

RESEARCH ARTICLE

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Fuel wood, fodder and timber consumption status in a forest fringe tribal society of Jharkhand

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ABSTRACT : The study examines the nature and extent of fuel wood, fodder and timber dependence in nearby forests by the local people living in Rarha village of Ranchi district in Jharkhand, India. A field survey of 72 households from the village was conducted for collecting primary data about the basic household's attributes, dependency on fuel wood, fodder and timber and consumption pattern of these forest resources through a well-structured pre-tested interview schedule, personal observations, focus group discussion and participatory rural appraisal using multi-stage random sampling technique. Simple descriptive methods are used to analyse the data. The investigation revealed that the consumption of fuel wood was maximum (50.94 qt yr⁻¹) by large farmers followed by medium farmers (40.95 qt yr⁻¹) and least by small farmers (29.97 qt yr⁻¹) and the fodder consumption was also maximum (23.43 qt yr⁻¹) among large farmers followed by medium farmers (21.90 qt yr⁻¹) and least by small farmers (20.43 qt yr⁻¹). Similarly, the maximum small timber consumption was recorded in large farmers (48.58 qt yr⁻¹) followed by medium farmers (42.54 qt yr⁻¹) and least by small farmers (39.49 qt yr⁻¹). As regards structural timber consumption, the amount consumed by large farmers was calculated to be (28.85 qt yr⁻¹), followed by medium farmers (26.31 qt yr⁻¹) and least by small farmers (24.67 qt yr⁻¹). The forests are facing enormous pressure for securing the needs by the local people, posing great threat to the biodiversity and environment. Therefore, the forest resources conservation through the intervention of alternative avenues is imperative to keep pace with current development and future challenges in the village.

KEY WORDS : Fuel wood, Fodder, Timber, Forest, Tribal society

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INTRODUCTION

Forests have been very important natural resource for rural livelihood and food security in India providing variety of products and services (Anonymous, 2013). In

most Indian villages, local people are heavily dependent on forests mainly for fuel wood, fodder and timber for household consumption and cash earning (Islam *et al.*, 2015). Fuel wood is one of the most important sources of energy in the developing and under developed countries (Banyal *et al.*, 2013). It constitutes a vital input for all productive economic activities and meets the basic energy requirement in both domestic and traditional industrial sectors in rural areas (Islam *et al.*, 2011). Fuel wood is a non-timber forest product (NTFP) that accounts for the primary energy sources for cooking and

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space heating used by rural households (70%) in developing countries (Mishra, 2008). Wood energy has been used for thousands of year for cooking and heating and it remains the primary source of energy throughout the world (FAO, 2009). In addition to wood, agricultural residues including rice husks, straw, bagasse, corncobs, and other forms of biomass are important sources of energy as well (FAO, 2009). Fuel wood extraction does not necessarily lead to forest degradation, however, it often leads to forest degradation where demands for fuel wood are high, where forest resources are limited (particularly high elevation and arid environments where plant growth is constrained by climate) and where alternative energy resources such as kerosene or Liquid Petroleum Gas (LPG), are unavailable (Rai and Chakrabarti, 2001). A major consequence of inadequate supply of fuel wood is the burning of agricultural residue and animal dung, which otherwise would have been used for restoration of soil fertility and increasing food production.

Livestock production is the backbone of Indian agriculture and also plays a key role in providing employment especially in rural areas. This sector has been the primary source of energy for agriculture operation and major source of animal protein for masses. Therefore, India has been the home of major draught, milch and dual-purpose breeds of cattle. Indian dairy production system is complex and generally based on traditional and socio-economic considerations. India is predominantly an agricultural country and has the largest livestock population in the world (Chandra *et al.*, 2008). The sustained livestock production needs adequate feed provision, however feed scarcity is major limiting factor for better productivity in India. In India, there is no practice of fodder production in rural areas and animals generally consume naturally grown grasses and shrubs which are of low quality in terms of protein and available energy, they are thus heavily dependent on seasonal variations and this result in fluctuation in fodder supply round the year affecting supply of milk. Livestock component is closely linked with the forest ecosystem and common property resources to meet the fodder demand. About 30-50 per cent of total animal feed is derived from forests and grasslands (Balachander and Ganesan, 1993).

Small timber is extensively used for various purposes like furniture and fixtures, agricultural implements, fencing, hutments, housing, furniture, mine props, packaging, match

wood, sports goods, scaffolding, poles etc. in the rural India. The demand for small timber is met through supplies from government forests and non-forest sources such as farmlands and homestead gardens (Chopra and Kumar, 2003). Primarily in the rural India and also in the urban sectors, most of the population depends on forests directly to meet the bulk of small timber requirement (Rai and Chakrabarti, 2001).

Forests represent a key component of available national and regional fuel wood, fodder and timber supply in rural India. Exploitation of forests resources is a common way for fuel wood, fodder and timber security among forest dwellers (Khanduri *et al.*, 2002). Indiscriminate withdrawal of forest resources is the main cause of forest degradation and environmental instability (Nabita *et al.*, 2007 and Chandra *et al.*, 2008). The excessive forest resources extraction broadens the gap between resources increment and resources removal resulting in localized shortages and un-sustainability of forest resources (IPCC, 2003). As the availability of forest resources is inadequate, forest cover is limited and forest productivity is diminishing, forest resources developments through various interventions need to be designed to cope with the future pressure and stop the further forest degradation. Keeping these facts in view, the present study was conducted to explore the estimates of extraction and consumption of fuel wood, fodder and timber in a forest fringe tribal society of Rarha village in Jharkhand, India.

EXPERIMENTAL METHODS

Study site :

The study was conducted in Rarha village lying on hilly tract of tropical dry deciduous forest (5B/C2) (Champion and Seth, 1968) under Kanke Forest Range of Ranchi east forest division. The village is about 18 km away from Birsa Agricultural University campus on Ranchi-Patratu road. The total geographical area of the village is about 2800 acres distributed in 22 *Tolas*. The Rarha village is demarcated on north by Hariharpur, Lem and Bicha villages, in south by Pithaurya, Pusu villages, in east by Parsa, Chandra villages and in west by Muretha village. The total population of the village is 3832 living in 478 households, of which majority (3255) belongs to tribal communities. The villagers mainly depend on forest produces and seasonal cultivation for their livelihood. The

climate is tropical with three distinct seasons, summer, monsoon and winter. Average annual normal rainfall is 1413.60 mm, the mean minimum temperature is 24°C and mean maximum temperature is 37.2°C (Anonymous, 2009).

Sampling and sample :

The study encompassed a stratified random sampling technique (Ray and Mondol, 2004) with 15 per cent sampling intensity approach to select the sample households from the 22 *Tolas* of the village for the survey. A representative sample of 72 forest fringe households having 15 per cent of the total 478 of the households comprising all the 22 *Tolas* in the sample village was drawn with an attempt to include persons from different land holding categories (small, medium and large), occupations and different resource endowment positions. Household heads or eldest men were treated as the respondents.

Data collection and statistical analysis :

The primary data on fuel wood, fodder and timber consumption status at both domestic as well as commercial level among forest fringe households belonging to different land holding categories were collected through field surveys and interacting with people in person through structured interviews, personal observations, focus group discussions and participatory rural appraisal (Mukherjee, 1993). The data included the quantity of fuel wood, fodder and timber collected, consumed or traded. Simple statistical tools *viz.*, frequency (f), percentage (%), average (\bar{x}) and standard deviation were used for analysis of the data as per Snedecor and Cochran (1967).

EXPERIMENTAL RESULTS AND ANALYSIS

The findings of the present study as well as relevant discussion have been presented under following heads :

Fuel wood consumption pattern of Rarha village :

The consumption of fuel wood at domestic level was

maximum by large farmers (43.69 qt yr⁻¹), followed by medium farmers (33.68 qt yr⁻¹) and least by small farmers (21.68 qt yr⁻¹), however, in case of consumption pattern at commercial level, maximum amount of sale of fuel wood is done by medium farmers (7.27 qt yr⁻¹), closely followed by large farmers (7.25 qt yr⁻¹) and least by small farmers (6.29 qt yr⁻¹). By combining the data of consumption of fuel wood at domestic and commercial level, maximum consumption is done by large farmers (50.94 qt yr⁻¹), followed by medium farmers (40.95 qt yr⁻¹) and least by small farmers (29.97 qt yr⁻¹) (Table 1).

Fuel wood supply problems are complex, they depend not just on how much is available in the village, but also on people's access to it, their attitudes and priorities, and local patterns of fuel wood trade. Fuel wood is mostly consumed for cooking purpose which is generally procured from forests, public lands, private lands or purchased. The fuel wood need is also supplemented by cow dung and agricultural residues among local people in the village. Fuel wood is the most important wood product in the northern districts of West Bengal where more than 200,000 people enter 11,879 km² of forests every day, collecting up to 120 kg of fuel wood per week per household and fuel wood business is found to be the main source of income for 10 per cent of rural households in these districts which accounted for about 45 per cent of their cash income (Hulscher *et al.*, 1999). Diminished supplies of fuel wood force rural communities to cut down their consumption, as they must market a greater proportion of their collection for livelihood earnings in Orissa and Chhattisgarh (Saxena, 1999). The local people generally depend on fuel wood for these purposes as they have less access to other energy sources such as LPG, kerosene, coal etc. (Bijalwan *et al.*, 2011).

Fodder consumption pattern of Rarha village :

The average number of cow, goat, bullock, pig and poultry possessed by the forest fringe households were 1.81, 6.85, 3.73, 0.27 and 12.16, respectively (Table 2). Goat and poultry are the two important livestock found integrated with the cultural life of tribals forming the main

Table 1 : Fuel wood consumption pattern of Rarha village

Use pattern (Qt./ household/ annum)	Household category		
	Small	Medium	Large
Domestic ($\bar{X} \pm S.E.$)	21.68 \pm 0.48	33.68 \pm 0.64	43.69 \pm 0.64
Commercial ($\bar{X} \pm S.E.$)	6.29 \pm 0.13	7.27 \pm 0.25	7.25 \pm 0.18

Qt.= Quintal, \bar{X} = Mean, S.E.= Standard error

source of income from animal husbandry profession among the people. Next to goat and poultry is bullock consisting as main farm power for agricultural activities. Cow is reared by the people for animal products such as milk, ghee, dung, manure etc. Very few households reared pig for meat as well as earnings. Rashid (2002) reported that one third of the households have cattle, poultry and goats, owning two animals on an average in Bangladesh.

The maximum consumption of fodder at domestic level was done by large farmers (18.18 qt yr⁻¹), followed by medium farmers (17.36 qt yr⁻¹) and least by small farmers (16.27 qt yr⁻¹). At commercial sale, same trend is observed with lesser quantities. Maximum sale of fodder produce is done by large farmers (5.27 qt yr⁻¹), followed by medium farmers (4.54 qt yr⁻¹) and least by small farmers (4.18 qt yr⁻¹). By combining the data of fodder consumption at domestic and commercial level, maximum utilization of fodder is calculated in case of large farmers (23.43 qt yr⁻¹), followed by medium farmers (21.90 qt yr⁻¹) and least by small farmers (20.43 qt yr⁻¹) (Table 3).

The livestock sector, apart from contributing to food and nutritional security, has good potential for improving the socio-economic condition of the people. The low economic condition, unavailability of pastures or fodder production unit and ignorance towards green fodder production results in higher intensity of grazing in the nearby forests of this village. World-wide, a very large number of people are employed in the gathering,

processing or trading fodder, the function of which is especially important in slack periods of the agricultural cycle (Gruenwald, 1998). Fodder contributes a considerable *per centage* to their total income which is almost double than the return from wage earning in the village. The situation in Manipur depicts a little different picture, with the return from fodder seems to be in balance with wage rate (Choudhary, 2007).

Timber consumption pattern of Rarha village :

The small timber consumption at domestic level was maximum by large farmers (28.90 qt yr⁻¹), followed by medium farmers (24.95 qt yr⁻¹) and least by small farmers (22.86 qt yr⁻¹). At commercial level, same trend was observed and it was maximum in case of large farmers (19.68 qt yr⁻¹), followed by medium farmers (17.59 qt yr⁻¹) and least by small farmers (16.63 qt yr⁻¹). By combining the data of small timber consumption at domestic and commercial level, maximum utilization of small timber is calculated in case of large farmers (48.58 qt yr⁻¹), followed by medium farmers (42.54 qt yr⁻¹) and least by small farmers (39.49 qt yr⁻¹). As regards structural timber consumption at domestic level, maximum consumption is shown by large farmers (21.72 qt yr⁻¹), followed by medium farmers (20.68 qt yr⁻¹) and least by small farmers (19.54 qt yr⁻¹). At commercial scale, same trend is observed and it is found maximum in case of large farmers (7.13 qt yr⁻¹), followed by medium farmers (5.63 qt yr⁻¹)

Table 2 : Livestock possession of Rarha village

Particulars	Livestock				
	Cow	Goat	Bullock	Pig	Poultry
Household livestock possession (X ± S.E.)	1.81 ± 0.48	6.85 ± 0.32	3.73 ± 0.13	0.27 ± 0.04	12.16 ± 0.80

X= Mean, S.E.= Standard error

Table 3 : Fodder consumption pattern of Rarha village

Use pattern (Qt./ household/ annum)	Household category		
	Small	Medium	Large
Domestic (X ± S.E.)	16.27 ± 0.83	17.36 ± 0.80	18.18 ± 0.66
Commercial (X ± S.E.)	4.18 ± 0.28	4.54 ± 0.32	5.27 ± 0.28

Qt.= Quintal, X= Mean, S.E.= Standard error

Table 4 : Timber consumption pattern of Rarha village

Category of framers	Small timber (Qt./household/year) ± S.E.		Timber (Qt./household/year) ± S.E.	
	Domestic	Commercial	Domestic	Commercial
Small	22.86 ± 1.47	16.63 ± 0.39	19.54 ± 0.34	5.13 ± 0.28
Medium	24.95 ± 0.30	17.59 ± 0.32	20.68 ± 0.44	5.63 ± 0.25
Large	28.90 ± 0.79	19.68 ± 0.40	21.72 ± 0.46	7.13 ± 0.37

Qt.= Quintal, X= Mean, S.E.= Standard error

and least by small farmers (5.13 qt yr⁻¹). By combining the data of timber consumption at domestic and commercial level, the amount consumed by large farmers is calculate as (28.85 qt yr⁻¹), followed by medium farmers (26.31 qt yr⁻¹) and least by small farmers (24.67 qt yr⁻¹) (Table 4).

Timber collection and sale have all along been a vital source of subsistence and livelihood particularly for the rural poor and tribals in the village. The poverty, low literacy and awareness, substandard socio-economic conditions, traditional severity, easy accessibility of forests among the local people and availability of inadequate markets, communication and transportation facilities in the area hinder them to access substitute of timber for their household consumption. The collection of timber acquires special importance for the poorer households as most of them generate income in the lean season from April to September (Saxena, 2003). Studies on timber and other forest products in China suggest that farmers only capture between one quarter and one third of the huge profits occurring in the sector (Ruiz-Perez and Byron, 1999). The low returns to labour and the inefficiency of co-operatives to increase price levels for timber collectors are compounded by the high vulnerability of traditional collectors to competition.

Conclusion :

The findings reflect that the tribal communities have traditionally been dependent on forests for fuel wood, fodder and timber security. The forest is has very huge pressure for procuring fuel wood, fodder and timber demands of the aboriginal people, creating threats to the biodiversity and environmental conservation. The tribal people are in deprived condition having very limited infrastructure restricting them to access substitute of forest resources for their household consumption. Therefore, the forest resources conservation is essential to keep pace with current development and future challenges. There is massive potential to relieve the pressure on forests and mitigate the environmental stress by the intervention of alternative avenues like biogas production, agroforestry plantation, energy plantation, pasture development, timber plantation, block plantation of bamboos, transformation of traditional agroforestry and homestead forestry to modern and efficient exploitation of village common lands. The interventions visualized needs to be implemented efficiently for fuel wood, fodder

and timber security of tribal people and ecological stability in the village. Strategies and policies must be sensitive and responsive to local conditions, and should encourage participation by the local communities.

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