

A Study on Biodiversity of Hatma Village, Mandar, Ranchi

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KEY WORDS Biodiversity. Conservation. Forest. Diversity Index. Literacy. Tribes.

ABSTRACT An attempt has been made in the present study to understand the biodiversity conservation of Hatma village of Mandar Block of Ranchi. Village. Hatma is inhabited by five different communities, i.e. Mundas, Oraons, Lohra, Mahtos and Ansaris. Belonging to 92 families, total population of the village is 599 individuals (282 males and 277 females); of which only 18.43 per cent are literate. The primary occupation of the village is cultivation (59.39%). The study incorporates various aspects like village economy, fuel need, fodder consumption, forest produce and medicinal plants, calculated the diversity index.

Scientists of the world are coming gradually to realise that a fate similar to the mighty Romans would befall on the humankind if man do not plan out programme to protect the mother earth in right earnest. Keeping this in mind scientists all over the world are now concerned in protecting the nature which has been immensely harmed because of the industrial revolution which started in the eighteenth century. The world scientists are advising to reduce the use of fossil fuel, poisonous pesticide and are now suggesting a new strategy for protecting man and environment. The new strategy is 'Biodiversity'. The man must cling to nature to protect humankind.

Biodiversity encompasses all species of plants, animals and microorganisms and the ecosystem of which they are parts. It is an umbrella term for the degree of nature's variety including both the number and the frequency of ecosystem, species or genes in a given assemblage. It is mainly considered at three different levels, 'genetic diversity', 'species diversity' and 'ecosystem diversity'. Genetic diversity is a concept of the variability within a species, subspecies or breed. Species diversity refers to the variety of organisms on earth which has been estimated to be between 5 to 30 million or more. Ecosystem diversity relates

to the variety of the habitats, biotic communities and ecological processes in the biosphere (Anon, 1988).

The conservation or restoration of biodiversity is a subject that is attracting world-wide attention today. The importance of biological diversity as a developing futuristic economic resource of great potential hardly needs to be emphasized. But estimating biodiversity is perhaps the greater challenge, for it would require millions of man-days of painstaking work by highly trained biologists. Life forms are so diverse that many years of specialized training are required so as to be able to recognize and describe them and even then such training will provide knowledge of just one small group of living organisms. The majority of the medicines or drugs in use by human society are derived from the wild plants or wild animals. Hence it is in our own interest that we should conserve the precious biological diversity.

Conservation has been defined as the management or resources for the benefits of all life, including the human of the biosphere, so that the sustainable benefits may be derived by the present, while potentialities be maintained to meet the needs and aspirations of the future generations (Khoshoo, p. 321). It is therefore a dynamic and continuing concept and not a static one.

India is richly endowed with a unique biodiversity and has a tremendous ecogeographic diversity. Almost all types of habitats available in the world are found in India.

India's unique biodiversity has rich economic potential but needs to be protected from degradation and exploitation from a particular class of people whose only interest is to get rice quick by exploiting the nature.

The primary objective of the present study is to find out the nature of biodiversity and the conservation problems of Ranchi district which

has become a flourishing industrial centre since the establishment of the Heavy Engineering Corporation at Ranchi in 1960. This development of industrial centre has made us aware that Ranchi and its adjoining areas need more attention for a sustainable development programme for many years, for a decent living, by taking care to maintain the ecological balance.

An interior rural area was taken up for an initial study on biodiversity of the region which is located in Mandar block of Ranchi district for which field work was conducted during April 1993 to September 1993.

MANDAR: THE FIELD AREA

Mandar has been specifically taken up for our biodiversity conservation study. Mandar has a unique rural/urban characteristic which is more aptly expressed as rural. Just about 10 Km to the north of Mandar bus stop lies the forested region. Ranchi to Mandar is easily accessible by road and the forested region can be reached by any two wheeler. It is because of this easy accessibility that Mandar was selected for our field study particularly the two panchayats i.e. Hasmi and Karge panchayat.

Mandar block office is situated at a distance of 29 Km (bus stop) on to the west of Ranchi Lohardaga road. The total area of Mandar block is 23864.31 hectare. The total population of Mandar block is 1,26,904 persons, out of this 47,456 are scheduled tribe and 959 are scheduled caste people (1991 Census). The rest is represented by caste Hindus and Muslims. Mainly the Oraons and the Mundas are the dominant tribal groups of the area. The total agricultural area of the Mandar block is 17578.88 hectare and the forest area of the block is 1645.20 hectare. In the block 157.36 hectare is the orchard area (Source: Block Officer Record).

Flora: Forest of this area is dry tropical Sal (*Shorea robusta*) type of forest. There are two forests named after the village Hatma forest named after Hatma village; and Harra forest in the name of Harra village. The only Sal forest (not dense) can now be seen on the bank of the Damha river near by Pandania tola of Hatma village as well as on the banks of Bhur river. The other species of this forest (Hatma forest) are

Gambhar (*Gmelina arbori*), Kend (*Diospyros tomentosa* or *Metanokylon ebenum*). At some places of the forest plantation has been done in which *Eucalyptus* are more in number.

Jamun (*Eugenia tomentosa*), Karanj (*Pongamia glabra*), Jackfruit (*Artocarpus integrifolia*), Pipal (*Ficus religiosa*), Bar (*Ficus bengalensis*), Bael (*Aegle marmegos*), Mahua (*Bassia latifolia*), Bamboos (*Bambusa sp.*), Semar (*Bombax malabaricum*), Karam (*Nauclea cordifolia*), Kusum (*Schleichera trijuga*) are common around the village area. At some places as in ghats a few Dwarf palm (*Phoenix acaulis*) or Khajur is found.

The Mahua tree which provides people with fruit (*duri*) and flower (*matkam*) is very important for the poor tribals.

Fauna: The wild life of the study area may be grouped into two—the carnivores and the herbivores. Throughout the wooded hills, nearby the river and sometimes around the villages, Hyaenas (*Hyaenas straita*) are found and they try to lift the goats and the small kids who usually play around villages near the fringe areas.

Village: Hatma

The village Hatma is situated at a distance of 34 km from Ranchi and 5 km north of Mandar block and falls under the Karge Panchayat of Mandar block on the Mandar Burmu road. The road is motorable and metalled. There is a primary government school in this village. All the houses are mud walled and with tiled roof. The total land area of the village is 1151.57 hectare. On the north side at 4 km is the village Murwa, on the south at 2 km is the village Karge. The village Thakurgaon is at 4 km on eastern side of Hatma and at 3 km west is the village Harra.

Table 1: Distribution of the Tribals, Hindus and Muslims in the village Hatma

	Number of families	
	Abs.	%
Tribals		
Munda	81	88.04
Oraon	3	3.26
Lohra	2	2.17
Hindus		
Mahto	4	4.33
Muslims		
Ansari	2	2.17
Total N =	92 families	

Table 2: Population distribution and literacy rate in the village Hatma

	Frequency	
	Abs.	%
Male	282	50.45
Female	277	49.55
Tribals	510	91.23
Non-tribals	49	8.77
Literate	103	18.43
Illiterate	456	81.57
Total persons in the village	559	

The village Hatma is a mixed village. It is inhabited by five different communities. The village is dominated by the tribals specially the Munda people. Whereas Mahtos are the next higher group. The village Hatma is divided into three main hamlets or tolas: Hatma (Barki Hatma), Chotki Hatma and Pandania tola. Barki Hatma or main Hatma covers almost 75 per cent of the total population of Hatma. The *Pahan*, the religious head of the tribals has his dwelling here.

The Village Demography

According to the data collected from the Block Office (1991 Census) the total number of families in the village is 92 out of which 92.23 per cent are tribals among them 88.04 per cent are Mundas, 3.26 per cent are Oraons and 2.17 per cent are Loharas. The Mahtos represent 4.35 per cent, while Ansari Muslims are 2.17 per cent. The total population of the village is 559. Out of the 559 souls 282 are males and 277 are females.

The adult members in the village are found to be 75.31 per cent of the total population. Only 18.43 per cent of the total population are literate, while 81.57 per cent are illiterate.

Source of Water Supply

It has been found during our field work that the villagers have a number of wells owned by individual households. Block Office has constructed 4 *chapakal* (hand pump). Dumaha river is also a source of water for washing, bathing, and for irrigation purposes for the lands near the bank of the river.

Occupational Structure

The primary occupation of Hatma villagers is cultivation (59.39 %). About 40% of the total population are found to be unemployed, while

only 5 members of the village are in service, and 3 members are engaged in other casual works.

Village Economy

For about 60 per cent of their subsistence the villagers are mainly dependent on agriculture. The people of the village regularly attend the weekly market (hat) which is held at Thakurgaon at a distance of 4 km. Another weekly hat is at Burmu about 4.5 km away, and another one at Mandar at a distance of 8 km.

Many villagers sell forest produce in the weekly *hat*.

Fuel Need

For their fuel, all the villagers have to depend upon the forest wood. The forest firewood is the only source which enable them to cook their food. More than 50% of the villagers collect firewood from the forest while some villagers bring the firewood from the Mandar *hat*. It is the customary practice that the female carry the fuel wood from the forest to their homes on their head (head load) and the male on their shoulder (shoulder load). A few villagers have been found to carry fire wood on their bicycle also. We estimated one head load as 20 kg and one shoulder load as 40 kg. It has been observed that the timbers or the poles are usually carried by the males. The villagers collect the fuel wood only for their own personal consumption and not for selling. The wood sellers come to the hat from a distance of 8-15 km to sell bundles of wood uniformly cut to a size of 12" to 15" and each bundle containing about 10 to 12 sticks.

Fodder Consumption

The waste lands in the village are the grazing land for the cattle. The cattle graze on uncul-

Table 3: Land distribution under various classes

Class of lands	Area (in hectare)
Cultivated land	306.79
Total cropped area	
Bhadai	188.61
Aghani	84.11
Rabi	29.40
Garma	4.67
Uncultivated land	844.78

Source: Block Office, Mandar

tivated land as well as in the forested area. The cattle are allowed to graze in the agricultural fields by the villagers only when the harvesting season is over. In the morning the cattle are taken to the grazing fields and forest by the adolescent/adult young boys (*charwaha*) and in the evening they are brought back to their homes, when all seems to be well fed. When grasses wither away during dry months of the summer, the cattle are given fodder of paddy straws which are usually stocked on specially made wooden platform of logs or on forked tree trunk after the harvest. Special attention is paid to the bulls and bullocks, as they are being used in ploughing their land. There are many problems in fodder collection. The maximum number of persons reported that they have no idea of fodder cultivation.

Timber Collection

Sal trees are abundant in and around the forest area. Other important trees are mango, jackfruit, pipal, karam, jamun, koinar, bamboo and mahua, which are common trees found in the village. Bamboo is a very useful material for them for house construction.

It is found that maximum number of the villagers collect Sal tree logs for their house construction, *bari* fencing and for erecting *machan* also. The roof of the houses are also made up of Sal and Bamboo logs and *khapra*. Many other implements are also made from the forest timbers.

Forbidden Trees

Usually the villagers do not cut down the trees which give them fruits. They do not cut down mango, jamun, jackfruit trees as these trees give fruits during lean summer season. They do not cut down karam trees as this has religious significance as the tribals worship the karam tree on the occasion of karam festival. However, jamun trees are very few in number in and around the village. The villagers reported that about 3-4 decades back the mango trees were abundant in number in this area and therefore the villagers named one of the tolis as Ambatoli.

Minor Forest Produce

There are large number of minor forest pro-

duce identified and collected by the villagers who live near the forest. The minor forest produce may be classified into groups like flowers, fruits, seeds, leaves and medicinal plants.

Koinar, Munga and Mahua flowers are minor forest produce used by the villagers as food items. Among the fruits; jackfruit, mango, jamun, kanoda, kend and tamarin (*imli*) are occasionally collected by the people of Tigoy Ambatoli, and Hatma villages from the nearby forest as food items.

Sal, Kendu and Phutkal leaves are used by the villagers for their domestic consumption as well as many other kinds of *sag* like Koinar sag, Sarso sag etc., are taken as vegetables by the villagers of Ambatoli and Hatma. Many types of roots like-Sakhin kanda, Sakar kanda and Aru kanda are also used as vegetables by the villagers.

These minor food items are useful supplement to the regular diet of the villagers particularly the tribals. As the tribals are living closer to the forested region of Mandar block so they are more knowledgeable about the minor forest produce which they procure from the area around the village and the forested region.

Medicinal Plants

The forest of Chotanagpur plateau abounds in herbs and roots of medicinal importance and only the elderly people among the tribals, that too limited only to a few families in the different tribal groups, are considered as knowledgeable about the use of these medicinal plants. The use of medicinal plants in the treatment of diseases was known to the tribals many centuries ago, mention of this already exists in literature on tribal studies and pharmacopoeia. The tribal folklore gives much information about useful plants and other natural resources which are found in tribal areas which the folklorists should record urgently before it gets lost by the impact of modernisation and industrialisation. The tribal people in general from time immemorial had been using herbs and roots which are having antifertility properties.

The medicineman of the tribal village is a very important person and his knowledge usually remains limited to his family and is passed on orally from the father to the sons, and so on to the next generation onwards.

In the Hatma forest village we came in contact with only one elderly person who is knowledgeable about the medicinal plants found in that area.

A general survey was undertaken through standard procedures of social survey methods, particularly through interviewing a number of tribal persons staying in the village Tigoy Ambatoli about the system of the treatment they are following for treating the diseases.

In general, most of the tribal people interviewed stated that they get themselves treated first with the traditional system for all general ailments (stomach trouble, cough and cold, pain, sprain, fever etc.), as modern medicines are very costly. As the tribal people are very poor so they stick to the traditional methods of treatment generally as far as possible.

Medicinal Plants used by the Tribal People

During the course of field survey in April-September 1993 in the Mandar area twenty six medicinal plant species were identified in the forest areas of Mandar and Burmu block with the help an elderly medicine man-Chamara Bhagat of village Sidroll who is considered to be very knowledgeable in this aspect by the people of the region. The curative properties of the medicinal plants as identified and informed by him have been reported by the author in an earlier paper (Dash Sharma and Sen, 1995).

Diversity Index

In the present paper a quantitative study of biodiversity in respect of plant species has been attempted by using the random sampling method by making quadrats through tapes in different areas of the forested region of the Hatma village. We did not follow a regular grid (a grid is a series of randomly spaced parallel lines with a second set of similar lines crossing it at right angles dividing an area into squares of equal size) which is usually done for surveying a small area for a detailed study. As our survey area was a vast stretch of forested area so random sampling by making quadrat was the most appropriate method of survey. The size of the quadrat considered for the survey of the forested area of the Hatma was 15m × 15m for the trees and 5m × 5m for shrubs.

A total of 8 quadrats were randomly sam-

pled in the Hatma forest covering four different regions of the forest (stratified sampling), namely (1) near the road side, (2) near the side of Bandhaniya village, (3) along the side of Dumaha river, and (4) near the village Sidroll. Vegetation study of a plantation area was also conducted during the survey. The mean density for each species for each quadrat size was calculated, further Diversity Index was worked out by using Simpson's Index.

There is infact no simple, precise definition of diversity, but attempts have been made to use Simpson's index of diversity (Slingsby and Cook, 1986).

$$D = \frac{N(N-1)}{\sum n(n-1)}$$

where D = Diversity (Simpson's) Index;
N = Total number of individuals;
n = Number of individuals of each species;

The table 4 shows the number of different plant species observed in two different quadrats size considered for the present survey of the forest area. It is evident from the table that there are six identified plant species.

Shorea robusta (Sal) shows the highest frequency of 28.00% while Palas show the minimum frequency of 0.6% in the forest area studied. The *Diospyros abenium* (Kend) shows the next highest frequency 23.78% in the decreasing order. Thus Sal and Kend are the two major plant species which cover the forest area.

It is also evident from the Table 4 that eleven unidentified plant species were found to occur in the small quadrat size (5m × 5m). However, they were not found in all quadrats.

The table 5 shows the relative frequency, density and relative density of the different plant species in the two different quadrats size. As expected, *Shorea robusta* shows the highest density (15.7) in the forest area, and the *Diospyros abenium* (Kend) shows the next higher density (13.3) in the forested area of Mandar. Density of *Karonda* and *Lantana* varies between 5 to 6.5. The 'Palas' shows the least density (0.3) in the forest area of Mandar.

On the basis of the total number of individual plant species in the quadrat size (5m × 5m) as given in table 4 the Diversity Index was calculated:

Table 4: Number of different plant species observed in two different quadrats size laid in Hatma forest

S. No.	Name of the plant species	Quadrat number								Total no. of individual plant species	Occurrence of same plant species in no. of quadrats
		1	2	3	4	5	6	7	8		
	Quadrat Size (15m × 15m)									Abs. %	
1.	<i>Shorea robusta</i>	30	32	39	39	43	28	22	31	254	8
	Quadrat Size (5m × 5m)										
2.	<i>Shorea robusta</i> (Sal)	16	18	15	22	18	08	11	23	126 (28.00)	8
3.	<i>Diospyros ebenum</i> (Kend)	30	06	12	12	15	14	15	03	107 (23.78)	8
4.	<i>Karonda</i>	05	02	04	08	11	09	10	03	052 (11.56)	8
5.	<i>Lantana</i>	-	04	06	02	01	11	13	04	041 (09.11)	7
6.	<i>Peltophorum</i> Sp.	-	-	-	06	03	-	-	-	009 (02.00)	2
7.	Palash	-	-	-	-	-	-	-	03	003 (00.67)	1
	Unidentified Sp.										
8.	Sp.1 (shrub)	02	04	03	05	07	08	06	06	041 (09.11)	8
9.	Sp.2 (shrub)	04	-	01	06	05	03	04	02	025 (05.55)	7
10.	Sp.3 (Climber)	-	-	-	02	-	01	02	02	007 (01.55)	4
11.	Sp.4 (Climber)	-	-	-	02	03	02	01	-	008 (01.78)	4
12.	Sp.5 (Climber)	-	-	-	01	02	-	-	01	004 (00.89)	3
13.	Sp.6 (Shrub)	-	-	-	01	-	04	02	-	007 (01.55)	3
14.	Sp.7 (Shrub)	-	-	-	-	-	03	04	01	008 (01.78)	3
15.	Sp.8 (Shrub)	-	-	-	-	-	01	02	-	003 (00.67)	2
16.	Sp.9 (Shrub)	-	-	-	-	-	01	01	-	002 (00.44)	2
17.	Sp.10 (climber)	-	-	-	-	-	02	02	-	004 (00.89)	2
18.	Sp.11 (Shrub)	-	-	-	-	-	01	02	-	003 (00.67)	2
Total										450 (100.00)	

Table 5: Density and relative density observed for different plant species found in Hatma forest

S. No.	Name of plant species	Relative frequency	Density	Relative density	Diversity index
	Quadrat size (15m × 15m)				
1.	<i>Shorea robusta</i>	100	31.7	100	D=5.9
	Quadrat size (5m × 5m)				
2.	<i>Shorea robusta</i>	10.8	15.7	25.5	
3.	<i>Diospyros abenum</i>	10.8	13.3	21.5	
4.	<i>Karonda</i>	10.8	06.5	10.5	
5.	<i>Lantana</i>	09.4	05.1	08.2	
6.	<i>Peltophorum</i> sp.	02.7	01.1	01.7	
7.	Palash	01.3	00.3	00.4	
	Unidentified Sp.				
8.	Sp.1 (Shrub)	10.8	05.1	08.2	
9.	Sp.2 (Shrub)	09.4	03.1	05.0	
10.	Sp.3 (Climber)	05.4	06.8	11.0	
11.	Sp.4 (Climber)	05.4	01.0	01.6	
12.	Sp.5 (Climber)	04.0	00.5	00.8	
13.	Sp.6 (Shrub)	04.0	00.8	01.2	
14.	Sp.7 (Shrub)	04.0	01.0	01.6	
15.	Sp.8 (Shrub)	02.7	00.3	00.4	
16.	Sp.9 (Shrub)	02.7	00.2	00.3	
17.	Sp.10 (Climber)	02.7	00.5	00.8	
18.	Sp.11 (Shrub)	02.7	00.3	00.4	

Table 6: Plants species of the plantation area (Mandar)

S. No.	Name of the plant species	Quadrat numbers			Total no. of individual plant species	Occurrence of same plant species in no. of quadrates	Relative frequency	Density	Relative density
		1	3	3					
Quadrat size (15m × 15m)									
1.	Shisham	33	-	34	67	2	66.6	22.3	66.9
2.	Gamhar	-	33	-	33	1	33.3	11.0	33.0
Qudrat size (5m × 5m)									
3.	Shisham	04	-	04	08 (7.84)	2	18.1	02.6	07.7
4.	Tendu	15	05	03	23 (22.55)	3	27.2	07.6	22.5
5.	Gamhar	-	04	-	04 (3.92)	1	09.0	01.3	03.8
6.	Lantana (common type)	17	03	-	20 (19.61)	2	18.1	06.6	19.5
7.	Lantana sp. (uncommon type)	28	02	17	47 (46.08)	3	27.2	15.6	46.2
Total					102 (100.00)				

$$\text{Diversity index (D)} = \frac{N(N-1)}{*n(n-1)}$$

$$= \frac{450 \times 449}{33936} = 5.9$$

Where, N = 450, n = number of individual plant species in 5m × 5m quadrat, and *n(n-1) = 33936

Thus the Diversity Index for the Hatma forest region of Mandar is 5.9. The Table 6 shows the different species of plants in the plantation area which is about 4.5 km from Mandar Chowk beyond Ambatoli village on the right side of the road. It is evident from the table that only two plant species are found in the 15m × 15m quadrat, namely, Shisham (*Delbergia sishoo*) and Gamhar (*Gmelina arborea*). Only three quadrats were selected for the plantation area study. In 5m × 5m quadrats the common *Lantana* species and another species of *Lantana* were found in abundance.

In the plantation area the density of *Delbergia sishoo* was found to be highest in the larger quadrats while in the smaller quadrats, the *Lantana* species (the uncommon type) was found to show the highest density.

The present report being only a preliminary report of Mandar region, so many things yet remains to be investigated particularly the spe-

cies diversity of different stratified areas for comparative study.

After having identified the important medicinal plants and the locations of the plants in the villages (see Dash Sharma and Sen, 1995). The next phase would be the action oriented programme involving the villagers for protection and preservation of these plants from the onslaught of rapid urbanization of the area. However, much of it depends on the availability of funds for such biodiversity conservation programme.

ACKNOWLEDGEMENTS

The author expresses his gratitude to World Wide Fund For Nature-India, Bihar State Committee, Ranchi, for providing the funds for the field work for this study in Mandar block.

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