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FUELWOOD REMOVAL BY HEADLOADS A CASE STUDY OF JABALPUR CITY

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BACK GROUND

Fire wood is the mainstay of India's rural population for cooking food with, and for other household and non agricultural work such as rural crafts. The annual consumption of firewood has been variously estimated, but on the conservative side it is about 200 million m^3 (Dubey and Chakravarti 1981; Chakravarti, 1985). Of this only about 16 million m^3 is recorded to be produced in India's forests, leaving a staggering gap of more than 90% of the consumption. Part of the gap is absorbed by production from farm forests and tree lands outside the forests - a source which has all but dried up but much of it is obviously accounted for by pilferage and the excessive exercise of concessions from the forests.

The most glaring example of excessive exercise of concession is free removal of dry, dead and fallen fuel removed by head loads, bicycle loads, hand carts, 'Kanwar' loads etc. The green saplings, poles and trees are felled and removed after drying under the garb of natural dry-fallen fuel wood presumed to be lying in the forests. The concession of free-removal of fuel headloads (including other types of loads), covers the fuelwood for bonafide consumption as well as for sale. In fact the poor and unemployed, more particularly the tribals and economically backward segments of the rural population concentrated in a radius of 10-15 km of big towns and cities have taken to it as a source of perpetual and gainful employment. Unskilled and physically weak labour class finds it more profitable and less exerting than other contemporary works. These set in a vicious circle of serious losses to the growing stock, soil erosion and other ecological imbalances.

Commercial energy, on account of high costs and non-availability, has made practically no impact on the Indian country side for house hold use, neither is it likely to, in the foreseeable future. Even an excellant alternative like biogas is not likely to make a significant dent in the present pattern of consumption of household energy. The serious impact of the high cost and non-availability of petroleum products is however, being increasingly felt in the urban areas, where fuelwood consumption has gone up (Reddy and Reddy 1983a; Reddy and Reddy 1983b). The increasing trend of urbanization in developing countries (Dopfer, 1979; Scholz, 1983) and the consequent formation of squatter settlements (El Hinnawi, 1982) are causing a rise in fuel wood consumption as a source of energy. Several studies on the problems of head loaders, and the consequent large scale disforestation have been conducted by some organizations (Bowander, 1983; Reddy and Reddy, 1983a, b). It has been reported that continued depletion of forestry resources have led to the serious fuelwood shortages (Pasca, 1981; de Montelambert and Clement, 1983). Bowander *et al.* (1984) estimated the fuelwood consumption in

Hydrabad city and in this study he based his assessment on the basis of fuel truck-loads arriving through check posts (Gopi and Dunkerly, 1981).

In Madhya Pradesh, two studies were carried out regarding the consumption pattern of wood and its consequent impact on loss of forest cover (Tomar and Joshi, 1977; Lal and Joshi, 1977). In one of these studies (Tomar and Joshi 1977) it has been reported that 26 districts of Madhya Pradesh are already in the category of firewood deficit areas while 13 more district may become deficit areas by the turn of the present century.

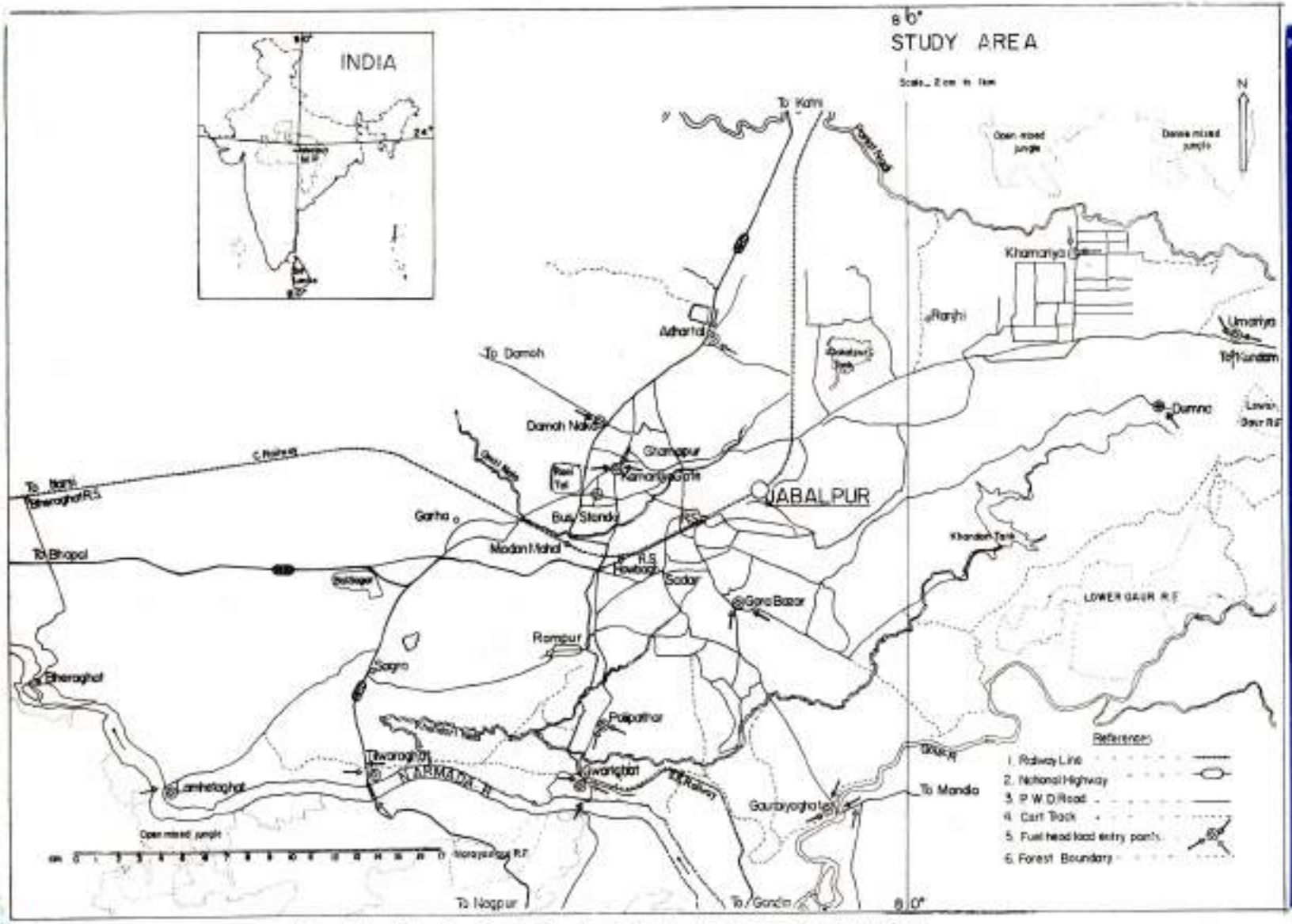
The above studies are based on the available data on growing stock and population increase which are presumed to be directly correlated. The loss of forest cover have invariably been calculated on the basis of population increase, mostly in the rural area. None of these studies however, take into account the loss of forest cover resulting from excessive exercise of concessions granted to the public in the form of free removal of fuelwood. There appears to be complete lack of data on the extent of fuelwood removal by head loaders and others from forests and its consumption in any major city of the country. In the present case therefore, actual field surveys spread over a period of one year (October 1985 to September 1986) were conducted in Jabalpur city. Studies on number of fuel head loads, bicycle loads, hand cart loads and 'Kanwar' loads, being brought to the city have been collected. The socio-economic status of head loaders, comparative price fluctuation of fuelwood vis-a-vis food grains (wheat and rice), impact of fuel head load removals on disforestation etc. have been discussed in this paper.

About Jabalpur

Jabalpur, the largest centre of specialised industries is situated almost in the centre of the State. Its cordinal points are 23°10'N° latitude and 79°57'E° longtitude with altitude of 393 m above mean sea level.

Jabalpur is linked by National Highway -7 interconnecting north to south (Varanasi to Kanyakumari). The other National Highway-12 connects Jabalpur with Jaipur. The State highways, mainly Jabalpur to Damoh; to Dindori-Amarkantak; to Mandla-Bilaspur and Raipur and Jabalpur-Narsinhpur are proposed to be linked to Bhopal. All these road links also provide all weather and throughout the year route for the fuel head loaders. In addition to the fuel head loads, the fuelwood is also removed on bus roof tops, in bullock carts and in passenger trains. Jabalpur, situated on Bombay-Calcutta trunk route via Allahabad, and meter gauge connection between Jabalpur-Balaghat-Gondia also feed Jabalpur town in respect of fuelwood. The headloaders board the train along with the fuelwood load and bring it in the train to Jabalpur, deliver it to predecided places (mostly the private fuelwood sale depots) and return after purchasing their daily requirements by some connecting trains. Long-distance truck drivers are in the know of places where the villagers collect dry and split fuel wood on roadside. These places are signalled by the small fuel wood lot stacked along roadsides to forewarn the commercial vehicles to stop and collect the fuelwood. These fuel wood loads are cheaper than the fuel wood sold in the private fuel depots in towns and cities.

Jabalpur also has a number of saw mills, private fuel wood depots and in



Fig—Map Showing Fuel Headload Entry Points in Jabalpur City

addition a large network of Iretai fuel-supply depots appointed by civil supply department and fed by central fuel wood depots of State Forest Department.

City is a growing organism. It is observed that during the rapid expansion of Jabalpur, particularly during the last twenty years, villages situated on the fringes of the city now form part of the main city. The process of merging of rural settlements with urban areas continues.

Area within Municipal Corporation Jabalpur is 134.70 sq km. There are 20 villages on the North-Eastern periphery of Jabalpur, one village Paraswara in the South-Eastern portion of the city; 17 villages including small town of Kundam in the South-West direction and 18 villages in North-West direction of Jabalpur. About 50% of these villages are within a distance of 5-10 km, 10% villages in a distance of 10-15 km; 5% villages in 15-25 km distance and remaining villages in a radius of 25-35 km from city limit.

Jabalpur is the largest and most important city of 'Jabalpur Forest Resource Region' because the forest produce of Jabalpur and adjoining districts of Mandla, Balaghat, Damoh, Seoni, Chhindwara and Narsimhpur are brought to Jabalpur for sawing and disposal, mostly to the markets in north India. The total forest area of Jabalpur district is 1927.54 sq km of which 850.94 sq km is under reserved forests and the remaining 1076. 60 sq km is under the category of protected forests (Prasad, 1985a). The concessions allowed in these forests are free grazing of cattle inside the forests and free removal of fuel head loads from the forests. In addition to these concessions, the villagers are also allowed small timber, bamboos, grasses and fuelwood for their *benafide* consumption at a very concessional rate. However, the protected forests are also burdened with the existing rights of the communities or individuals as the areas were declared protected forests with the above provisions.

Jabalpur district is endowed with three major forest crops viz. teak, sal and mixed forests occuring as site specific species primarily governed by the natural factors such as geology, rocks and soil and moisture regime. The crop composition, ecological status and productivity of these forests is governed by these natural locality factors. Forester's role in the scientific management of these forests came in with a view of exploiting the resources on sustained basis but before doing so the management practices envisaged the continuity of forest ecosystem by the replacement of older stocks with new ones to take its place. However, in the process of human involvement, there came many attendant problems in the form of excessive biotic interferences. The biotic forces such as fires, cattle grazing, excessive cuttings, insects and diseases act as a super-constraints disturbing the entire ecological balance, often leading to total annihilation of forests inspite of very ideal geological, soil and moisture conditions. While it is not easy to quantify the forest degradation by grazing and fires, the evils of unauthorised cuttings and removal of fuel head loads could be precisely assessed and quantified and its impact on disforestation can be calculated.

A human settlement is like a living organism particularly in its growth pattern. It influences and is also influenced by the neighbouring settlements. The socio-economic interaction between the adjoining settlements establishes a functional system. A study of growth pattern

of Jabalpur in relation to other urban centres in neighbouring areas is, therefore, of great significance. It will include population changes in study area, growth trends, age-sex structure, family structure, migrational trends etc. An analysis of these factors in relation to the city functions will also help in the assessment of various city needs in respect of housing, commerce and industries, amenities, recreation etc.

Since 1901, the population of Jabalpur has increased six-fold (Table 1). Analysis of the population trend has indicated that after independance there have been greater increase in population. With the exception of Bhopal the State's capital, the pattern of population increase for other major cities of the State, have been almost identical. Continuously increasing developmental activities and urbanization of Jabalpur has led to large scale migration of rural population. The migratory population falls in low-income group and thus cannot afford spending lion-share of their earnings on energy for cooking food and other household works. This low-income group population has encouraged the fuel headload removal by rural poor, fuelwood being cheapest sources of energy. The growing population and increasing fuelwood consumption in urban areas has thus resulted in large scale deforestation around Jabalpur. The forest boundary which in early fifty's touched the municipal limit of Jabalpur has now receded about 25-30 km from the city periphery in a short span of say 30 years.

Table 1 : Population growth of Jabalpur city

Year	Population Jabalpur (Lakhs)	% increase in population (base year 1901)	Other major cities			
			Gwalior	Raipur	Indore	Bhopal
1901	0.90	—	—	—	—	—
1911	1.01	+11.44	—39.07	+10.03	—44.64	—27.03
1921	1.08	+ 8.09	+34.60	+ 8.51	+94.52	—19.77
1931	1.24	+14.33	+11.67	+18.14	+35.33	+35.36
1941	1.78	+43.38	+43.75	+39.32	+42.92	+23.25
1951	2.59	+44.11	+32.38	+41.50	+52.61	+36.03
1961	3.67	+42.81	+24.23	+55.66	+27.05	+81.15
1971	5.35	+45.73	+35.12	+47.35	+37.59	+60.77
1981	7.58	+41.68	—	Not available	—	—

DETAILS OF THE METHODOLOGY

Field surveys of head loads and other modes of fuel wood removal was started in October, 1985 and continued till Septmber, 1986. The following road nakas and Railway Stations were included in this survey:

1. Road-Nakas :

1. Gwarighat
2. Tilwaraghat (N.H.-7 Nagpur-Jabalpur)
3. Damoh (Sagar-Damoh-Jabalpur)
4. Adhartal (N.H.7 Rewa-Jabalpur)
5. Kamania gate area
6. Ranjhi-Khamaria (Ordinance Factory-Jabalpur road)
7. Umaria(Amarkantak-Dindori-Jabalpur)
8. Dumna Naka (Air-port-Jabalpur)
9. Gora Bazar (Cantonment-Barela forests-Jabalpur road)
10. Gour-Naka (Mandla-Jabalpur)
11. Polipathar
12. Lamheta ghat

Railway stations and Bus-stand.

1. Jabalpur main.
2. Madan Mahal.
3. Main Bus-stand.

Table 2 : Monthwise sampled days.

S. No.	Months	No. of days	Days
1.	October '85	4	Thursday, Friday, Saturday and Sunday.
2.	November '85	3	Monday, Tuesday, Thursday.
3	December '85	2	Tuesday, Monday.
4.	January '86	4	Tuesday, Friday, Wednesday and Thursday.
5.	February '86	1	Friday.
6.	March '86	1	Sunday.
7.	April '86	3	Saturday, Monday and Wednesday.
8.	May '86	2	Monday and Saturday.
9.	June '86	1	Monday.
10.	July '86	2	Wednesday, Sunday.
11.	August '86	1	Thursday.
12.	September '86	2	Tuesday, Friday.
	Total	26	

Survey parties collected informations on socio-economic status of the head loaders (caste, sex, age, village, economic status etc.) place of collection, time taken in collection, total distance travelled, purpose of head load collection, disposal, daily earnings etc.

On each survey day, the parties were placed at different entry points at about 0500 hours. The observations were continued till late evening (2200 hours). Railway stations and Bus stand were also observed. The survey parties had made arrangements for drinking water, gram and sweet (*Gur*) to be offered to the head loaders. This arrangements helped survey work because the head loaders stopping at these points could get rest and drinking water and thus obligingly answered to the questions put to them in a sympathetic manner. In the mean-time, the headloads were weighed with the help of spring balance and improvised weighing arrangements installed at each place of survey. Survey was conducted on different days in a month in such a way that practically all the dates of a week were covered in about 2-3 months time. Monthwise, sample days are given in Table 2.

The survey work was carried out on 26 days spread over 12 months (October 1985 to September 1986). Socio-economic surveys of 3,347 families, located on the periphery of Jabalpur city were also carried out. Number of family members, employment pattern, monthly income, consumption of conventional and non-conventional sources of energy and expenditure on various items of household were also recorded.

Informations pertaining to the arrival of fuelwood by truck loads were also collected from weigh bridges, saw mills, forest depots etc. The information on arrival of fuelwood, conversion in saw mills local consumption pattern and fuel wood export from Jabalpur were compiled, analysed and have been discussed in this report.

Table 3 : Age-group and Sex-wise classification of fuel headloaders.

S. No.	Age group	Sex-wise		Total Nos	Percentage
		Male	Female		
1.	Upto 15 yr	336 (42.53)	454 (57.47)	790	5.06
2.	16 – 30 yr	4032 (42.59)	5441 (57.41)	9,473	60.00
3.	31 – 50 yr	1680 (42.56)	2267 (67.44)	3,947	25.06
4.	Above 51 yr	672 (57.59)	906 (57.41)	1,578	9.88
	Total	6720	9 068	15,788	100.00
	Per cent	42.47	57.43	100.00	

Figures in parenthesis are per cent of total sampled numbers.

DISCUSSION

Head loads and other modes of fuel Wood Removal :

The fuel wood is being brought to Jabalpur city by head loads, bicycle loads, hand carts, and 'Kanwar' loads (two loads are tied on two ends of a bamboo half-split acting as lever, and bringing it on shoulders).

Age-group and Sex-wise Classification of Head Loaders :

The sex-wise and age-wise classification of fuelwood loaders have been given in Table 3.

Data presented in Table 3 shows that in all the gradations, female out-number male members. In all, there were 15,788 persons who were studied on sample basis.

Table 4 : Caste composition of Sampled head loaders

S. No. (1)	Caste (2)	No. of persons (3)	Per cent (4)
1.	Scheduled Caste	6,340	40.15
2.	Scheduled Tribe	8,392	53.15
3.	Backward Classes	126	00.80
4.	Others	930	05.90
	Total	15,788	100 00

Of this, there were 9,068 females and 6,720 males. The sex ratio thus works out to 57.43 : 42.57 persons (female : male). It is further revealed that extent of female population involved in removal of fuel wood by head loads and other means are almost constant (57.43%) in all age gradations. While 5.06 per cent (male and female) of sampled persons engaged in fuel-wood removals fall in age group of upto 15 years the maximum number of persons (60%) were in the age group of 16-30 years. Above 25 per cent were in the age group of 31-50 and less than 10 per cent (9.88%) were in the age group of more than 51 years. These observations indicate that the work of fuel head-load collection and disposal is more common among youth, both male and females, and less prevalent among underaged (less than 15 years) and over-aged (more than 51 years). The hard labour required in fuel wood collection and extensive on-foot travel required in fuel head-load disposal appears to discourage the physically weak persons from undertaking this work. When interviewed some of the head loaders revealed that as long as the under-aged and over-aged get themselves engaged in agricultural works and public works, including the work of forestry

Bicycle load.....a poor man's conveyance and bread earning mode.

operations, they do not resort to headload sale. In tribal areas more than one family members are engaged in collection of fuelwood from adjoining forests. The fuelwood is collected practically every day, from forests and continuously stored. The family members while returning from various works also bring with them some fuel wood, partly for consumption at home and partly for sale in consumption centres in urban areas. From the fuel dumps which have been created over a period of time, fuel head-loads are taken to the city by comparatively stronger persons of a family so that they carry bigger loads to fetch higher monetary gains.

Involvement of female members in fuelwood collection and disposal, in rural and more particularly in tribal areas, is primarily on account of the fact that fuel wood collection is considered as part of the works connected with the cooking of food. Female members are generally less preferred for field works in public as well as in private sector and this fact also attributes their involvement in fuel head load collection and sale works. Head-loaders during their interview revealed that in case alternative works are created around villages, some of them may keep away from head load jobs.

Caste Composition

Among the total number of persons who were interviewed while bringing headloads to the city, the maximum number of these persons belonged to Scheduled Tribe (8,932). The next was Scheduled Caste

members who constituted 40.15% of the total number. Other backward classes constituted only 0.80% of the total sampled persons engaged in head-load sale. Other castes (other than scheduled caste, scheduled tribe and backward classes) were 5.90 per cent.

On-Foot Travel by Healoadders and Others :

As would appear from Table 5, a normal head-loader as well as a 'Kanwar' loader is required to travel about 26 km from his residence to collection point and back (12 km) and again from his residence to sale point and back (14 km). Thus, everyday, a head loader or a 'Kanwar' loader covers on an average, a distance of 26 km on foot with 23-30 kg load on his/her head (the load in case of 'Kanwar' loaders is more than 30kg). In case of a bicycle loader the distance covered by him is 36 km every day but in case of handcarts the distance is much less (20 km) probably on account of less mobility of hand carts on account of rugged terrain in the forest areas. However, the distance travelled by the persons who bring fuel wood by train make a journey of about 100-132 km in train. In case of a head-loader who travel by trains carry more than 2-3 head loads and sell it after separating them into appropriate sized loads after getting down from the train. Even if they have to sell their load to the private fuelwood sale depots they make the sub-loads because invariably the loads are not weighed but instead it is assessed by the private purchasers on occular basis.

Table 5 : Distance covered by different class of loaders.

S. No.	Particulars	Head loaders	Kanwar loaders	Bicycle loaders	Hand carts	Through trains
1.	Residence to collection point (km)	6	6	8	4	6
2.	Collection point to Residence (km)	6	6	8	4	6
3.	Residence to Sale point (km)	7	7	10	6	60
4.	Sale point to residence (km)	7	7	10	6	60
	Total	26	26	36	20	132
5.	Total distance travelled in a month km (@25 days each month)	650	650	900	500	3,300
6.	Total distance travelled in a year km (@250 days in year)	6,500	6,500	9,000	5,000	33,000

Critical review of data in table 5 further reveals that on an average, every head loader or a 'Kanwar' loader travels an estimated distance of 650 Km on foot every month and about 6,500 km in a year. Bicycle-loaders travel a distance of about 900 km in a month and an estimated distance of about 9,000 in whole year, partly on cycle and partly on foot. As against this, the fuel wood removed through train, the villagers travel on an average a distance of 3,300 km in a month and about 33,000 km in whole year of about 250 days.

Increasing consumption in urban areas have triggered forest destruction through rural poor.

Extent of Head-load Removals :

Data pertaining to the extent of head load removals by various modes have been summarised in Table 6. While 599 persons removed fuelwood as head-load, only 119.69 persons removed as 'Kanwar' loads, 33 as bicycle load and 0.80 as hand cart loads per day. The maximum quantity of fuelwood removal was also occordingly by head-loads. Other mode of removals such as 'Kanwar' loads, bicycle loads and hand-cart loads accounted for 6.265 tonnes of fuelwood every day. Similarly 4.576 tonne of fuelwood was removed by 'Kanwar' load, 1.469 tonnes by bicycle loads and 0.22 tonne by hand cart loads. On the basis of these figures, removal during a full year comes to 4,516.880 tonnes of head-loads, 16,447.360 tonnes by 'Kanwar' loads and 528.840 tonnes by bicycle loads. In all 6772.28 tonnes of dry fuel wood is thus brought to Jabalpur town every year.

Women are required to travel long distances to fetch firewood for cooking.

The average weight of fuel wood removed by head-loads is 19 kg; by 'Kanwar' load-38 kg; bicycle load-44 kg and hand cart load 275 Kg. The average figures of all types of loads thus, comes to 23 kg per load per day. The head-loaders are unattracted by alternative jobs no matter how lucrative they may be in terms of financial gains because with these jobs there is always some degree of uncertainity, discontinuity and discipline which is generally not liked by rural people. As against this, the fuel wood removal provides them full time employment as there is nothing like retrenchment, holiday or any other reasons. They go to the forests, cut the green saplings, poles and tree branches, leave them in the forest and after 2–3 days when it has driedup bring under the garb of dry and fallen fuel as this type of natural fuel alone is permitted to be removed from forests free of charge. They do this job uninterruptly unless they are forced to sit idle on account of inclement weather, festivals or when they are indisposed. Even if the regular head loader of a family is indisposed the work is normally taken-over by another member of the family. The work of fuel-wood removal and consequent destruction of forests, thus continues unabated.

As would appear from Table 6, an estimated 2.67 lakhs of fuel head-loads are being brought to Jabalpur and 1.88 lakhs of fuel head-loads are being brought to Katni town (Prasad, 1985a). It is further estimated that about 5.50 lakhs of head loads are being removed for consumption in rural areas and other small townships of Jabalpur district. Thus, an estimated 10 lakhs fuel head-loads (20,000 tonnes) are being annually removed from the forests. These removals remain unrecorded.

Table 6 : Extent of headload removals.

S. No.	Type of loads	Purpose of removal	No. of loads Per day	No. of loads Annually	Total weight (kg) Per day	Total weight (kg) whole year	Average removal per load (kg)
1.	Head loads	Sale	514	1,85,040	9.911	3,567.960	19.00
		Sale	023	0,08,280	0.449	0,161.640	19.00
		Own use	051	0,18,360	0.798	0,787.280	16.00
		Totel	588	2,11,680	11.158	4,516.880	19.00
2.	Kanwar loads	Sale	119	0,42,840	4.552	1,638.720	38.00
		Own use	000.69	0,00,248	0.024	0,008.640	35.00
		Total	119.69	0,43,088	4.576	1,647.360	38.00
3.	Bicycle loads	Sale	028	0,10.080	1.297	0,466.920	46.00
		Own use	005	0,01.800	0.172	0,061.920	34.00
		Total	033	0,11,880	1.469	0.528.840	44.00
4.	Hand cart loads	Sale	000.30	0,00,108	0.165	0,059.400	550.00
		Own use	000.50	0,00,180	0.055	0,019.800	110.00
		Total	000.80	0,00,288	0.220	0,079.200	275.00
		Grand Total	741.490	2,66,936	17.423	6,772.280	23.00

For Jabalpur city, about 6,772.28 tonnes of unrecorded fuelwood (head-loads etc.) and 11,836 tonnes of recorded fuelwood through two Central depots of Sangram Sagar and Neemkheda (Table 7A) are being distributed annually. In addition, about 36,700 tonnes of fuel-wood, 12,134.5 tonnes of sawn offcuts and 6,217.4 tonnes of sawdusts are available through forest contractors and saw mill owners of Jabalpur (Table 8). Forest contractors purchase the fuelwood in auction from which offcuts and saw dusts

are the bye-products of timber sawing. It is estimated that entire quantity of saw dust and sawn offcuts are disposed off within Jabalpur. Similarly, bulk of the fuelwood estimated to be 35,425.00 tonnes (94.52%) of the total purchased fuelwood is annually consumed in Jabalpur and less than 4 per cent is exported outside Jabalpur.

Table 7 (A) : Annual fuel wood supply through Forest Department's Depots.

S. No	Name of Depots	Quantity of fuel wood (t y)	No. of Depots	Average fuel-wood distributed per depot (t/y)
1.	Sangram Sagar, Jabalpur	8,169	132	114.34
2.	Neemkheda, Jabalpur	3,667		
3.	Budhagar, Panagar	3,257		
4.	Katni	1,314	6	219.00
5.	Sehora	300	3	100.00
6.	Shahpura	100	1	100.00
	Total	16,807	142	118.36

Table 7 (B) : Production of timber and fuelwood from Goverment Forests.

Year	Annual production from Goverment Forests				
	Timber logs cu m	Timber poles Nos	Fuel wood tonnes	Bamboo Tonnes	
				Commercial	Industrial
1980-81	6,466.463	18,969	40,963.2	949.00	184.083
1981-82	6,342.423	10,790	39,165.0	2842.20	617.990
1982-83	4,716.220	19,122	23,152.2	3165.47	1249.342
1983-84	4,339.539	19,649	30,072.0	295.87	120.790
Average	5,465.661	17,178	33,338.4	1811.88	542.50

The production of timber, poles, fuel-wood and bamboo from Government forests of Jabalpur district have been given in Table 7 (B). Perusal of the figures indicates that production has been declining. This decline is attributed to the excessive biotic pressures such as recurring fires, uncontrolled grazing (in excess of the carrying capacity of the forests), unauthorised cuttings, unregulated exercise of concession of free removal of fuel head-loads etc. These biotic pressures are causing tremendous pressure on the forests and thus creating conditions unfavourable for the establishment of natural regeneration. And in the absence of natural regeneration the annual harvest which is based on the sustained yield principle thus, also amounts to disforestation.

Fuel head loads to Jabalpur are being brought in from adjoining forest areas of Jabalpur, Bargi Ranges of Jabalpur Forest Division and Barela Forest Range of Mandla Forest Division. Two more adjoining Forest Ranges of Kundam (On Jabalpur Dindori-Amarkantak Road) and Sihora (National Highway-7 Jabalpur-Katni-Varanasi Road) are at an average distance of about 35 km. Some fuel head loads, are being brought from the forests of these two Forest Ranges on Bus-stop, by trucks, trains and as cycle loads. The annual production of timber and fuel wood from these Ranges are given in Table 7 (c).

Table 7 (C) : Annual Production From Adjoining Forest Ranges.

S. No.	Name of Forest Range	Annual Production		Proportional production from the areas within the reach of fuel head-loaders around Jabalpur	
		Timber cu m	Fire wood tonnes	Timber cu m	Fire wood tonnes
1.	Barela (Mandla)	2000	5000	500	200
2.	Bargi (Jabalpur)	1000	3000	100	500
3.	Jabalpur	500	2000	100	1,000
4.	Sehora	1000	3000	050	100
5.	Kundam	1000	3500	050	100
	Total	5500	16,500	800	1,900

Unrecorded removal of fire wood through head-loads from forests around Jabalpur city (Table 6) and annual authorized cut as per working plan prescriptions need to be compared and analysed. As against, about 2000 tonnes of annual fire wood production

from the forests around Jabalpur. 6772.280 tonnes are removed as fuel head loads and remains as unrecorded removel. These facts bringout the state of forest destruction going on in these forests. The concept of silviculture and scientific forest management that a tree be removed only when its replacement has been ensured through another established plant is not coming through on account of excessive biotic pressures. It is therefore quite reasonable to accept that the annual authorized cut of 8,200 cu m of timber and 16,500 tonnes of fire wood is in excess of the natural replacement.

The total forest area of the adjoining Forests Ranges and the production figures, both recorded as well as unrecorded, are summarized in Table 7 (D). The estimated average growing stock per hectare of these forests is also given in this Table.

Table 7 (D) : Forest Area, Growing Stock and Removal from Forest Areas around Jabalpur.

S. No.	Forest Ranges	Forest area hec.	Mean growing stock tonnes /ha	Total growing stock in lakh tonnes	Recorded Removal tonnes	Unrecorded tonnes	Total Tonnes	Estimated disforestation area ha	Likely period upto which the forests can last years
1	2	3	4	5	6	7	8	9	1o
1.	Barela (Mandla)	31672	12	3.8o	62oo	2ooo	82oo	683.33	46.35
2.	Bargi (Jabalpur)	24757	1o	2.47	36oo	3ooo	66oo	66o.oo	37.51
3.	Jabalpur	1892o	o8	1.51	23oo	3ooo	53oo	662.5o	28.52
4.	Sehora	33821	o8	2.7o	372o	3ooo	672o	84o.oo	4o.26
5.	Kundam	19823	1o	1.98	44oo	2ooo	64oo	64o.oo	3o.97
	Total	128993			2o22o	13ooo	3322o	3285.33	39.26

Unrecorded removal of 6772.280 tonnes/ year pertains to Jabalpur city only. This quantity is being brought out from adjoining forests of Bargi, Jabalpur and Barela Ranges. However, these forests feed to the requirement of other towns also. For example Udaipur, Barela and Bijadandi townships are fed from forests of Barela Range.

Similarly, Bargi forests also cater to the demand of Bargi irrigation colony and Bargi town (estimated population of 10,000). Forests of Jabalpur and Sehora Ranges also meet the requirements of Panagar and Sehora townships and that of Kundam Range to Kundam proper and Ordinance factory areas of Ranjhi. Sample survey of fuel head load arrival in these small towns and villages have revealed that about 13,000 tonnes of fuelwood is being annually taken away by head-loads, bicycle loads, hand cart loads, bullock cart loads (Table 7 D) etc. This quantity includes about 6772.280 tonnes of fuelwood which is being annually brought to Jabalpur city. On the basis of growing stock which varies from 8.12 tonnes/ha, the annual disforestation in forest areas around Jabalpur is estimated to be 3285.33 hectares. With this pace of disforestation, the forest cover in Bargi, Jabalpur, Sehora, and Kundam Ranges of Jabalpur and Barela Range of Mandla District may disappear in less than 40 years time. This situation may approach earlier unless some corrective measures are taken up immediately because the declining forest areas would be subjected to increasing population pressure of man and animals.

Data given in Table 9 shows the monthly consumption pattern of fuel wood and other sources of energy by different income groups. Perusal of data indicates that fuelwood consumption is higher in lower income groups while petroleum products are more popular with families in higher income brackets. Charcoal, wood dust and kerosene oil are more popular with middle class families. Critical analysis of data further reveals that lowest income group families (upto Rs. 500/- p. m.) spend about 11.5 per cent of their income on fuelwood alone while persons in higher income brackets (1000–2500) spend 1.0–2.6 per cent on fuel wood and about 7.80 per cent on other sources of energy (including petroleum products). Consumption of liquid gas (a petroleum product) is more common in higher income groups.

Poorer section of the community is though required to spend more on fuelwood and other sources of energy, part of their requirement is met by fuel headloads collected from forests and brought by one of their family members. This fact is brought out by the data in Table 6 where out of 588 head-loaders as many as 51 (8.67%) bring fuelwood for their own use. 'Kanwar' loads, bicycle loads and handcart loads are brought mainly for sale and partly for own use (Table 6).

Fuel wood prices *vis-a-vis* prices of Food Grains :

Comparative price increase in respect of wheat, rice and fuelwood over a period of years (1982–85) have been summarised in Table 10. Perusal of data reveals that over a period of 5 years the price of wheat registered an increase of 33.30 per cent and rice by 52.00 per cent. In comparison to the food items, the prices of fuel wood registered an increase of 66.66 per cent over the same period. Though, the price rise in respect of other energy sources have also registered increasing trend, generally it has been in the range of 20–25 per cent. In a similar study of Hydrabad city, Bowonder *et al.* (1984) have compared the price rise of paddy and fuelwood. This study covered a period of 9 years (1976–84). As against 30.74% increase in the price of rice in above period, the price rise in respect of fuelwood in the same period was reported to be as high as 190% (Bowonder, *et al*, 1984).

Table 8 : Extent of fuelwood sale through forest contractors (average of 5 years) : 1981-85.

S. No.	Category of forest contractors.	Number of contractors in the category	Firewood purchased and sawn offcutts and saw dust produced in tonnes/year				Disposal within Jabalpur in tonnes/year.				Exported to other cities in tonnes/year.			
			Fuel wood	Sawn offcuts	Saw dust	Total	Fuel wood	Sawn offcuts	Saw dust	Total	Fuel wood	Sawn offcuts	Saw dust	Total
1.	A	10	11,000	429.5	148.0	11,577.5	10425.0	425.5	148.0	11,002.5	575.00	—	—	575.00
2.	B	29	7,250	2255.4	1277.7	10,783.1	7125.0	2255.4	1277.7	10,658.1	125.00	—	—	125.00
3.	C	88	5,000	6740.5	3548.5	15,289.0	4425.0	6740.5	3548.5	1,474.0	575.00	—	—	575.00
4.	D	55	13,450	2709.1	1343.2	17,502.3	13450.0	2709.1	1343.2	17,502.3	—	—	—	—
	Total	182	36,730	12134.5	6317.4	55,151.9	35424.0	12134.5	6317.4	53,876.9	1275.00	—	—	1275.00

A, B, C & D categories are on the basis of economic status in descending orders. No precise statistics is available about their status and therefore the figures given by their association have been accepted.

Table 9 : Household Information Concerning Energy Consumption

Income Group	No. of families	No. of family members	No. of earning members	Energy consumption/Family/Month					Expenditure/Family/Month				
				Fuel wood (Qtls)	Charcoal (Qtls)	Wood dust (Qtls)	K. oil (lit.)	H. P. gas (cyl)	Fuel-wood @50/- per Qtl. Rs.	Charcoal @60/- per Qtl. Rs.	Wood dust @10/- per Qtl. Rs.	K.oil @2.50/- per lit. Rs.	H.P. gas @70/- per cyl. Rs.
Up to Rs. 500/- P. M.	1252	9092	1203	1.15	0.94	0.88	2.40	0.64	57.50	56.40	8.80	6.00	44.80
Rs. 5q1 to 1000 P. M.	1797	6467	2300	1.00	0.56	0.77	8.83	0.85	50.00	33.60	7.70	22.07	59 50
Rs. 1001 to 1500 P. M.	479	3043	674	0.65	0.80	0.44	8.76	1.08	32.50	48.00	4.40	21.90	75.60
Rs. 1500 to 2000 P. M.	457	2803	597	0.54	0.66	—	9.41	1.14	27.00	39.60	—	23.52	79.80
Rs. 2000 to 2500 P. M.	165	932	240	0.50	—	0.33	1.33	1.18	25.00	—	3.30	3.32	82.60
Above Rs. 2501 P. M.	197	1335	297	0.50	0.50	—	2.05	1.91	25.00	30.00	—	6.25	133.70

Small towns in rural areas also trigger forest destruction.

Table 10 : Comparative Price Increase in respect of Food Grains and Fuel Wood.

Year	Wheat		Rice		Fuel-wood	
	Rs./q	% increase	Rs./q	% increase	Rs./q	% increase
1	2	3	4	5	6	7
1982	21o.oo	—	25o.oo	—	3o.oo	—
1983	24o.oo	14.28	27o.oo	8.oo	35.oo	16.66
1984	26o.oo	24.8o	32o.oo	28.oo	36.oo	2o.oo
1985	3oo.oo	42.85	35o.oo	4o.oo	4o.oo	33.34
1986	28o.oo	33.33	38o.oo	52.oo	5o.oo	66.66

The steeply rising fuelwood prices are thus indicative of (1) fast disappearance of forests and diminishing forests productivity; (2) more demand in urban areas; and

(3) the head load removal is becoming more popular with unemployed youth both rural and urban poors. In a study, Tomar and Joshi, (1977) had estimated that with the increasing population and consequent increase in demand, most of the productive forests of Jabalpur may disappear in less than 40 years. This situation may be faced earlier if the corrective measures are not taken promptly because population increase and forest degradation are closely following each other.

Fuel Head-Load Depots

The concession of allowing free removal of firewood from natural forests was based on premise that there would be enough dry fallen fuel lying in the forests and that its removal would not create problems in the scientific management of the forests. The concession was also intended to demonstrate to the people, the Government's determination to help the rural and economically weaker section of the society to get their daily requirement of firewood in the vicinity of their villages for *bonafide* consumption. These concessions were further relaxed permitting the villagers to collect the fallen fuelwood from forests for *bonafide* consumption as well as for the sale to earn their livelihood. Probably, no one at that time realized the longterm implications of such a *Carte-blanche* which has now come to be realized as one of the major causes of present-day destruction of our forests. Forest Administration is engaged in finding out the alternatives and evolving methodologies to over-come the hardships of rural and urban poor for fuelwood and at the same time preserve the precious but fast disappearing forest wealth.

In its deep concern for the preservation of forests and to enlist the people's cooperation in this national effort, Government decided to experiment the ebtablishment of fuelhead-load depots for the benefit of villagers who have taken the fuelwood collection and sale as the source of livelihood. Several such depots have been established around Jabalpur and other major consumption centres of the district. Four headload depots at Jodhpur, Mangeli and Chhatarpur for Jabalpur city and Barginagar for Irrigation colony respectively, have been established in 1986. The headloaders from adjoining villages are registered in these depots. The registered headloaders are issued the fuelwood from these depots @ Rs. 2.00 per load of 20 kg each at first instance and Rs. 5.00 per load (20 kg each) if the headloader collects the firewood second time in a day. He is free to take subsequent loads @ Rs. 5.00 per load any number of times in a day.

Data showing the number of villages and registered number of headloaders at these four depots have been given in Table 11. Data pertaining to the monthly issue of fuelwood from Jodhpur and Mangeli Depots have been presented in Table 12. Perusal of data in Table 11 shows that 979 headloaders from 37 villages are registered in 4 depots. Maximum 623 headloaders from 16 villages are registered in Jodhpur which is about 10 km from Jabalpur (consumption point). There are 206 headloaders registered in Barginagar, 120 in Mangeli and 30 in Chhatarpur depot. It is further observed that headloaders have to cover distances of 3-5 km daily from their place of residence to depots and 02-10 km from depot to sale point. Distance thus, covered by them one way(village to depot and to sale point) varies from 05-15 km one way and 10-30 km both ways. The headloaders from 16 villages registered in Jodhpur are

required to make a journey of 15 km one way and 30 km both way, every day (Table 11). Similarly, the average distance covered by headloaders of Mangeli depot is 26 km (both way); Barginagar depot–10 km and Chhatarpur depot 12 km.

Table 11 : Headload Depots of Jabalpur Range (Jabalpur city) : Fuelwood issued to Registered Headloaders.

S. No.	Name of Depots	Total No. of villages	No. of Registered head loaders	Av. Distance in km		Total Distance km.	Total Distance of Both way- km.
				Village to Depot	Depot to Disposal point		
1.	Jodhpur	16	623	05	10	15	30
2.	Mangeli	05	120	05	08	13	26
3.	Barginagar Irrigation Colony	06	206	03	02	05	10
4.	Chhatarpur	10	30	04	02	06	12
	TOTAL	37	979	4.25	05.00	9.25	18.50

Perusal of data pertaining to Jodhpur and Mangeli depots (Table 12) further shows that over a period of 12 months (June 86 to Dec. 86) only 45 headloaders collected second load from Jodhpur depots but none turned up second time in Mangeli depot. In Jodhpur depot, over a period of 12 months (January to December, 1986) there were 25,984 persons who collected the single load and in the same period there were only 45 headloaders who visited the depot second time. However, in Mangeli depot, there were 18,997 headloaders who took the firewood load once but none came to fetch the firewood second time.

Economic analysis of the firewood sale from headload depots shows that a headloader spends good part of a day in reaching the depot, collecting the firewood, disposal in the market and ultimate return to his village. The time spent and distance covered in procuring and disposal of one load makes him unfit for fetching the load second time. The head loader spends Rs. 2.00 per load (Rs. 10.00/-q) for the purchase of wood and earns Rs. 8.00 per load (Rs. 40.00/- q) in sale. Thus, in a whole day the headloader makes a net earning of Rs.6.00as against the daily wage rate of Rs. 10.00—14.00 for doing hard labour on agricultural farms, in forestry operations and other private works. Despite these variations in figures of wage earning from sale of headloads and public / private works, many headloaders continue to depend upon collection and sale of fuelhead load. Two reasons could be attributed to this situation. Firstly there is no certainity of works at farms, in forestry operations or at public works. Secondly, fuel headload job appears to be

less exerting than many other works and as a result female members, children and other physically weak can easily earn livelihood. Many people who are required to come to the towns in connection with other works also bring with them the fuel headload from depots without much efforts and thus for such persons, the income of Rs. 6.00 per day comes as an incidental earning to their routine works.

Effect of Headload Depots on Fuel-Fellings in Forests :

The scheme of establishing headload depots was introduced to regulate and not to prevent fuelwood felling and removal by headloads. However, looking to the small number of headloaders registered in different depots, it is natural to conclude that the scheme for various reasons has not clicked. The village folk has been collecting fuelwood from forests since time immemorial, first, for their bonafide requirements at home and then for sale in consumption centres to purchase consumables in towns and cities. The rural people are normally not inclined to change their habit overnight especially when they find natural forests around their habitation for cutting and collecting the wood without any restrictions. Healthy male members bring 'Kanwar' load (tying on both sides of shoulder) which is equal to 2-headloads. This doubles their income. Even the headloader who comes to the city for other works also brings with him appropriate quantity of firewood, and for this he is neither required to spend a penny nor he is to wait for his turn in the headload depots. Many headloader's families collect the fuelwood on different days and one or two of their family members bring the wood to the consumption centre almost every day. As would be clear from Table-12, the headload depot at Jodhpur operated for 287 days and Mangeli for 281 days in a year (1986). And for remaining about 80 days the traditional headloaders have to depend upon fuelwood collection from natural forests.

The general scarcity of firewood in towns and cities has pushed up the prices considerably. As a result of price increase, the drivers of commercial vehicles find it easy and cheap to collect split wood from rural areas. Highways and rail routes passing through forested tracts witness firewood stacks being loaded and unloaded at appropriate places. These extra collection points and transport modes have further aggravated the process of forest destruction. These long distance transport modes are carrying fuelwood to places far away from the nearby towns and cities. There appears to be no solution to such ever increasing pace of exploitation and consequent destruction of forests. The concession which was initially extended to overcome the hardships of the rural and urban poor, appears to be acquiring a commercial base and if allowed to continue this way for too long, may lead to the total annihilation of forest ecosystem.

Fuelwood Removal and Extent of Forest Destruction :

In respect of fuel head-load Jabalpur city is mostly fed by four Ranges of Jabalpur District (Jabalpur, Bargi, Sehora and Kundam) and one Range (Barela) of Mandla District. As against about 16,500 tonnes of authorised annual fuelwood production from these areas (Table 7 C), about 6,772 tonnes of unrecorded fuelwood is

Table 12 : Monthly issue of Fuelwood to the Registered Headloaders.

Months	JODHPUR					MANGELI				
	No. of selling days in months	Total no. of Headloaders who took Fuelwood loads			Total Wt. of wood in tonnes	No. of selling days in months	Total no. of headloaders who toor Fuelorard loads			Total wt. of wood
		Once a day	Twice a day	Total			Once a day	Twice a day	Total	
January'86	20	2051	12	2063	4.126	19	2471	—	2471	4.942
February'86	18	1645	—	1645	3.290	15	1067	—	1067	2.134
March '86	26	1332	—	1332	2.664	31	892	—	892	1.784
April '86	29	1628	—	1628	3.256	20	308	—	308	0.616
May '86	24	1236	—	1236	2·472	30	1459	—	1495	2.920
June '86	23	1791	20	1811	3·622	28	1670	—	1670	3.340
July '86	27	2645	1	2646	5.292	26	362	—	362	0.724
Aug. '86	25	1650	3	1653	3.306	26	1693	—	1693	3.386
Sep. '86	23	2246	5	2251	4.502	26	3162	—	3162	6.324
Oct. '86	22	2143	—	2143	4.286	10	1058	—	1058	2.116
Nov. '86	24	2268	—	2268	4.536	24	1236	—	1236	2.472
Dec. '86	26	5349	4	5353	10.706	26	3619	—	3619	7.238
Total	287	25984	45	26029	52.058	281	18997	—	18997	37.994
Jan. '87	18	6272	14	6286	12.572	12	2003	—	2003	4.006
Total	305	32256	59	32315	6.463	293	21000	—	21000	42.000

being brought from these forests as head-loads and by other means of removal to Jabalpur and similar quantity (10,000 tonnes) for consumption in small townships such as Bijadandi, Udaipur, Barela, Sehora, Panagar, Kundam, Bargi and slums around Jabalpur. For entire district of Jabalpur (including rural and urban areas) the guestimated unrecorded removal is about 20,000 tonnes.

The annual fuelwood production has been continuously declining in Jabalpur Division. As against 71,841 tonnes of fuelwood production in 1979-80, it has come down to 30,072 tonnes in 1983-1984. The figures indicate the depleting forest resources of the district. The unrecorded removal of fuelwood as also the other biotic factors have greatly contributed to the loss of forest productivity in most of the natural forests of this district.

Key Issues and Need for Policy Interventions :

1. The magnitude of unrecorded removal of fuelwood from forests indicates the continuing pace of disforestation. Fuelwood continues to be the cheapest source of energy and therefore, its utilization is increasing in urban areas also, especially by urban poor. In addition to rural population urban unemployed residing on the periphery of Jabalpur have taken to fuelwood removal as more lucrative and as an assured means of gainful employment. The fuelwood is not brought for their own use but mostly for sale.

2. The forests in Jabalpur are subjected to a number of biotic pressures. Recurring fire from January to June every year; grazing of cattle in excess of the carrying capacity of the forests, illicit removal of timber and the excessise concessions of removal of dead, dry and fallen fuelwood (which does not exists in the forests) by cutting saplings, poles and green tree branches have rendered the productive forests into an unproductive wastelands. The biotic pressures and the consequent degradation have resulted in the complete absence of natural regeneration. All these factors are thus contributing to the gradual depletion of forests cover and consequent disforestation. In the absence of natural regeneration, the very concept of scientific management and silviculture which envisages sustained productivity till perpetuity is being thwarted; at this stage the very continuity of forest ecosystem is threatened.

3. About 20,000 to 25,000 tonnes of wood biomass is being annually removed as fuel headloads. And this annual cut remains to be unrecorded harvest. The extent of loss of plant biomass on account of fire and grazing and illicit cutting may be much more. According to a guestimate about 20,000 tonnes of biomass loss by fires and grazing and 10,000 tonnes of merchantable biomass by illicit fellings (Prasad, 1985 b) the total unrecorded loss suffered by these forests comes to about 50,000 tonnes, annually. The growing stock of already depleted forests of Jabalpur district varies from 08-10 tonnes per hectare. Taking an average figure of 10 tonnes/ha of growing stock, free removal of head-loads estimated at 20,000 tonnes annually means disforestation over an area of about 2000 hectares. Other forms of biotic pressures (grazing, fire and illicit fellings) are resulting in the annual loss of biomass to the extent of 30,000 tonnes which is equivalent to the growing stock from about 3000 hectares of forest area. These unrecorded removals pooled together thus account for annual disforestation over an estimated area of

about 5000 hectares, every year.

4. In the absence of natural regeneration, even the annual cut in long run may amount to disforestation. The total prescribed annual cut of fuel and timber of about 40,000 tonnes will then mean disforestation over an estimated area of about 4,000 hectares. Taking the figures of recorded and unrecorded exploitation of forests would thus mean disforestation over an area of 9000–10,000 hectares every year. With the present rate of disforestation, the entire forest area of Jabalpur (1927.54 sq km) projected to last till 40 years (Tomar and Joshi, 1977) may be liquidated much earlier. The mean population increase of about 30 per cent every decade would continually exert greater pressure on the remaining forests and as a result, the present forest wealth may be evaporated by the turn of this century, unless corrective measures are taken up immediately to halt the present pace of disforestation.

5. As discussed earlier, in view of increasing biotic pressures the concept of sustained yield and sound silvicultural system have become non-existent. Excessive exercise of concession of free removal of fuel headloads from natural forests have further contributed to the failure of management principle. There is a complete absence of natural regeneration in our forests. The trees are not putting up annual accretion and therefore, the annual cut prescribed in the working plans amounts to the encroachment on principal.The situation created by these facts thus warrant serious thinking if any trees are to be cut from natural forests unless another tree has been successfully planted elsewhere. The concept of silviculture today needs to be replaced by the concept of tree cultivation. Compensatory plantations would thus be needed not only for the biomass loss suffered by forests on account of biotic degradation but also on account of annual prescribed cut.

6. In order to compensate for the loss of forest cover to such an extent, annual budgt provisions of about Rs. 100 millions would be required for Jabalpur district. If the existing forests are to disappear, the entire urban poor and rural unemployed, presently depending upon headloads as source of earning would have to search for alternative source of assured employment. In view of yawning gap between the employment potential and ever increasing army of the unemployed population, no readymade solution appears to be in sight. The present rate of forest destruction therefore, may create further socio-economic problems. Massive plantation efforts may, however, make-two way attack on the problems created by large scale disforestation. Firstly, by providing alternative employment to the youth otherwise engaged in headload removal and secondly, by compensating for the loss of forest biomass on account of biotic pressures. Creation of rural energy plantations and practising urban forestry may go a long way in solving the fuel-wood crisis in rural and urban areas.

7. Study of sampled population engaged in fuelwood removal indicates that persons who are otherwise fit for other exacting works (16-30 years age) are engaged in this job. The female members who out number male are also engaged in more exacting and compulsory occupations but the responsibility of cooking food by female members extends beyond their kitchen (collection of fuelwood for cooking the food with). The amount of energy dissipated in the process of firewood collection, in many cases, may

be much more than the energy (firewood) gathered by the headloaders. This situation may further worsen creating a very adverse socio-economic equations especially in the rural areas. Shrinking forest boundaries may require them to cover still long distances.

8. From these studies, it has been clearly established that fuelwood availability to urban poors through Government depots are not adequate and this situation is expected to continue unless some corrective measures are taken up urgently. The most feasible corrective measure is one, to produce more firewood and produce it urgently. In much of rural India–as in the case of a third of humanity and of an estimated 1,500 million people, of whom more than 400 millions are in India, the real energy crisis is not the scarcity of petroleum but of firewood (Eckholm, 1978; Seth, 1980).

9. There are vast areas lying as wastelands around Jabalpur, presently infested with thick *Lantana* bushes and are in highly degraded stage. Such areas can be developed for fuelwood farming.

10. Urban centres are drawing huge quantities of fuelwood from rural areas and are acting as major consumption centres of fuelwood without any programme for replanting. One of the major consequence of the large scale use of fuelwood in urban areas has been the high increase in rate of fuel-wood as compared to the prices of food items such as wheat and rice. The increase in price of wheat and rice in last 5 years have been 30–50%. As against this, the price rise in respect of fuelwood has been quite alarming. As against Rs. 30 per quintal of fire wood in 1982 in Jabalpur city, it is now (1986) selling at the rate of Rs. 50/– per quintal thus, registering an increase of about 67% in a short span of 4 years. The above trend can be halted by popularising non-convenional sources of energy such as biogas, solar cookers and by use of improved *chullahs*.

11. Fuelwood consumption by hostels, bakeries, hotels, crematories etc. can be reduced by enforcing use of other source of energy so that the fuelwood so saved may be made available for household consumption, especially by urban poors.

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