

5. Bio-resource utilization:

5.1 Introduction :

Study of the ethnic communities in the present state of socio-political environ of our country is not only very important but a necessity. Tribal people of the present study at Hili Block as also others elsewhere often suffer from the notion that they are being left out from the mainstream society of the country. This feeling generates discontent, dissent and distress in them and emboldens them to dissociate from the general developmental activities of the country. Study of the patterns of resource utilization by different ethnic communities is important not only in identifying existence of possible unutilized niches in their ecosystem and suggesting proper strategy for their exploitation on one hand and also in determining resources they are over-exploiting to the detriment of the resource in question and themselves. Significant studies in different aspects have been conducted by various authorities both in India and abroad (Dube, 1951; Vidyarthi, 1963; Malhotra, 1974; Malhotra *et al.*, 1978; Gadgil and Guha, 1992; Vithal, 1992; Das, Jagannath, 1998; Lee and Devore, 1968; Dwyer, 1974; Eder, 1978; Odend'hal, 1980; Brightman, 1996; John Christy and Thirunavukkarasu, 2002.

The objectives of the present study is to determine resource utilization pattern of the three tribal communities at Hili Block with particular emphasis on hunting-capture-collection (HCC), daily wage labour, forest collections and livestock rearing..

5.2 Materials and methods :

Data were collected from house to house survey and field observations. Detailed survey was conducted for enumeration of human as well as livestock population of the village. The age-sex of the cattle were recorded for each household. The age of the cattle reported by their owners were found to be fairly accurate because it coincided well with 30 – 35% cases where it was checked by a veterinarian. Verification of data is possible by repeating the procedure once or twice, where each successive survey acts as a check on the previous count (Odend'hal, 1980). The weight of fresh dung of the experimental cattle in the field were taken separately and oven dried at 75°C – 80°C to constant weight. Energetic value of dried dung was taken to be 4.26 K. Cal/ gm (National Council of Applied Economic Research, 1965). The work performed by each bullock was converted in terms of K. Cal/ hr which was approximately 433 K. Cal/ hr (Kurup, 1967; Ubbelohde, 1963; Brody, 1945; Odend'hal, 1972). The energetic value of milk of the study cattle was taken to be 829 K. Cal/ kg for milk containing 4.7% fat (Panse *et al.*, 1967; Brody, 1945). All the reported data were strictly verified and cross-checked with those obtained from other sources before finally accepted for consideration. The data were analysed qualitatively and quantitatively and those obtained from direct observations agreed well with reported ones.

Often the hunting, fishing, and collection spots were visited in company with the tribal groups to determine the manner of their activity and the amount of materials obtained. Plant and animal materials collected were first sorted out. The materials were grouped into animal and plant categories and weighed. Animal specimens were preserved in 70% alcohol. Herbarium sheets were prepared with the plant specimens. Professor A. P. Das, Department of Botany, N.BU. graciously identified the plant specimens. Animal specimens were identified by experts at Z. S. I., Calcutta.

5.3 Results :

At the very outset it may be pointed out that resource utilization pattern in the three tribal communities at the Hili Block is similar in general. This could probably be a function of living in close proximity with one another for over a century and due to the fact that they are mostly cut-off from their own main-stream populations elsewhere. Subsistence activities

of the tribal communities of the Hili Block include a host of activities such as hunting-fishing-collection of animals, cultivation in own land, daily-wage labour, preparation - sale of alcohol, small trade, forest collection, (mainly green vegetables and fire wood) for own consumption and sale and rearing of domestic animals. The common terrestrial and aquatic fauna utilized by the tribals in the Jungles and water bodies of the Block are shown in the Table 5.1, and 5.2, respectively.

It is to be mentioned that tribal communities maintain some taboo in consumption of certain animals found in the block. For example, the Santals do not consume crows and kingfishers, similarly the Mundas do not take bats, jungle cats; and the Oraons the porcupines, frogs, bats, wood cutters, crows, jungle cats and kingfishers.

In general it may be said that at present hunting among the tribal communities has ceased to be a major subsistence activity mainly because of paucity of preferred game species due to massive deforestation on one hand and enactment of laws prohibiting hunting on the other. Hunting nowadays is mostly ritualised to some religious activity on some particular days of the year such as: Holi, Pousparbon, X-mass (for the Christian tribals), Kalipuja, Soharai, Dalpuja, 1st January and "Gai" (worship of bow and arrow). However, despite all constraints few Santal and Munda families still hunt considerably.

Table 5.3 shows comparative accounts of number and percent families participating in hunting-capture-collection of animals, total and average amount obtained per family per year. It is observed that a high percent of families practice fishing and snail collection in all the three communities. Percent participation of Santal and Munda families in different capture-collection activities is mostly similar and differ substantially from that of the Oraons. For example, about 75%, 60% and 8% Oraon families participate in fishing, snail and prawn collection in comparison to 51%, 48%, 3.7% and 44%, 51% 3.9% percent in the Santals and Mundas respectively. The Oraons also hunt less than the others. Again unlike the Santals and Mundas the Oraons do not consume frogs at al. It is also observed that although the Santals and Mundas are more or less similar in their food habits, the Santals prefer frogs more than the Mundas whereas the latter prefer turtle more than the former. It may be pointed out that average animal food materials hunted-captured-collected by a Oraon family per year is 143.80 kg in comparison to 168.80 kg and 164.42 kg in the Santals and Mundas respectively.

Table 5.1 : Utilization of Terrestrial Fauna by the Santals, Mundas and Oraons at Hili Block (1996-97)

Common Name	Santal Name	Munda Name	Oraon Name	Scientific Name
Jungle cat	Runda	Gara	Bando	<i>Felis sp.</i>
Indian hare	Tulai	Lambha	Lambha	<i>Lepus ruficandatus</i>
Guinea pig	Asulgudu	Beniposh	Beniposh/ baramusa	<i>Cavia porcellus</i>
Indian porcupine	Jhink	Chhedar	Chhedar	<i>Hystrix indica</i>
Rat	Godo	Indur	Musa	i. <i>Bandicota bengalensis</i> ii. <i>Ratus rattus</i>
Wild boar	Birsukri	Jangli sukor	Jangli kisshi	<i>Sus cristatus</i>
Bat	Bakdur	Bakdul	Bakdul/ Badri	<i>Pteropus giganticus</i>
Dove	Otum	Ghughu	Ghughu	<i>Streptopelia sp.</i>
Wood cutter	Kath thokra	Kath thokra	Kath thokra	<i>Picus spp.</i>
Pea fowl	Marah	Mayur	Mayur	<i>Pavo cristatus</i>
Sparrow	Hatiuri	NA	Chocha charai	<i>Passer domesticus</i>
Wild fowl	Birsim	Ban murgi	Jangli kher	<i>Gallus sp.</i>
Wild duck	Sherali	Genrey	Genrey/ Bali hansh	
Pigeon	Paora	Kaptor	Kaptor	<i>Columba livia</i>
Crow	Kanhu	Kauoa	Kauoa	<i>Corvus Splendens</i>
Kingfisher	Kikir	Kil kila	Kil kila	<i>Alcedo sp.</i>

NA = Not available

Table 5.2 : Utilization aquatic fauna by the Santals, Mundas and Oraons at Hili Block (1996-97)

Common Name	Santal Name	Munda Name	Oraon Name	Scientific Name
Turtle	Hara	Kachhua	Kachhua	<i>Chelone sp.</i>
Frog	Bardha rotey	Holabang	Bang	<i>Rana tigrina</i>
Punti fish	Punti hako	Punti masri	Punti masri	<i>Barbus puntio</i>
Singi fish	Sishing hako	Kanos masri	Kanos masri/ Shingi masri	<i>Heteropneutes foosilis</i>
Magur fish	Mangri hako	Magur masri	Magur masri	<i>Clarius batracus</i>
Tangra fish	Ranreh hako	Tengra masri	Tengra masri	<i>Mystus sp.</i>
Blind serpent	Bambi	Cuchia	Cuchia	<i>Amphipnous cuchia</i>
Climbing perch	Rodgo hako	Kai masri	Kai masri	<i>Anabus testudeni</i>
Snake heads	Ganrai hako	Santhi masri	Santi masri	<i>Channa punctatus</i>
Crab	Katcom	Khokra	Kankro	i. <i>Potamon atkinsonianum</i> ii. <i>Cancer sp.</i>
Prawn	Iccha hako	Jal masri	Ichla masri	i. <i>Palaemon sp.</i> ii. <i>Macrobrachium rogenburgii</i>
Apple snail	Gungha	Ghungi	Ghungi	i. <i>Pila globossa</i> ii. <i>Brotia costula</i>
Mussel	Jhinuk	Jhinuk	Jhinai	i. <i>Lamellidens marginalis</i> ii. <i>Anodonta sp.</i>

Table 5.3 : Contribution of hunting-capture-collection of different animal items in the diet of the Santals, Mundas and Oraons at Hili Block (1996-97)

Hunt- capture - collection of Animals	Number and percent families practicing			Amount / year (kg)			Average amount hunted-captured-collected/ family/ year (kg).		
	Santal	Munda	Oraon	Santal	Munda	Oraon	Santal	Munda	Oraon
Mammals and birds	135 (23.89)	137 (23.46)	67 (21.33)	3651.75 (10.39)	3733.25 (10.12)	1440.50 (6.15)	27.05±0.9	27.25±0.50	21.50±0.32
Turtle	13 (2.30)	11 (1.88)	07 (2.23)	68.25 (0.19)	82.50 (0.22)	45.00 (0.19)	5.25±0.46	7.50±0.44	6.43±1.28
Frog	29 (5.13)	25 (4.28)	-	275.5 (0.78)	156.25 (0.42)	-	9.50±0.57	6.25±0.31	-
Fish	287 (50.80)	281 (48.12)	235 (74.84)	13058.5 0 (37.15)	11450.7 5 (31.05)	9928.75 (42.38)	45.50±0.67	40.75±0.62	42.25±0.22
Crab	189 (33.45)	195 (33.39)	113 (35.99)	1086.75 (3.09)	1033.50 (2.80)	595.00 (2.54)	5.75±0.14	5.30±0.12	5.27±0.14
Prawn	21 (3.72)	23 (3.94)	25 (7.96)	63.00 (0.18)	75.00 (0.20)	65.00 (0.28)	3.00±0.23	3.26±0.31	2.60±0.21
Snail	251 (44.42)	297 (50.86)	187 (59.55)	16440.5 0 (46.77)	20005.5 0 (54.24)	11220.0 0 (47.89)	65.50±0.79	67.36±0.81	60.00±0.38
Mussel	56 (9.91)	51 (8.73)	23 (7.32)	406.00 (1.15)	344.25 (0.93)	132.25 (0.56)	7.25±0.24	6.75±0.30	5.75±0.24
						Total	168.8	164.42	143.8

* Figures in the parentheses indicate %; – Means absent; ± Indicate S. E.

Various forest produces contribute substantially in the diet of most tribal societies including Santals, Mundas and Oraons in the present study. While animal food items are solely used for self-consumption, some of the plant produces collected are sold in the market for cash.

Time invested in a particular activity by an individual is a reliable index of the relative importance of that activity in the life of the individual in question. This is sometimes called time-budget. Table 5.4 shows time spent by Santals, Mundas and Oraons at the Hili Block on different subsistence activities. Six major subsistence activities of the tribals have been considered. For convenience, some of the smaller activities have been lumped with certain major activities. It is found that all three communities invest more time in three categories of subsistence activities, i.e., agricultural work, day labour and forest collection. The time-budget strategy of the three communities are in general similar, however, investment of time by the Santals and Mundas are more similar than the Oraons. For example, Oraon males and females do little hunting, agricultural work and preparation selling of liquor but more day labour. Division of labour among the sexes is also not very conspicuous. Both sexes invest some time in almost all the activities except that the Santal and Oraon males do not perform any domestic rearing while Oraon females are not involved in liquor preparation and selling. Besides the females in all the communities put more time in forest collection and domestic rearing while the males give more time in the rest of the subsistence activities.

Table 5.4 : Average time spent / adult on different subsistence activities among the three ethnic communities at Hili Block (1996-97).

Activity	Time spent (hours/ year/ adult)					
	Male			Female		
	Santal	Munda	Oraon	Santal	Munda	Oraon
Hunting-fishing- collection of animals	150.30 (8.03)	159.30 (8.23)	100.75 (6.37)	90.45 (4.86)	100.00 (5.97)	85.50 (5.08)
Agricultural work in own land	550.15 (29.40)	530.45 (27.41)	400.15 (25.30)	350.00 (18.80)	370.15 (22.08)	220.45 (13.11)
Day labour	600.00 (32.07)	655.00 (33.84)	630.50 (39.86)	450.00 (24.18)	400.50 (23.90)	475.15 (28.25)
Preparation and selling of alcohol and other small trade	225.15 (12.03)	205.50 (10.62)	150.25 (9.50)	90.00 (4.84)	80.00 (4.77)	-
Forest collection	345.45 (18.46)	330.30 (17.07)	300.00 (18.97)	555.30 (29.83)	500.00 (29.83)	550.50 (32.74)
a. Sell of forest produces	27.52 (1.47)	26.32 (1.36)	23.90 (1.51)	44.24 (2.38)	39.84 (2.38)	43.86 (2.61)
b. Consumption of forest produces by self	3.16 (0.17)	3.02 (0.16)	2.75 (0.17)	5.09 (0.27)	4.58 (0.27)	5.04 (0.30)
c. Firewood	314.76 (16.82)	300.96 (15.55)	273.35 (17.28)	505.97 (27.18)	455.58 (27.18)	501.60 (29.83)
Domestic rearing	-	54.75 (2.83)	-	325.50 (17.49)	225.40 (13.45)	350.00 (20.81)

* Figure in the parentheses indicate %.

Table 5.5 : Number of households, human and domestic animals reared by the Santals, Mundas and Oraons at the Hili Block (1999).

Ethnic community	Households	Human	Cattle	Goats	Sheep	Chicken	Ducks	Pigs
Santal	565	2547	1820 (1.40)	965 (2.64)	150 (16.98)	2403 (1.06)	225 (11.32)	663 (3.84)
Munda	584	2787	1672 (1.67)	1872 (1.49)	50 (55.74)	1553 (1.79)	305 (9.14)	342 (8.15)
Oraon	314	1506	1305 (1.15)	885 (1.70)	28 (53.79)	1105 (1.36)	355 (4.24)	451 (3.34)
Total	1463	6840	4797	3722	228	5061	885	1456

- Figure in parentheses indicate animal/ human.

Table 5.5 shows no of households, human and domestic animals reared by the three ethnic communities while all the tribes at Hili Block maintain all the common domestic animals it is observed that the Santals keep sheep and chickens more; the Mundas keep more goats and the Oraons keep more cattle, ducks and pig in terms of animal man ratio. The Oraons obtained substantially lesser amount of animal food materials from hunting-capture-collection (HCC) activities (Table 5.3). The deficit probably is met through more animals rearing activity. Table 5.6 shows daily average wet weight, dry weight and dry wt./ wet wt. ratio of dung produced by three age sex categories of tribal cattle.

Table 5.6 : Daily per capita dung production and dry matter among the tribal cattle in kg.

Age class	No. of cattle	Mean per capita dung production and dry matter		
		Wet weight	Dry weight	Dry weight/ wet weight
Adult male	1439	11.25	2.37	0.210
Adult female	1295	8.5	1.74	0.205
Below 3 years (Sub-adult)	2063	2.25	0.57	0.253

Table 5.7 : Caloric output through dung of tribal cattle.

Age class	Mean daily caloric output per cattle through dung (dry wt.)	Daily total production (K. Cal)
Adult male	$2.37 \times 2.13 = 5048.1$ K. Cal / male	7264215.9 K. Cal.
Adult female	$1.74 \times 2.13 = 3706.2$ K. Cal / female	4799529 K. Cal.
Below 3 years (Sub-adult)	$0.57 \times 2.13 = 1214.1$ K. Cal / Sub-adult	2504688.3 K. Cal.

Table 5.7 presents caloric output through dung production for the tribal cattle. Daily total dung production is converted in terms of K. Cal., taking 2.13 K. Cal/ gm of dry cattle dung (National Council of Applied Economic Research, 1965 : 114). Total daily energy production through dung by the cattle population = 14568432 K. Cal / day (Table 5.7). Hence total yearly energy production through dung = 5317477680 K. Cal/ year. In India use of cow dung as fuel varied from 40% (National Council of Applied Economic Research, 1965) to 75% (Lodh, 1968). However, cow dung is used not only as fuel but also as fertilizer in the crop fields.

Table 5.8 : Total No. Lactating cows and yearly caloric value.

No. of lactating cows	Daily milk production / cow (kg)	Daily total milk production (kg)	Yearly total milk production (kg)	Yearly caloric value (K. Cal)
466	2.25	1048.5	382702.5	3172603725

* Energy conversion of milk is done by 829 K. Cal/ kg (Panse *et. al.*, 1967; Brody, 1945).

The number of lactating cows and their average milk production is estimated in Table 5.8. This estimation is done during the three survey periods in 1999. Table 5.8 shows total number of lactating cows and their yearly calorific value. Daily milk production per cow is only 2.25 kg, which is considerably lower than high milk producing varieties.

Bullocks are employed by the tribals for ploughing from the age of about 5½ years. Workable male tribal cattle population during 1999 is 1207 (Table 5.9). A bullock works on average for 4.25 hours a day and is used on average for 205 days a year. A team of two bullocks usually operate at 1.35 horsepower, i.e., an expenditure of 0.675 H. P. / bullock. 1 H. P. is the work done at the rate of 642 K. Cal./ hour (Kurup, 1967 Ubbelohde, 1963; Brody, 1945) and thus the work-rate of a bullock is approximately 433.35 K. Cal./ hour. Thus, work accomplished by all the workable bullocks in a year amounts to : 433.35 K. Cal/ hr. × 4.25 hr. / day × 205 days / year × 1207 = 455710305.5 K. Cal/ year.

Table 5.9: Total number of workable bullocks and yearly total energetic value.

No. of workable bullock	Working hours/ day/ bullock	Working days/ year/ bullock	Working power/ day/ bullock (H. P.)	Yearly total energetic value (K. Cal)
1207	4.25	205	2.87	455710305.5

Table 5.10 : Total energetic output (K. Cal/ year) of cattle reared by the Santals, Mundas and Oraons at the Hili Block 1999.

Age class	Average number of cattle	Calorie obtained/ year (K. Cal/ yr.)		
		Dung	Milk	Work
Adult male	1439	2651438475	-	455710305.5
Adult femal	1295	1751828085	3172603725	-
Below 3 years (Sub-adult)	2063	914211120	-	-
Total	4797	5317477680	3172603725	455710305.5

Table 5.10 represents total energetic output from dung, milk, and work of tribal cattle in the Hili Block is 5317477680 K. Cal/ year, 3172603725 K. Cal/ year and 455710305.5 K. Cal/ year respectively.

5.4 Discussion :

Despite low human population, favourable climatic regime and a number of rivers and rivulets, that promote growth of forests and games; there is severe decline of forest area and games solely because of indiscriminate deforestation in the Block. This is evident from Table 5.1 and 5.2. Meagre success from HCC activities compelled tribal populations to concentrate more on other subsistence activities. The Oraons differ considerably from the Santals and Mundas in their animal food habits and procure less of it on average/ year.

As omnivores human beings feed from several tropic levels and they depended on hunting and gathering for their subsistence for over 99% of their evolutionary history (Lee and Devore, 1968). At present, however, in most enlightened ethnic communities; agriculture, daily-wage labour and small trade complement substantially to their subsistence in addition to hunting and forest collection because the latter two means are inadequate to meet the total requirement due to colossal disappearance of forests in most parts of the world.

Unlike certain tribes such as Aka (Andrew and Hewlett, 2001), Ju-hoan (Bisele and Barkley, 2001), the women folk of the tribal communities at Hili Block do not accompany their husbands or male members during hunting-fishing-forest collection etc. because there is no apprehension of rape and violence from males of other groups. The female members, however, accompany other adult members, both male and female in most of their hunting capture-collection endeavours. In other words, tribal women of Hili Block apprehend little or no assault and violence in their outdoor activities. Hardy (1997) opined that co-operation in hunting reduce the risk of violence on women. Lower investment of time by the tribal women in outdoor subsistence activities also provide them with opportunities to invest more in infant-child care (Kelly, 1995; Mukhopadhyaya and Higgins, 1998), domestic core and domestic rearing.

Tribal communities at Hili rear a variety of domestic animals out of which cattle and chicken are most common. Almost all-tribal families irrespective of community rear one or two cattle, which serves them in various ways to meet their subsistence.

Tribals at Hili Block are in a state of transition from hunter-gatherer community to settled agriculturist-gatherer-labourer society. This probably is due to their contact with mainstream society as also due to nonavailability of game animals in the forest of the region. In this connection it may be mentioned that wildlife conservation strategy of our country should have some provision for utilization of game animals as food by tribals who traditionally depend on this resource.

Projects to popularise cultivation of some common fruits, mushroom cultivation and animal husbandry particularly involving cattle, goats, pigs, and chicken have enormous potential in enhancing socio-economic transition of this tribal people.



Some Munda returning from hunting.



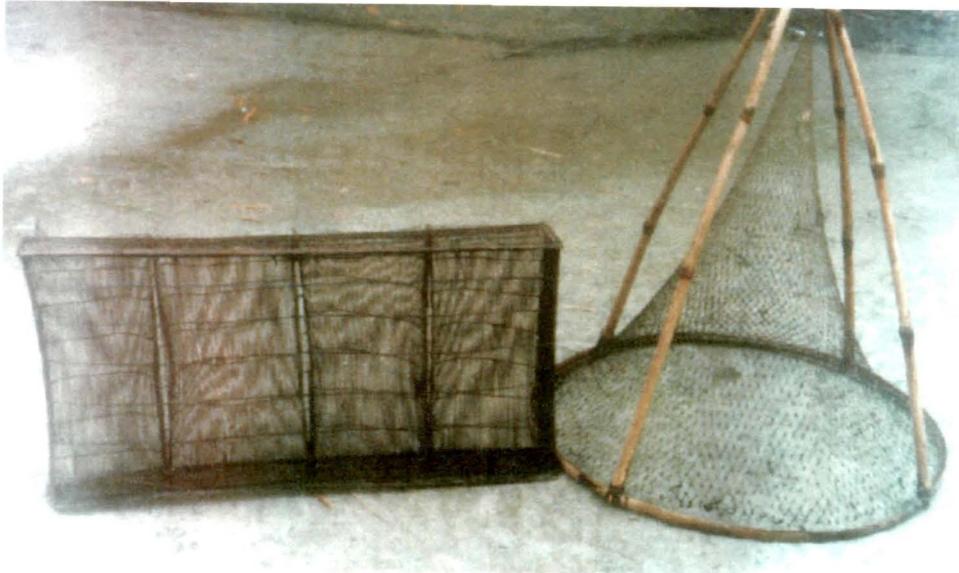
Santals on a hunting spree in a forest at Hilli Block.



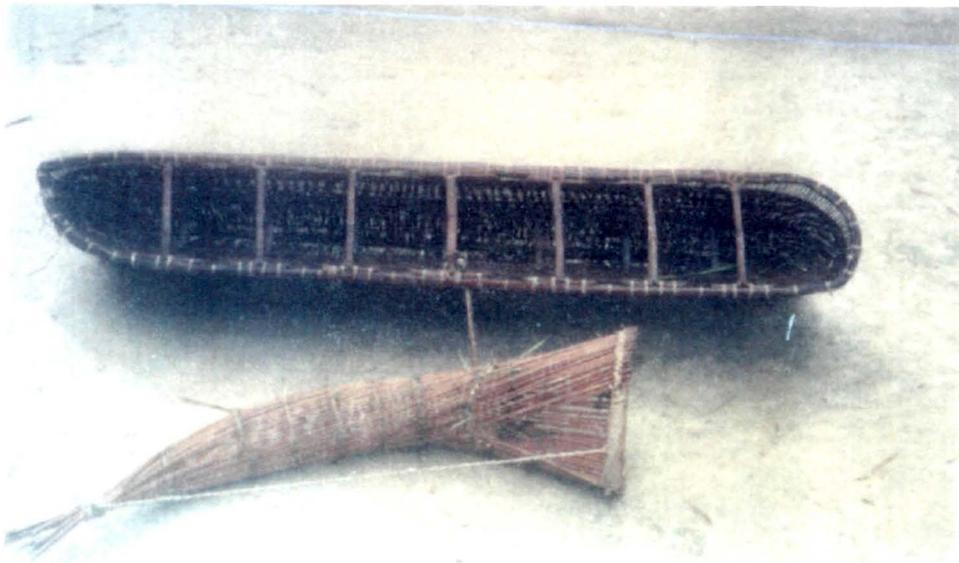
Oraons engaged in shooting birds with indigenous bows and arrows.



A Santal hunting team in a different posture.



Two indigenous fishing implements made of bamboo and thread .



Two indigenous fishing implements made of bamboo and thread of the Santals.



Two indigenous fishing implements made of bamboo and thread of the Santals.



A group of Santals enjoying fishing around the last phase of winter with indigenous fishing gear.



Tribal people catching fishes with their fishing implements.



Tribal people Catching fishes from a rivulet.



A tribal team with fishing implements on their way to fishing.



A basket of dry leaves near an indigenous oven.



An Oraon girl carrying fuel sticks made of cowdung and jute steam.



A Santal girl with a basket of cowdung cake.



Indigenous fuel of tribal community.



Tribal children returning from forest with loads of fire wood while santal male stands aside.



A stack of paddy straw to be used for fuel and fodder.



The Tribals collecting snails and crabs from a rivulet.



Tribal people with their children catching fishes from a low lying field.