FUEL COLLECTION IN THE CONIFEROUS FORESTS OF HAZARA CIVIL DIVISION, N.W.F.P.

by

K.M. Siddiqui, M. Ayaz and A. Jah*

Abstract

Coniferous forests of Hazara Civil Division in the vicinity of habitations are under a very high pressure of fuelwood collection by the local people. It is estimated that a total of 1,597.3 tonnes of fuel and fuelwood is collected from the reserved forest of Massar and adjoining Guzaras in Siran Forest Division every year at a rate of 1.099 tonnes/ha/annum. Out of this 72.2% is woody and 27.8% is non-woody fuel. Woody fuel constitute about 0.62% of the total growing stock and 31% of the annual increment. Therefore, these forests have a limited use other than fuelwood collection. Heavy collection of fuelwood by the people is a socio-economic problem and needs long term planning for the improvement of socio-economic conditions of the people and gradual substitution of wood fuel with commercial fuels to save the valuable forest wealth from misuse and destruction.

INTRODUCTION

Pakistan is a part of developing world and in common with other countries is facing serious energy crisis. This is due to poor domestic energy resources, both traditional and commercial. The gap between energy supply and demand is increasing due to growing population and expansion and development in various sectors of economy. Fuelwood from the farmlands, wastelands and forests provide upto 50 percent of domestic energy mainly for cooking and heating (Siddiqui, 1988). The per capita consumption of fuelwood is estimated at $0.2m^3$ per annum and for a population of 104.4 million in 1986-87, the country needeeds 20.8 million m^3 of fuelwood (Amjad and Khan, 1988). The commercial production of fuelwood from government forests is only about 0.2 million m^3 1 percent of the total, and rest 20.6 million m^3 is coming from farmlands, wastelands and forests.

Director General, Logging Officer and Forest Manager, Pakistan Forest Institute, Peshawar, respectively.

The fuelwood supply situation in mountainous areas of Pakistan is quite different from that of plains, because of economic, topographic and climatic factors. The area is thickly populated and the peoples are very poor mostly depending on agriculture. Production of fuelwood on farms as well as marginal lands is very meagre and the procurement of fuelwood and commercial fuels from other areas is also very low, because of the high prices and poor buying power of the local inhabitants.

The fuelwood needs in mountainous areas is also much higher than the overall average for the country. This is because of long winter season and wasteful methods of energy use. Therefore, there is an acute shortage of fuelwood. To meet their daily fuel needs, the people depend on nearby forests and collect all types of biomas including fuelwood either by cutting standing trees (mostly pole crop) or by severe lopping of trees. Some people besides meeting their domestic needs also sell fuelwood so collected to earn their livelihood. Pressure of fuelwood collection on these forests is consequently very high and ever-increasing. It is feared that these forests will vanish very soon if the present pace of fuelwood collection remained unchecked.

In order to find out the quantities of fuel collected from the forests in the vicinity of population centers in mountainous areas as well as to find out the socio-economic motives for this activity, a study was carried out in the reserved and guzara forests around the Research and Training Field Station of the Pakistan Forest Institute at Shinkiari, Siran Forest Division of Hazara Civil Division.

MATERIAL AND METHODS

Material

The study forests cover an area of about 1,453 ha, located around the Pakistan Forest Institute, Research and Training Field Station, Shinkiari. This area comprised of the following compartments of both reserved and guzara forests:

Forest	Compartment No.	Area(ha)
Reserved:		
- Massar	6,7,8,9,14 and 15	996.7-I
Guzaras:		
- Shinkiari	1,2 and 3	178.5
- Okharila	1 and 2	98.0
- Jhandwal	1 and 2	178.8
	Total	456.3-II
	G. Total (I+II)	1453.0

Source: Compartment History Files, RFO,Shinkiari.

The tree crop in all these compartments comprised of almost pure mature and sub-mature chir pine (Pinus roxburghii) trees with occasional broad-leaved species like sharol (Alnus nitida) and rin (Quercus incana) in the moist nullahs. The crop density is different in reserved forest and guzara forests. The reserved forests are comparatively dense with a crown density between 0.6 to 0.8, while guzara forests have a thin crop of trees with density range of 0.3 to 0.5.

A growing stock of 181m^3/ha is estimated for the reserved forest of Massar (average for compartment No. M-2 and M-8) with an annual volume increment of 3.69m^3/ha (CHEEMA, and KLEINE,1989). Similar data of growing stock and increment are not available for guzara forests. However, from the general look of the crop, the increment and growing stock are very poor in guzara forests as compared to reserved forests.

Methods

The study on fuel collection covered full one year from January, 1988 to November, 1988. Observations were recorded on alternate months and only for 5 sample days/month. First and last Friday of the month were necessarily included for making observations, while rest of 3 days were selected at random. T h e observation points were selected at the termination of two important routes coming from these forest areas. Location of these points alongwith the forest areas served by them is given as under:

Observation point	Compartments served
- Khan Dheri Village	- Massar - 8,9,14,15 - Shinkiari Guzara - 1,2&3 - Okharila Guzara - 1&2
- Primary School,Makhria	- Massar - 5,6&7 - Jhandwal Guzara - 1&2

Khan Dheri observation point was connected to the forest area above by a standard forest road, while a very poor standard road and a bridle path served as means of communication between Makhria and forest compartments above it. On each observation day a party of technicians with proformas was posted at these observation points, who worked from dawn to dusk and recorded the following information:

- Forest and compartment No. from which the fuel and fuelwood was collected
- Mean of transportation (head loads, donkey loads and van/mechanical transport)
- No. of loads
- Weight of loads in kilograms (only for sample months)
- Nature of fuel (branches, poles, drywood, cones, bark/needles)

Data record for 5 days/month and on alternate months made up a total of 30 days of observations from January, 1988 to November, 1988. During the months of January and March, 1988 the loads of fuel were actually weighed by a spring balance to calculate the average weight of head loads, donkey loads and van loads etc. Later on only the number of loads were counted on study days.

ANALYSIS OF DATA

As the study was a survey and only spot observations were made, therefore, no statistical analysis was carried out. However, the data on the quantity of fuel were grouped according to its type, mean of extraction and the months of study. Based upon the average of 5 sample days/month, the quantity of fuel collected per day and per sample months were calculated. Yearly collection of fuel was estimated on the basis of average daily collection during 30 sample days. Comparison between sample months was made to determine the fluctuations in fuel collection with respect to seasons (months) of the year.

RESULTS AND DISCUSSIONS

Fuel Collection

The results of the study on the quantity of fuel collected during the year and its composition are given in Table 1 and Fig.1.

Table 1 Yearly collection of fuel and its composition

Name of the biomass	Quantity(kg)	Percentage of total
1. Branches	920,044	57.6
2. Drywood	148,549	9.3
3. Poles	84,657	5.3
4. Cones	103,825	6.5
5. Bark/Needles	340,225	21.3
Woody(1+2+3)	1,153,250	72.2
Non-woody(4+5)	444,050	27.8
Total	1,597,300	100
	1,597.3 tonnes or 1,099kg/ha/annum	

FIG.1 COMPOSITION OF FUEL WITH RESPECT TO ITS TYPE

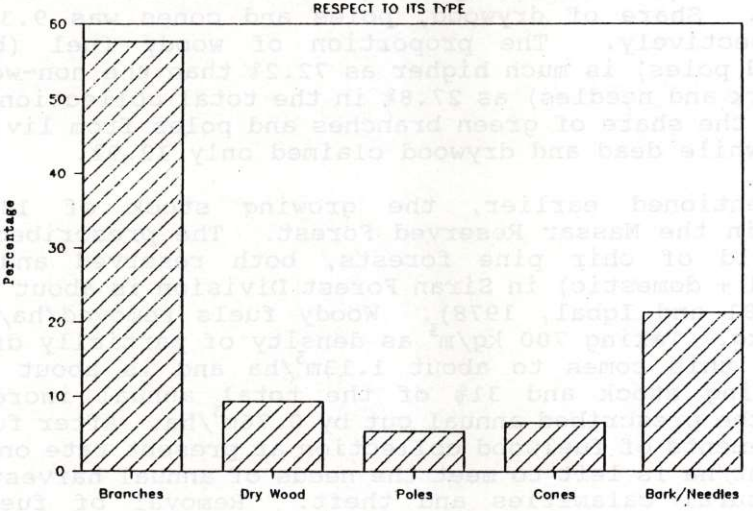
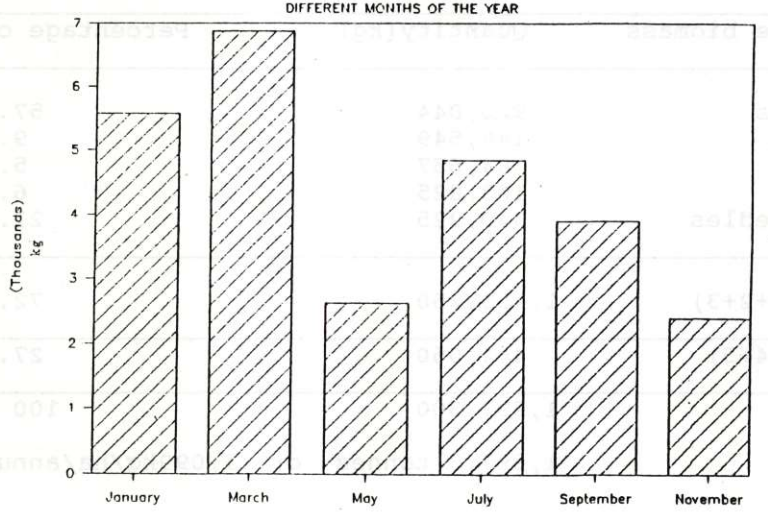


FIG.2 AVERAGE DAILY FUEL COLLECTION IN DIFFERENT MONTHS OF THE YEAR



As shown in Table 1, the annual fuel collection from the forest area of about 1,453 ha was 1,597.3 tonnes or about 1,099 kg/ha. The major, proportion of this fuel comprised of tree branches as 57.6% followed by bark/needles as 21.3% of the total collection. Share of drywood, poles and cones was 9.3 5.3 and 6.5%, respectively. The proportion of woody fuel (branches, drywood and poles) is much higher as 72.2% than the non-woody fuel (cones, bark and needles) as 27.8% in the total collection. In the woody fuel the share of green branches and poles from living trees was 87.1% while dead and drywood claimed only 12.9%.

As mentioned earlier, the growing stock of 181 m^3/ha is estimated in the Massar Reserved Forest. The prescribed average annual yield of chir pine forests, both reserved and guzara, (commercial + domestic) in Siran Forest Division is about 0.37 m^3/ha (Iqbal, 1981 and Iqbal, 1978). Woody fuels removed/ha/annum is about 794 kg. Taking 700 kg/m^3 as density of partially dried chir pine wood, this comes to about 1.13 m^3/ha and is about 0.62% of total growing stock and 31% of the total annual increment/ha, exceeding the prescribed annual cut by 0.76 m^3/ha. After fulfilling the requirements of fuelwood collection at present rate only 2.56 m^3 of increment/ha is left to meet the needs of annual harvest, losses due to natural calamities and theft. Removal of fuelwood in guzaras is evidently more than 0.62% of growing stock, because of their poor stocking and increment and their proximity to habitations.

The above figures are for the woody fuels, which are taken out of the forest through two major routes and does not include the quantity of fuelwood taken out through other minor routes or utilized by the people living inside the forest. From this it is clear that these forests have a limited role for commercial utilization other than fuelwood and biomass collection by the local people.

Means of Fuel Extraction

Table 2 shows the different means of fuel extraction alongwith the number of loads/month, average quantity/load and the average daily, monthly and yearly collection.

Table 2 Means of extraction and quantity of fuel collected

Means of Extraction	No. of loads/ 30 days	Av.Qty per load (kg)	Qty/30 days (kg)	Av.Qty per day (kg)	Qty/year (tonnes)	% of yearly Qty
Head loads	463	36	16,668	556	202.8	12.7
Donkey loads	990	91	90,090	3,003	1,096.1	68.6
Mechanical Transport	45	545	24,525	818	298.4	18.7
Van	41	515	21,115	704	-	-
Tractor trolley	2	1,200	2,400	80	-	-
Gattu	1	600	600	20	-	-
Jeep	1	400	400	13	-	-
Total	1,498	88	131,283	4,376	1,597.3	

Among different means of fuel extraction use of donkeys remained the most dominant and used for transportation of 68.6% (1,096.1 tonnes) of fuel in 990 loads/month each load consists of about 91 kg/load. Next in order of magnitude was the mechanical transport, using forest road, and extracting about 18.7% (298.4 tonnes) of fuel every year in 45 trips/month carrying average load of 545 kg. Suzuki van was the most frequently used vehicle, transporting about 86% of the total fuel extracted by mechanical means.

Head loads accounted for only 12.7% (202.8 tonnes) of the annual fuel collection with 463 load/month and 36 kg/load. Heads loads were the lowest for fuel extraction due to its difficult nature and was suitable for shorter distances only.

Variation in fuelwood collection in different seasons

The data on the average quantity of fuel collected per day in alternate months of the year as based on 5 sample days/month are given in Table 3 and Fig.2.

Table 3 Quantity of fuel collected/day in different months of the year

Months	Quantity collected/day(kg)	Index No.
January	5,580	238
March	6,879	287
May	2,628	110
July	4,852	202
September	3,914	163
November	2,400	100
Average	4,376	

The above table shows that variable quantities of fuel were collected during different months of the year. This was partly due to climatic conditions and partly due to the availability of spare time to collect fuel. As the people of the area are engaged in one way or the other in farming activities, therefore, period of crop sowing and harvest did effect the intensity of fuel collection. Average quantity of fuel collected per day was minimum in the month of November as 2,400 kg. This was mainly because of pre-occupation of people in the grass cutting and availability of maize stalks as fuel. The fuel collection being minimum, in this month was taken as base line for comparison with other months with an index number of 100. The fuelwood collection in the month of May was 2,628 kg/day, which is only slightly higher than that in the month of November, with an index number of 110. Low collection in May is partly because of onset of summers and partly due to pre-occupation of people in sowing of maize and paddy. Similarly, in September, the people are harvesting maize and paddy, therefore, fuelwood collected/day in this month was about 3,914 kg, with index number of 163. The months of January and March gave the highest collection of fuelwood as 5,580 and 6,879 kg/day with index numbers

of 238 and 287, respectively. This is obviously due to cold winter season and more time available for fuel collection because of absence of farming activities. In July fuelwood collection was less than January and March, but higher than other months with 4,852 kg average daily collection, with an index number of 202. This was because of non-availability of fuel from the farms and sufficient time isavailable to farmers due to less farming activities

SOCIO-ECONOMIC CONDITIONS OF THE PEOPLE

The people of hilly region of the Hazara Civil Division are very poor and the average per capita annual income from various resources is estimated as Rs. 2,206 and nearly 50% of this comes from farming (Khattak, 1981). This is less than the national per capita income by Rs. 1000/- (Anon, 1988). Dependence of people on agriculture is very heavy, which is generally of subsistence level with very low productivity due to difficult terrain, severe climatic, and small and fragmentary land holdings. The population density of the area is also very high as 158 persons/km^2 of geographic area and 1000 persons/km^2 of cultivated area, increasing at a fast rate of 3.9%/annum (Anon. 1981). According to Khattak (1981), the average literacy rate of the people is only about 26% and about 75% of the working population is locally employed, 48% in agriculture,18% in labour and 9% as professionals. Rest go to clerical jobs, armed forces and others. Low per capita income and dependence on agriculture also affect the family size and structure. About 55% of the households are of joint nature Number of single families is higher in towns than in villages. An average family comprised of 10 persons.

The above facts reveal that the socio-economic conditions of local people are poor. Their dependence on agriculture and forest is high. Their daily domestic needs of energy are met by the nearby forests.

CONCLUSIONS

Fuelwood collection pressure on the forest areas adjoining inhabitation in the hills is very high and is causing heavy damage to them. These forests are also being subjected to commercial exploitation which is also causing their degradation. Results of this study show that these forests hardly have any commercial scope because of high rate of fuel and fuelwood collection from them. As fuel and fuelwood is one of the basic needs of people of the area, therefore, its procurement from the forest in the present way cannot altogether be stopped. However, some measures need to be

adopted to check such a heavy use of forest resource through popularization and substitution of fuelwood with commercial fuels for domestic energy needs. As the fuelwood collection pressure on the forest is a socio-economic problem therefore only sound long term action plans for the general economic uplift of the area would help in reducing or completely eliminating it, thus to ensure survival of the forests. Further, timber is the major natural produce of the area, therefore, proper management of its trade within Hazara can greatly contribute to solve the socio-economic and energy problems of the people through following measures:

1. The centuries old practice of exporting raw-timber from Hazara Civil Division should be stopped and it should be processed in the area by sawing, seasoning, manufacture of various fitments and wood products for use in the rest of the country.

2. Timber processing units should be established deep in the interior of valleys at suitable places with dependable communication system and power supply.

3. Basic processing of timber will create job opportunities for the people and improve their socio-economic condition. Sawmilling and processing waste can also meet the local energy needs to a greater extent.

4. The system of sale of timber also needs to be changed. Instead of collecting it at only one place, sale points should be scattered throughout the area. Scattered sale points of timber, besides catering to the timber needs of local people, will also ensure cheeper and quicker supply of raw material to the local timber processing units.

5. Private enterprise should be encouraged to establish forest based industries through incentives of loans and taxes.

6. A net-work of good standard public and forest roads should be constructed for the efficient supply of goods and services, like commercial fuels (Kerosene, LPG) etc. to the local people. Use of commercial fuels can be popularized through subsidies.

REFERENCES

1. Amjad, M. and N. Khan. (1988). The State of Forestry in Pakistan (1987), Forest Economics Branch, Pakistan Fores Institute, Peshawar.

2. Anon. (1988). Pakistan Statistical Year Book, Federal Bureau of Statistics, Government of Pakistan, Islamabad.

3. Anon. (1981). District Reports Abbottabad, Kohistan and Mansehra Districts. Population Census Organization, Statistic Division, Government of Pakistan, Islamabad.

4. Cheema, M. A. and Kleine, M. (1989). Forest Resource Inventory of the Forests of Research and Training Field Station, Forestry Research Division, Pakistan Forests Institute, Peshawar.

5. Iqbal, M. (1981). Working Plan of Siran Guzara Forest (1981 to 1990) Office of Chief Conservator of Forests, Peshawar.

6. Iqbal, M. (1978). Working Plan for Lower Siran and Agror Reserved Forests (1978-79 to 1987-88). Office of Chief Conservator of Forests, Peshawar.

7. Khattak, G. M. (1981). The feasibility of forestry and forest industries in Hazara Division, Pakistan Academy of Sciences, Islamabad.

8. Siddiqui, K. M. (1988). Cook Stoves and fuelwood conservation: Some issues. Forest Products Research Division, Pakistan Forest Institute, Peshawar. (unpublished)

FOREST ENGINEERING