Jangle jelebee* (*Pithecellobium dulce*)
- 12) Karanj (*Pongamia pinnata*)
- 13) Dhaman (*Grewia tiliacfolia*)

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14) Kachnar (*Bauhinia racemosa*)

15) Dhawda (*Anogeissus latifolia*)

16) Ber (*Zizyphus sp.*)

Cover plants:

1) Gular (*Ficus glomerata*)

2) Jamun (*Syzygium cumini*)

3) Karanj (*Pongamia pinnata*)

4) Kurum (*Adina corolifolia*)

8) Neem (*Azadirachta indica*)

9) Vad (*Ficus bengalensis*)

12) Bahada (*Terminalia bellerica*)

13) Bakain (*Bridelia retusa*)

(a) Farm forestry: With a view to reduce dependence on the natural forests for biomass, alternate resources need to be building up. Nurseries will be created, which will raise seedlings every year. Species to be raised are primarily to cater to fuel and small timber needs. Seedlings will be distributed to villagers on a nominal rate. Nominal charge will reinforce a sense of belonging and promote planting and post planting care. The distribution will be facilitated through DFO.

(b) Village woodlot: High density plantations will be done in village woodlot @ 2500 plants/ha, i.e. a spacing of 2x1.5m. The species to be used are fast growing species like *Acacia auriculaeformis*, *Albizia procera*, *Gmelina arborea*, *Eucalyptus*, *Peltophorum*, *Leucaena leucocephala*, *Cassia siamea*, *Azadirachta indica* and bamboos. The plantation will be fire protected and grazing stopped for 1-2 years depending on growth. Land is adequately available in various villages in the study area.

(c) Deweeding and sowing of grass: Heavily weed infested area will be de-weeded by manual uprooting at the commencement of rains followed by sowing of grass. This work need to be completed by July. For uniform growth of grass and to prevent seeds being washed away, grass seed pellets will be sown at regular interval of 1x1.5m for which 5000 pellets will be needed per ha. Pellets can be made by mixing powdered clay and farm yard manure in 6:1 ratio to which grass seeds will be added @ 5 kg/ha. The mixture will be made into balls of 2 cm dia and sun dried in summer to be sown soon after de weeding. The weeds will be heaped in continuous lines along contours at a horizontal spacing of 4-5m, which will act as mulch and disintegrate in due course. This will also arrest erosion to an extent. Seeds of *Themeda triandra*, *Dichanthium glabrum*, *Eragrostis ciliate*, *Apluda mutica* etc. can be mixed and pellets made. It is important to completely protect the treated area from fire by fire lines of 10m wide.

Corpus fund: DFO Korba will maintain a corpus fund A/C to which a contribution will be made by the company.

Training for alternate livelihood: Professional training for alternate livelihood will be arranged through Government training institutions. Alternatively, specialists in the training along with training material may be taken to selected venue, where prospective candidates will be gathered to imbibe hands on practice & experience.

Awareness promotion: The success of any conservation plan of this magnitude is entirely hinged on the active support and whole hearted co-operation of all stakeholders with the members of public playing a major role. For this purpose, meetings and seminars will be organised from village to village

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on regular basis to carry the people along with implementation. The discussion may evolve around habitat loss, fragmentation, monitoring of movement of bears, fire damage control and how best the vegetation can be revamped etc. Members of public will be encouraged to speak. Student community may also be sensitised on various conservation issues. Members of NGO may be invited. Promote community-based forestry projects. As forested lands outside the reserves continue to shrink and decline in quality due to human activities, more land needs to be protected. Community-based forestry programs could significantly expand habitat for sloth bears.

Measures within the plant area: Besides the measures suggested above other provisions made in environmental management plan and those suggested by the MoEF while granting environmental clearance may have to be scrupulously followed in order to minimize the impact of the emissions from the plant and other adverse impact created due to other activities which will result due to establishment and operation of the proposed plant.

Monitoring Committee: A monitoring committee under the Chairmanship of the DFO (WL) will be formed with Manager (Environment), M/s. C.G. Coal. The committee will provide guidance, resolve conflicts & problems and provide direction to the smooth implementation of plan. The committee will scrutinize emission standards as prescribed by SPCB and will also monitor conditions stipulated under environment clearance. Above measures will bring transparency in working and adherence to conditions imposed under statutory clearances.

Funding: The conservation plan will be funded by M/s. C.G. Coal and DFO Division shall be implementing agency with collaboration of project proponent where the plan will be intimated.

Budgetary Provision for conservation Plan (In Lac)

S. No.	Particulars	Total
1	Conservation of soil and water	4.00
2	Plantation for food and cover development	6.00
3	Fire protection	3.00
4	Awareness programme & Training	2.00
	Grand Total	15.00