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Human ecology of a village in Similipal Biosphere Reserve, Odisha, India

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ABSTRACT

The present paper is an attempt to study the village-forest interface in the Similipal Biosphere Reserve. Many villages of Jashipur Block are located within Buffer Zone of Reserve. Study of the ecosystem linkage of Gudgudia village of this block indicates that the village have total area of about 1.6 Sq. km with majority of land coming under un-irrigated and culturable wastes categories. The village is dominated by Adivasi and SC *and* ST (73%) and Non Adivasi (27%) populations. Kharia and Kohl together constitute about 71.4% of houses and Mahakud, Teli, Mahali and Kamar etc. around 10%. Population of 180 cattle of the village are looked after by two Baramashias. The population depends on rain fed cultivation for livelihood as they grow only single crop per year. To improve the soil quality, some work to check soil erosion by making check dam and water harvesting structures has been done in the village. During Summer, villagers face problem of water shortage. Ground water level is around 300 feet. The people construct trenches to ward off the wild animals from the villages. Elephant herds usually enter in the village and destroy the paddy crop. The anthropogenic disturbances in wild habitats of core area force the wild animals to invade the human settlements. The Minor Forest Products (MFP) collection continues to be their main occupation as they collect wild vegetables, wild seeds, wild fruits, wild tubers and roots and wild flower in different months. The medicinal plants are also collected by the villagers as they consider the traditional medicines very effective over allopathic ones. It appears with this preliminary investigation that there is a close link between the inhabitants and the nature. Further study shall be of much help for revalidating the local knowledge for sustainable livelihood and for eco-sustainable management.

1. Introduction

Similipahar or Similipal is a compact patch of tropical forests located between 21^0 30' and 22^0 08' No lat and 86^0 05' and 86^0 37' E long. Similipal Biosphere Reserve (SBR) is a typical example of Mahanadian Biogeographic Zone located in the Mayurbhanj district of state Odisha. The district accounts for 10,418 sq. km. area of which forest area is of about 439000 ha, next to Kandhmal and Sundergarh districts. Mayurbhanj has the highest number of inhabited villages (3718) among all districts in Odisha. SBR also retains about 65 villages of which 4 are in core zone and 59 in buffer zone. With all efforts of planners and policy makers, these villages could not be relocated. 65 revenue villages are under three Grampanchyats. viz. Astakumar, Gudgudia and Barehipani. In hill regions of SBR, most of the settlements are established on southern and south-eastern aspects. The Tribal Research Bureau carried out study of villages in Similipal, describing ethnic, social and ecological aspects of the villages.

Similipal was declared biosphere reserve on June 22 1994 under UNESCO's Man and Biosphere programme (MAB). The forests of Similipal are highly biodiverse providing a good habitat for wild animals and various indigenous tribal populations. The destruction of Similipal started when British began influencing the management of Similipal forests for business interests by assigning long-

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term leases to timber companies to supply slippers for railway lines. The Tribals from Ranchi, Singhbhum, Midnapore and other places of Jharkhand and West Bengal were brought to carry out forest operations. A few Tribals settled here for agriculture in Similipal forests, and today there exists 4 villages in core zone, 65 villages in buffer zone and about 1100 villages in peripheral zone. SBR has a total area of about 4,374 Sq Km of which 845 Sq Km is designated as core zone of Similipal Tiger Reserve (STR) and 2,129 Sq Km is buffer zone (1905 Sq Km of STR buffer + 77 Sq Km of Nato reserve forest + 147 Sq Km of Satkoshia reserve forest) and remaining about 1400 Sq Km in transitional zone or peripheral zone. The high biodiversity in wilderness habitat in Odisha has benefited the local people to seek for herbal remedies in the treatment of various diseases (Behera *et al.,* 2006; Singh and Sureja, 2007; Rout and Panda, 2010; Shiddamallayya *et al.,* 2010). The traditional health service providers like Vaidyas and Kabirajs or the knowledgeable persons know about huge potential of traditional knowledge for curing the people with the help of vast biodiversity resources. Several authors have highlighted the indigenous knowledge used by Tribals for medicine (Dey and De, 2011) and need for conservation of such resources (Pandey *et al.,* 2007; Ilahi *et al.,* 2007).

2. Materials and methods

One tribal village, Gudgudia located in buffer zone of biosphere reserve was selected to collect ecological data on human-forest interface for agro ecosystem study. Gudgudia is 29 km away from the block Headquarter of Jasipur. It is a small village under Gudgudia Grampanchayat located at 21^0 52' N lat and 86^0 15'E long. The village is connected to Jasipur by a forest road which leads to the core zone of the Biosphere Reserve. It is situated in a river valley of Khairi, with valley region located 600m elevation and the nearest hill top on south to south-east slopes of a hill is at an elevation of 921m above mean sea level. Two rivers namely Jamuna and Khairi meet each other at Kumari village of Gudgudia Grampanchayat; it flows down further to Gudgudia in a North to North-West direction.

The participatory rural appraisal method was applied through well structured questionnaire so as to collect data on the important elements affecting the human life, forests, and economy of the village. A household survey was conducted on a well-structured questionnaire between July 2003 and June 2004. Each Household was studied and data on livestock, house type, house structure, infrastructural amenities, agricultural land, seeds, fertilizer, pesticides, cow dung, human and animal labour and fence wood applied as agricultural input and crop output, kerosene, fuel wood and food consumption in the household and social traditions were collected. The census data of 2001 was used for calculation of demographic parameters. All agricultural and village data collected during study have been discussed in this paper. Group discussions were also held to find out some additional details regarding traditions and practices performed by the inhabitants of the village. All the data gathered was tabulated and analysed. The secondary data collected from census and Tribal Research Bureau were used to make a comparison with respect to changes in the land use, population and other facilities.

3. Results and Discussion

3.1 Population and Communities

The village has a total population of 526 (299 male and 227 female). The schedule tribe and schedule castes constitute about 73% (383 individuals) while general category population is represented by only 27% (143 Individuals) of the total population. There are 112 households in Gudgudia, of which 44 households are Kols and 34 are Kharia (71.4%). 11% households together comprise of Mahakud, Teli, Mahali, Bhatudi and Kamar communities. Some other tribes are also present as minority (Table 1). The records of past three decade show that population of the village is continuously increasing (Table 2). The total population increased by 29.2% in decade 1971 to 1981, while the total area decreased by 59.5% in the same decade. The sex ratio is also increasing from 1971 (803 females/thousand males) to 2002 (983 females/ thousand males). The number of households increased from 54 in 1971, to 112 in 2002. 80% households are below poverty line while 20% are above poverty line.

3.2 Population and social structure

In Gudgudia, there are 5 persons per household on an average basis: 2 males, 2 females and 1 child. The poor

Table 1
Community structure of Gudgudia village in SBR.

Sl. No.	Name of tribe	Households (No.)	Total household(%)
1.	Kharia	36	32.14
2.	Kol	44	39.29
3.	Bhathudi	2	1.79
4.	Mahali	3	2.68
5.	Teli	3	2.68
6.	Mahakud	12	10.71
7.	Kamar	2	1.79
8.	Others	10	8.93
	Total	112	100

Table 2
Demographic Structure of Gudgudia village in SBR.

Sl. No	Year	Total population	No of households	Male	Female	Sex ratio
1.	1971	274	56	152	122	803
2.	1981	354 (29.19)	93	181	173	956
3.	1991	453 (27.96)	94	243	210	864
4.	2001	526 (16.11)	112	299	227	759

Note: Values in parenthesis are decadal % growth

families have 4 to 5 persons while richer families have 10 to 12 persons. Usually after marriage or after the death of one of the parents, the son gets separated from the parent to look after his own family. The Bathudi, Mahakud, Mahali and Ho are main agricultural communities. They also work for various activities of Forest department to supplement their income. Kol and Kharia are in their very beginning stage to adopt agriculture as their main occupation is still the collection of Minor Forest Products. In Gudgudia, the age of house is form 6 years to 100 years (some more than 100 years). Their houses are made up of clay, bricks, Sal and Bamboo woods. The walls are mainly made up of wood or stone. Bricks have also been used in recently made houses. Use of wood from the forest on the basis of naturally acquired indigenous knowledge for different household purposes has been reported from various locations occupied by indigenous people in various parts of Odisha (Mohanty *et al.,* 2011). Roof is constructed mainly of Bamboo, Sal and Asan wood, thatched with paddy straws or Khappral (a type of tile made up of clay)/cement tiles. Floor is mostly kuchha, usually gabbed with a mixture of clay and cow dung. The number of rooms and its size and number of doors and windows depends upon the economic condition of the household. The poor families possess house of one room of 5x6 feet size, with one door and no window, while the rich households possess house of 4-5 rooms of 12x8 or 12x15 feet size with 4-5 doors and 3-4 windows. Most of the inhabitants make open yard of 2 to 3 feet wide on all the three sides of the house sparing the back side, covered by a projected part of the roofs. This protects the wall and yard during rainy season.

Most of the settlements inside Similipal follow the law of nature as their social and cultural life is intricately intermingled with nature. The settlements in Similipal are mainly of two types (open and closed). In open or the linear settlements, the houses are built along a river or pathway. The closed settlements are formed when the houses form a closed loop encircling a central yard. The central yard is used for common agricultural operations such as drying of grains, processing of agro-products, etc. A dhenki is commonly fixed on the front yard which is covered by projected part of roof.

3.3 Agriculture and animal husbandry

Agriculture is at its beginning stage in this village as majority of the households viz. Kharia and Kols still consider the minor forest products collection as their main occupation. They are still not mentally and financially prepared to adopt agriculture as their main occupation. They are also under the influence of super natural powers/ superstitions. The villagers of Gudgudia rear good number of animals as a source of additional income. The village has 180 animals of which 131 are cows, 38 goats and 11 sheep. The animals are looked after by two Baramashias. Animals are reared only for their meat and manure but not for milk and there is no market to sell milk.

Every household rears 5 to 6 cattle including two to three cows but buffalo is conspicuously absent from Similipal. The cow rearing is comparatively cheaper than buffalo. This might be the factor that only very few households are rearing buffalo. They rear bullocks for their ploughing requirements and for bullock carts. The presence of bullocks is also a status symbol in village. The poor households deploy cows also to plough their agricultural fields in case they have no bullocks, while in some villages they also get helped by their neighbours. Goats are reared chiefly for meat. They seldom drink milk of goat or cow, instead they leave it for the young calves. The cow dung is thrown directly to the fields, however they also do composting before applying to the fields. They rear hens and ducks also for their eggs and chickens to fulfill only their household requirements. Cattle are reared as per their requirements in agriculture and to supplement their resources. There is no animal husbandry facility available in all three Grampanchyats. Veterinary attendants also make frequent visits to the villages. The cattle are under direct supervision of one or two persons called Baramashias who take them for grazing inside the reserve forest and village

Table 3
Minor forest products collected by people of Gudgudia village in SBR.

Sl. No.	Items*	Period of Collection	Average collection (gm/day)	Sl. No.	Items*	Period of Collection	Average daily collection
Wild vegetables				Wild sap and Gum			
1	Sanka saga (*Pachyrrhizus sp.*)	Jan.-Mar.	600	1	Panaria (*Elaeocarpus wallichii*)	Mar.-Apr.	1 liter
2	Gadri saga (*Alternenthera sessilis*)	Jan.-Mar.	100	1	Simili gum (*Bombax ceiba*)	Mar.-Apr.	1 kg
3	Pita saga (*Trewia nudiflora*)	Jan.-June	267	Wild Fruits		Gram	
4	Zinka saga	Jan.-June	267	1	Chara (*Buchamania lanzan*)	June	200
5	Kulari saga (*Bahunia purpurea*)	Apr. -May	333	2	Chunkari (*Ziziphus rugosa*)	June	200
6	Sajana (*Moringa oleifera*)	Whole year	100	3	Guehra (*Acacia bucopholaea*)	June	200
7	Mati saga (*Pachyrrhizus erosus*)	Jan. -June	167	4	Rajara	November	200
Wild Seeds				5	Mahua (*Madhuca latifolia*)	March	1 000
1	Rimiri (*Protium serratum*)	June	67	6	Anola (*Emblica officinalis*)	February	1 000
2	Siali (*Bauhinia valichii*)	Feb.	233	Wild Tuber's & roots			
3	Khandia	Dec.	67	1	Muandai	April	500
4	Jambiro (*Citrus medica*)	Dec.	67	2	Pinkara	December	200
5	Zellrli	Whole Yr.	67	3	Rasa	December	200
6	Ghurdu (*Gardenia gummifera*)	Feb.	167	4	Ladu	December	200
7	Kusum (*Schleichera oleosa*)	Aug.	167	5	Pitaddu	December	200
8	Kendu (*Diospyros melanoxylon*)	April	167	6	Jungle alu (*Curcuma species*)	Feb.- Mar.	7000
9	Sal (*Shorea robusta*)	June	5000	7	Karu alu	July	500
10	Jamun (*Syzygium cumini*)	August	167	Wild Grasses			
11	Bela (*Aegle marmelos*)	August	167	1	Chana grass (*Imperata cylindrica*)	January	10000

forests, that are partially to fully degraded. Most of the villages take one crop per year; main crops grown are paddy (three varieties viz- Ashu, Aman *and* Dalua), Maize, Mustard and Rasi. Land holding is very unequal, the agriculture land per household ranges from 0.5 to 10 acres, while average land per household is 1.42 acres. The paddy production per household ranges from 2 to 40 quintals, while average paddy production/acre is 3.62 quintals. Big farmers sell excess paddy in market at Jashipur. For most of the household, the paddy crop does not fulfill their annual requirements. In ploughing operations, 2 to 13 persons are engaged depending upon the economic ability of the household. Number of bullocks per households ranges from 0 to 6. In sowing operation, the manpower requirement is 2 to 10 persons. The wage rates range from Rs.30 to Rs.40 per day for a 5 hours hard labour (data collected in 2003-04). Most of the villagers use previous crop seeds for sowing due to their inability to access the new improved crops. The fertilizers are used only by big farmers. The rich households apply cow-dung thrice in a year while the poor households apply only once a year. The modern improved seeds being used in the village are Sarana, Bhargavi, Ketki, Ratana, Annapurna, Khandagiri, Udayagiri, Konark, Kanchan, Samnata and Sarangi. Rest of the crops like Corn, Rasi, Mustrad, Kulthi are grown with seeds of indigenous varieties.

3.4 Change in Land use

In 1961, the Gudgudia was recorded as an uninhabited village. Forest area recorded in Gudgudia in 1971 was 28% of the total area, while in 1991it was reduced to 26%. The culturable waste land or the area of settlements, market and other community facilities increased following the increase in population. The culturable waste land was only 4% of the total village area in 1971 while in 1991 it was recorded as 21% of the total village area. No irrigation was recorded during the period. Only the low lying areas near the streams get some irrigation water by lifting the water. Due to rains, these areas suffer from gully erosion during rainy season. So villagers usually leave the river side area as fallow. These areas are classified as “unsuitable for cultivation”, degraded land by erosion and other anthropogenic factors.

3.5 Minor Forest Products

Fishes are relished by all the communities of the village. The major group of fishes being captured in the village are Silua, Khezara, Kari, Chengo, Baliputra, Genthu, Diazihiri, Birbal, Sala, Pitark, Turi, Kuahki and Gobhi. These freshwater fishes are captured only for domestic consumption as no transportation facilities or methods to preserve them is available. They also buy the Sukua Machha or dried fish from local Haat helds on every Sunday. Various types of green leafy vegetables (*saga*) are also collected by them from 100 to 600 grams per day, mostly for domestic consumption. The principal *saga* are: *Sanka saga, Gardi saga, Pita saga, Zinka saga, Kulari saga, Sajana saga* and *Mati saga*. All of these sagas are collected during January to June as no agricultural crop is available to them during this period. The principal wild seeds collected by them are Rimiri, Siali, Khandia, Jambiro, Ghurdu, Kusum, Sal, Kendu, Jamun and Bel in quantities of 67 to 233 grams per day except Sal, which have some market value. All wild seeds are collected during June to February.

Panaria, the main wild sap and Siali Gum are collected during March and April. On an average Panaria sap is collected 1 liter daily. Among wild dry fruits, Chara, Chunkari, Guehra, Rajara, Mahua, Anolaa and Harada are colleted 200 grams daily in the month of June except Rajara in November for domestic consumption. Seeds of Mahua and Harada are collected 1 kg per day in February to March also for domestic consumption. Muandai, Pinkara, Rasa, Ladu, Pitadu, Jungle Alu, Karu Alu are main wild tubers and roots collected by Tribals for domestic consumption at the rate of 200 to 500 grams per day, except Jungle Alu (5 to 7 kg daily). All these roots and tubers are collected during December to July. Gilliri Champa and Simili are main wild flowers collected by Tribals. The medicinal Plants collected by them includes Sarpa Gandha (*Rauvolfia serpentina*), Patal garuda (*Rauvolfia serpentina*), Murica ghasa, Kanbindi, Kasanapani, Salupani, Parasapani, Gangasiali (*Nyctanthes arboritritis*), Bhunineeba (*Andrographis paniculata*), Neem (*Azadirachta indica*), Karanja (*Pongamia pinnata*) and Ocalbinda. These forest product based medicines are used in malaria, stomach ache and other diseases which are considered endemic to the Similipal and its adjoining areas. Several researchers have reported use of 33 fern species from 21 families for medicines by the people residing inside Similipal Biosphere Reserve (Mishra *et al.,* 2001; Rout *et al.,* 2009). A good amount of firewood are also extracted form the forests besides these minor forest products. 45 kg of fire wood is utilized in one month on an average basis per household. The range of firewood utilization varies with economic ability of the households maximum being 70 kg and minimum 40 kg per month. Firewood is mainly collected from the village forests and some parts form the protected forests also. The main fire wood species are Sal, Asan, Gambhari, Piasal, Beguni, Neural, Jia, Dala and Vhakra etc.

4. Conclusion

The hill village ecosystem is highly dependant on forests. 71% of household belongs to primitive group of tribes. They are less developed to accept agriculture. In fact

they are in a transitional stage and not ready to give up their traditional occupation of minor forest products collection. The village economy largely revolves around minor forest products and agriculture in a less developed form. The unavailability of various agro-development measures further increase their dependency on forest products. The pressure on forest is continuously increasing with increase in population, though the decreased population growth rate percentage shows that there is awakening about problems due to large number of children. The minor forest products are collected mainly for domestic consumption only as there is no marketing facility available. Sustainable utilization of resources is a key to development of community and forests. Any form of disturbance in the ecosystem stability will have its direct impact on the natives. All the agriculture dependant human beings will indirectly get affected from it as the Similipal hills work as water tower of the region. The participatory resource management seems to be solution for Similipal. We recommend further systematic study by competent institutions as collaborative projects for revalidating the local knowledge for sustainable livelihood and for eco-sustainable management.

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