

WOOD FOREST PRODUCTS MARKETING SYSTEM IN NEPAL

Study of the Urban Areas of Kathmandu Valley

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THE FOREST PRODUCTS MARKETING SYSTEM IN NEPAL:

Case Study of the Urban Areas of Kathmandu Valley

(Final Report)

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Special Terms and Abbreviations

NFC	Nepal Fuelwood Corporation
TCN	Timber Corporation of Nepal
FPDB	Forest Products Development Board
HMG	His Majesty's Government of Nepal
Rs.	Nepali Rupees
Chatta	Volume unit of measurement for a stack of wood 1 chatta = 5ft x 5ft x 20ft
Bhari	Headload of wood weighing approximately 30-50 kilograms
Bakal	Long strips of wood derived as a by-product of milling (off-cuts)
Cft	Cubic feet (1 cft = 1ft x 1ft x 1ft)
Heft	Hoppus cubic feet - measure of volume of roundwood
Qt	Quintal
Quintal	100 kilograms
Kg	Kilogram
MT	Metric Ton
IDS	Integrated Development Systems
WERDP	Water and Energy Resources Development Project
ICS	Improved Cookstoves Project
U.S.A.I.D.	United States Agency for International Development Mission to Nepal
IRR	Internal Rate of Return
PE	Public Enterprise
DFCO	District Forest Officer
Ha	Hectare
Cum	Cubic Meter
m ³	Cubic Meter

Principal Conversions

1 Metric Ton	= 1,000 kilograms
1 Quintal	= 100 kilograms
1 Chatta	= 6.4 MT = 6,400 kilograms
1 Bhari	= 30-50 kilograms
1 Cubic Meter	= 35.3 cft = 755.4 kilograms
1 Cft	= .0785 Heft = 21.4 kilograms
1 Heft	= 1.273 cft = 27.7 kilograms

NOTES

The Nepali fiscal year runs from mid-July to mid-July of the Gregorian Calendar.

The Current exchange rate of the Nepali Rupee is Rs. 26.2 = US \$ 1.

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Preface

The study uses 1986/87 as the reference year for its data and analysis. This is the last year for which complete information was available. The findings of the study remain broadly applicable for subsequent time periods as well.

Since the Draft Report was completed, there have been substantial changes in the retail prices and royalty fees for the major public enterprises involved in forest products marketing. These and other recent developments are discussed in Chapters 3 and 7.

Executive Summary

Forestry plays a significant role in the economy of Nepal. Forests and trees form an integral part of the farming system, and are central parts of the natural resources base on which rural production systems depend. Deforestation in Nepal has been linked to soil erosion and runoff, declines in agricultural productivity, sedimentation of rivers and streams and the loss of wildlife habitat and biological diversity. The imbalance between the supply and demand for forest products increases the workload of rural populations and implicitly lowers the standard of living of urban populations by raising the prices of energy and construction. Fifteen percent of Nepal's Gross Domestic Product and 75% of its energy needs are derived from forest products. His Majesty's Government (HMG) obtains 2.5% of its revenues from the sale of fuelwood and timber, and the sector directly employs 12,000 people. An estimated 1.3 million people derive some portion of their incomes from the collection, transportation and sale of fuelwood, fodder and timber.

ES.1. Objectives and Methodology of the Study

This study builds on the work done in the Master Plan for the Forestry Sector of Nepal (MPFS), and the Forestry Private Sector Study (U.S.A.I.D., 1986). Its objectives are to establish the factual basis for understanding the forest product flows to the urban areas of Kathmandu Valley; to analyze the role of both public enterprises and the private sector in the operations of this market; and to make recommendations for future public policy with respect to this sector.

The study methodology draws information from five independent sources to form as accurate a picture as possible of both officially reported and unofficial flows of forest products to the Kathmandu Valley. Primary and secondary data was collected on both the supply and the demand side. The principal sources of information for the study were: reported statistics from public enterprises; daily records of incoming wood traffic from the Forest Department's roadside checkpoints; independent roadside monitoring conducted by the Study Team; estimates of household, industrial/commercial and institutional demand; and both quantitative and qualitative field data collected from a wide variety of sources throughout the forest products marketing system. The data from these five independent sources was cross-checked, and discrepancies reconciled, in order to obtain final estimates of sufficient accuracy for policy conclusions to be drawn.

ES.2. Principal Findings

Market Structure

There is a heavy concentration of population in the Kathmandu Valley (475,000 in 1988) in the cities of Kathmandu, Bhaktapur and Lalitpur. Forest resources from

surrounding hills are relatively inaccessible, and potentially accessible supply has already been depleted through years of over exploitation. As a consequence, the high urban market prices attract large volumes of fuelwood and timber from the Terai. Ninety-five percent of the fuelwood and virtually all of the timber used in the urban areas of the Valley is trucked in from the Terai from distances of as much as 300 kilometers. All incoming wood moves along one main road (through the Churia and Mahabhrat ranges), whose condition is extremely poor.

In both the fuelwood and timber markets, public enterprises (the Nepal Fuelwood Corporation and the Timber Corporation of Nepal, respectively) are the principal officially-sanctioned suppliers of forest products. However, in both markets, supply from public enterprises is inadequate to meet demand, and the gap is filled by the private sector. Official prices charged by public enterprises are well below free market prices, but most consumers are unable to obtain wood at the low official price. At each stage in the supply and marketing chain from harvesting to end-use, there is strong financial incentive for unofficial intermediaries and consumers to by-pass official channels. In general, they have been successful at doing so. The problem is compounded by the overlapping mandates of several public institutions and the poor management of public enterprises.

The result is an extremely complex marketing system. There is a potentially bewildering array of public and private actors, of discrete steps in collection, transport, wholesaling and retailing, of permits and access rules, of financial incentives which run counter to policy objectives, of avenues to circumvent market rigidities and of prices and resource allocation mechanisms. The basic fact is of a market which is highly segmented: the sources of supply are distant from centers of demand, separated by poor roads through mountain passes; publicly-controlled supply at fixed prices is inadequate to meet demand and coexists with a flourishing private trade. The very complexity of official rules on access and transportation results in the inventiveness of private sector responses.

"Unofficial" private sector operators are not limited to traders and financial intermediaries. Large segments of the rural poor earn as much or more than their agricultural incomes from the collection and sale of forest products. This activity is a particularly important source of *cash* income for many rural households. There are, however, also some very large and organized unofficial suppliers with vertically integrated operations. What is true of unofficial supplies to the Kathmandu market is also true, with lesser intensity, for other urban markets as well. From the consumer standpoint, unofficial suppliers play an important and valuable role: they provide access to supplies needed to meet basic needs in energy and construction. Public initiatives to limit unofficial supplies have generally failed because they have not simultaneously addressed the problem of satisfying consumer demand.

Total Flows of Forest Products

The study has used 1986/87 as the base year for analysis of quantitative flows of fuelwood and timber to Kathmandu. This is the latest period for which full data sets are available. Since that time, total demand will have grown at least in step with population, which is increasing at the annual rate of approximately 2%.

In 1986/87, 85 million kilograms (850,000 quintals¹) of fuelwood was supplied to the urban areas of Kathmandu Valley, to meet the energy needs of households, institutions and industrial/commercial establishments. Ninety five percent of fuelwood came from the public forests in the Terai and was trucked in on dedicated fuelwood transport vehicles belonging to the private sector or to public enterprises. A much smaller percentage (2%) was brought in with travellers in private vehicles (including buses, passenger cars, official vehicles, etc. not dedicated to fuelwood transport) who buy headloads from the roadside sellers en route. Approximately 3% is supplied by villagers from surrounding areas within the Valley, who sell headloads of wood directly to end-users as a means of supplementing their income. Only half of these flows (43 million kilograms) is accounted for by supplies from the Nepal Fuelwood Corporation or its permit holders.

Timber supply to the Valley in the same year was of 1.3 million cubic feet². All of the timber supply came from public forests in the Terai. Timber is used primarily for construction and furniture for households, industry, commerce and institutions. Construction demand is particularly heavy in Kathmandu relative to other urban areas because of the concentration of government offices, private enterprises and foreign residents in the capital. Less than 20% of the timber supplied is sold through the Timber Corporation of Nepal (TCN). Timber is generally brought into to the Valley as sawn wood (as opposed to logs), processed in TCN or private sawmills in the Terai.

Public forests in the Terai are already being exploited at a rate which surpasses their regeneration capacity. Demand for fuelwood and timber will increase by 25% by the year 2000 due to population increases alone. Demand has historically grown faster than the rate of population growth.

The Role of Public Enterprises

The Nepal Fuelwood Corporation (NFC), the Timber Corporation of Nepal (TCN) and the Forest Products Development Board (FPDB) are the three public institutions involved in forest products marketing in Nepal. NFC and TCN are responsible for supplying fuelwood and timber, respectively, through vertically integrated operation: from wood collection and transport to retailing. TCN also maintains 42 sawmills where round logs are transformed to sawn wood. The FPDB supplies timber to some industries, and has responsibilities which encompass forest management and plantation projects. All three of these public enterprises are fully-controlled by HMG and sell products at officially set prices.

NFC and TCN meet only small percentage shares of their respective market demands. Neither has succeeded in assuring stable supplies which are accessible to poor populations. While official prices are one third of free market prices, the majority of

¹ 1 quintal = 100 kilograms. Quintals are the basic unit of measure used for fuelwood throughout this report.

² 1 cubic foot = approximately 21.5 kilograms, depending on the density of the species.

consumers must buy on the open market to meet their needs. Therefore, the role of public enterprises in assuring affordable supply is limited. Low-priced official supplies do not necessarily go to low income groups who have the greatest need for them. Competition for access to official supplies is intense. As a result, influence, rather than need, determines allocations.

Public enterprises in the forestry sector have constituted a major drain on government budgetary resources. In particular, the Timber Corporation has had annual deficits for most of the last decade, and has accumulated large liabilities in its tax and royalty payments, in addition to receiving annual operating subsidies. The Fuelwood Corporation has shown a budgetary surplus in recent years, but loses substantial amounts on its base operations -- direct sale of fuelwood to consumers. It is able to compensate these losses only through the large markups it takes on permits granted to private industry and commerce. Despite its recent operating surpluses, NFC has also accumulated substantial amounts of unpaid debt. Finally, neither NFC nor TCN makes significant contributions to more rational or sustainable management of forest resources.

ES.3. Principal Conclusions and Recommendations

Conclusions

The following are the study's principal conclusions:

1. At current rates, the supply/demand balance in the commercially exploited public forests of the Terai cannot be kept in equilibrium on a sustainable basis.
2. In the long run, increased stimulus must be provided for forestry production. To do this, local populations must be positively involved in resource management, and production.
3. Neither the Nepal Fuelwood Corporation nor the Timber Corporation of Nepal meet the objectives for which they were established. They supply small shares of the market and do not provide affordable supply to the poor. Attempts to increase the percentage of consumers who are able to buy forest products from them at subsidized prices will not solve the problem.
4. Society as-a-whole pays for the subsidies provided to private enterprises and their direct clients. Because access to subsidized supply is often gained by those with influence, this process results in regressive income transfers.
5. Actual exploitation of forest resources is already in private hands, either through contractors hired by public enterprises or through permit holders and unofficial suppliers.

6. Substitute fuels (kerosene, LPG, electricity, coal) are increasingly competitive with fuelwood, and are likely to meet a growing share of demand in the Kathmandu Valley. Improved wood stoves offer promise of reducing fuelwood demand, despite early problems in their widespread adoption.

Overall Conclusion

Public enterprises in this sector have failed in their attempt to fulfill the objectives of government policy. The marketing system is, for most consumers, already privatized. The problems in the marketing system reflect more **fundamental problems on the resource management side**. Resource management deficiencies will not be solved through increased controls or price subsidies. They will require sustained effort to increase incentives for decentralized and private **production**, and to promote **transition strategies** which reduce demand through efficiency improvement and substitution.

Recommendations

The following are the principal recommendations of the study. They are intended to provide a consistent vision of the principles which can guide a transition from the current system to a more rational private market, and which can permit sustainable operation of such a privatized market.

1. The forest products **marketing system should be privatized**. Public enterprises operating in the retailing system should be closed, and officially-set retail prices abolished.
2. Emphasis should be given to measures which improve **decentralized local resource management** -- the core problem -- rather than those which attempt to control resource flows. This will require changes in land and resource tenure policies, legislation concerning local resource management rights, provision of financial incentives and technical support to producers and changes in pricing policy.
3. HMG should undertake a careful assessment of the **economic tradeoffs in moving to substitute fuels** (kerosene, LPG, electricity, coal), even if they require increased imports. Based on the results, accelerated programs to promote fuel substitution in urban areas should be seriously considered. Such programs should cover all demand sectors: households, industry and commerce and institutions.
4. As part of a strategy for moving towards better demand management, **substitutes for timber** should be further investigated (including iron frames, fiberboard from waste wood, cement blocks for bricks, etc.), and promoted where appropriate.
5. **Improved cookstoves** programs should be pursued with **sharply increased emphasis**. Experience from other countries shows that stoves programs are most successful when part of a highly visible and sustained campaign. Early failures have been

typical in most countries where improved stoves have been introduced. They should not prevent further effort.

6. The transition toward a privatized forest products market should **begin immediately**. There is already sufficient information available to show that it is both appropriate and necessary. The Forestry Sector Policy Paper of December 1988 addresses the steps required in such a transition.

Chapter 1

Introduction

Nepal's land area covers a diversity of physical terrain, ranging from the relatively flat and fertile plains of the Terai to the rugged landscape of the High Mountains and Himal. Its population of nearly 18 million is distributed unevenly over this territory, with densely settled agricultural zones in the Terai, high urban concentrations in the Kathmandu Valley and smaller, scattered settlements in the mountainous regions.

Eighty percent of Nepal is hilly and mountainous. Of the 14.75 million hectares of total area, 21% is cultivated, 7% consists of non-cultivated inclusions adjoining farm land, 12% is grassland, 37% is forested land which has a crown cover greater than ten percent, 5% is degraded forest, and the remaining 18% is other land which includes rocks, waterways and settlements. Fifty-three percent of the land mass (including a portion of the 'other land' category) can potentially be used to produce forestry outputs.

With an average annual per capita income of \$160, the majority of Nepal's population lives below the poverty line. Ninety-two percent live in rural areas, and ninety percent depend primarily on agriculture for their livelihood. Agriculture generates 60% of the total GNP. Only 6% of employment is based on industry. The population is divided almost equally between the Terai and Siwaliks (47%) and the Middle Mountains (46%), with the remaining 7% in the High Mountains and Himal. Nepal's population is growing at the rate of 2.2% per year, and is expected to reach over 23 million by the end of the century.

1.1 The Importance of the Forestry Sector

Forestry plays a significant role in the national economy of Nepal. Fifteen percent of GDP and 75% of energy needs are derived from this sector. Forests and trees form an integral part of the farming system. Public revenue from the sale of forest products was equal to about U.S. \$5 million (2.8% of government revenue) in 1985-86. There are over twelve thousand technical and non-technical staff employed in government and parastatal organizations of the forestry sector. Half of these are in the Department of Forestry and a quarter in the parastatals. An estimated 1.3 million people engage in the collection, harvesting and hauling of fuelwood, fodder and timber and in forest plantations and free farm operations.

This report builds on the considerable body of previous work done on forest products in Nepal. The Master Plan for the Forestry Sector of Nepal Project (MPFS) has prepared a set of comprehensive analyses of each forestry subsector in Nepal. MPFS provides

detailed information on the sub-regional level (defined as the intersection of a development region and a physiographic zone). The Master Plan documents are a rich source of detailed information on forest resources, products and supply-demand balances by geographic zone, and provide much more complete coverage of the sector than this report attempts to do. In addition, the U.S.A.I.D. Forestry Private Sector Study (1986), established the basis for understanding the role of public enterprises in forest products marketing, and identified the need for the present work.

1.2 Forest Products Flows to the Kathmandu Valley

Kathmandu, the capital of Nepal, lies in the Middle Mountains. The three urban centers of Kathmandu Valley (Kathmandu, Biraktapur and Lalitpur) constitute, by far, the largest urban concentration in the country. The Valley is also the most important industrial and commercial center in the country. Its economic activity and the consumption needs of its population depend heavily on trade routes through the mountain passes to the Terai and India.

While the Terai has less forested land per capita than either the Middle Mountains or High Himal, its forests are both rich and relatively easily accessible because the terrain is flat. As the Forestry Master Plan's analysis shows, much of Nepal's forest resource is only accessible to local populations, because poor roads and the extremely rugged landscape make the costs of transportation prohibitive.

These twin forces — strong urban concentrations in the Kathmandu Valley and the relative accessibility of supply in the Terai — mean that the most important **commercial** flows of forest products are of supplies from the Terai to the urban markets of the Valley. Urban prices are high enough to attract supplies from as much as 300-400 kilometers' distance.

The majority of rural populations throughout the country collect their own forest products to meet needs in energy, construction and fodder. In the mountainous areas, this places great pressure on forest resources which are sufficiently near villages to be accessible. In the Terai, wood is accessible over longer distances (even by foot), but pressure on resources is compounded by two factors — high population and population density, strong commercial demand for the region's forest resources. In both cases, **the consequence tends to be overexploitation of forests and degradation of the resource base on which rural economic activity depends.**

The total growing stock in Nepal's natural forests is estimated at over 500 million cubic meters (m^3), or an average of 96 m^3 per hectare. Fifteen percent of the forested area is densely forested, while 20% is classified as 'degraded'. Table 1.1 shows the distribution of woody biomass resources by region.

Table 1.1
Wood biomass (MT/ha)

	FWDR	MWDR	WDR	CDR	EDR
High Himal	176	145	101	115	159
High Mountains	156	173	109	108	97
Middle Mountains	94	97	56	54	49
Siwaliks	103	94	104	113	97
the Terai	151	140	109	146	160

Source: Forestry Master Plan Draft Report

Note: FWDR - Far Western Development Region, MWDR - Midwestern Development Region, WDR - Western Development Region, CDR - Central Development Region, EDR - Eastern Development Region

1.3 Institutions

Both public enterprises and the private sector play important roles in supplying forest products to the Kathmandu Valley. The Timber Corporation of Nepal (TCN) and the Nepal Fuelwood Corporation (NFC) oversee timber and fuelwood marketing, respectively. The Forest Products Development Board (FPDB) sells timber directly to forest-based industries, and plays a role in plantation management and forest conservation. Through the forestry department, the public sector exercises jurisdiction over all forests officially exploited for commercial purposes.

The role of these public enterprises notwithstanding, private suppliers play an even greater role in the forest products marketing system. There are two major categories of private actor involved: "officially sanctioned" private suppliers, most of whom hold permits from public enterprises for meeting specified needs, "unofficial" private suppliers, who, at a variety of levels, satisfy demand which is not met through public or officially sanctioned supplies.

Chapter 3 of this report provides a detailed account of the activities of the three public enterprises in this sector. Chapters 4 and 5 analyze the total marketing system for fuelwood and timber, respectively, and show both the role of the private sector and the interplay between officially controlled flows and private market responses.

It is a basic finding of this study that public enterprises do not, in fact, exercise effective control over the forest products marketing system. They have an important influence, but because it falls short of "control", regulations do not always lead to the intended effects. Conversely, the thriving "unofficial" sector can not simply be viewed as

an obstacle to the public interest. It provides valuable services in satisfying demands which might otherwise go unmet. This report does not prejudge the role or the motives of either the public or private sector. Instead, it attempts to shed light on these roles and on what future policy can do to balance the multiple and sometimes competing objectives of sustainable resource management.

1.4 Objectives of the Study

The basic objectives of this study are threefold:

- o to establish the factual basis (including both quantitative and qualitative information) for understanding the market structure for forest products flows to the urban areas of Kathmandu Valley.
- o to analyze the role of both public enterprises and of the private sector in the operations of this market, and
- o to make recommendations on the future course of public policy with respect to this subsector.

Specifically, the report analyzes market mechanisms including supply and demand both in terms of volume and value of products. Based on this assessment, the report draws general conclusions and makes recommendations to assist policy makers in both the public and private sectors of the forest products industries in Nepal. *Although some of the assessments and analyses made are, of necessity, based on secondary data sources or on data derived from interviews and limited samples, the results presented in this report are thought to portray a reasonably accurate picture of the actual existing markets.*

Chapter 2

Overview of Sources

Commercial supplies of fuelwood and timber satisfy the bulk of the urban demand for these forest products in the three urban areas of Kathmandu Valley: Kathmandu, Bhaktapur and Lalitpur. The purpose of this chapter is to identify and briefly describe the flows of these products, as the context for the more detailed presentations of Chapters 3, 4 and 5.

Fuelwood is used for cooking by the majority of urban households in the Valley, although a significant proportion of households in Kathmandu and Lalitpur use LPG and kerosene for cooking. Fuelwood is also used extensively in commerce, industry and institutions, including restaurants, brick and tile factories, hospitals and army barracks. The principal use of timber is for construction, including government buildings, private homes and industrial and commercial buildings. Furniture making is the second most important use of timber in the Valley.

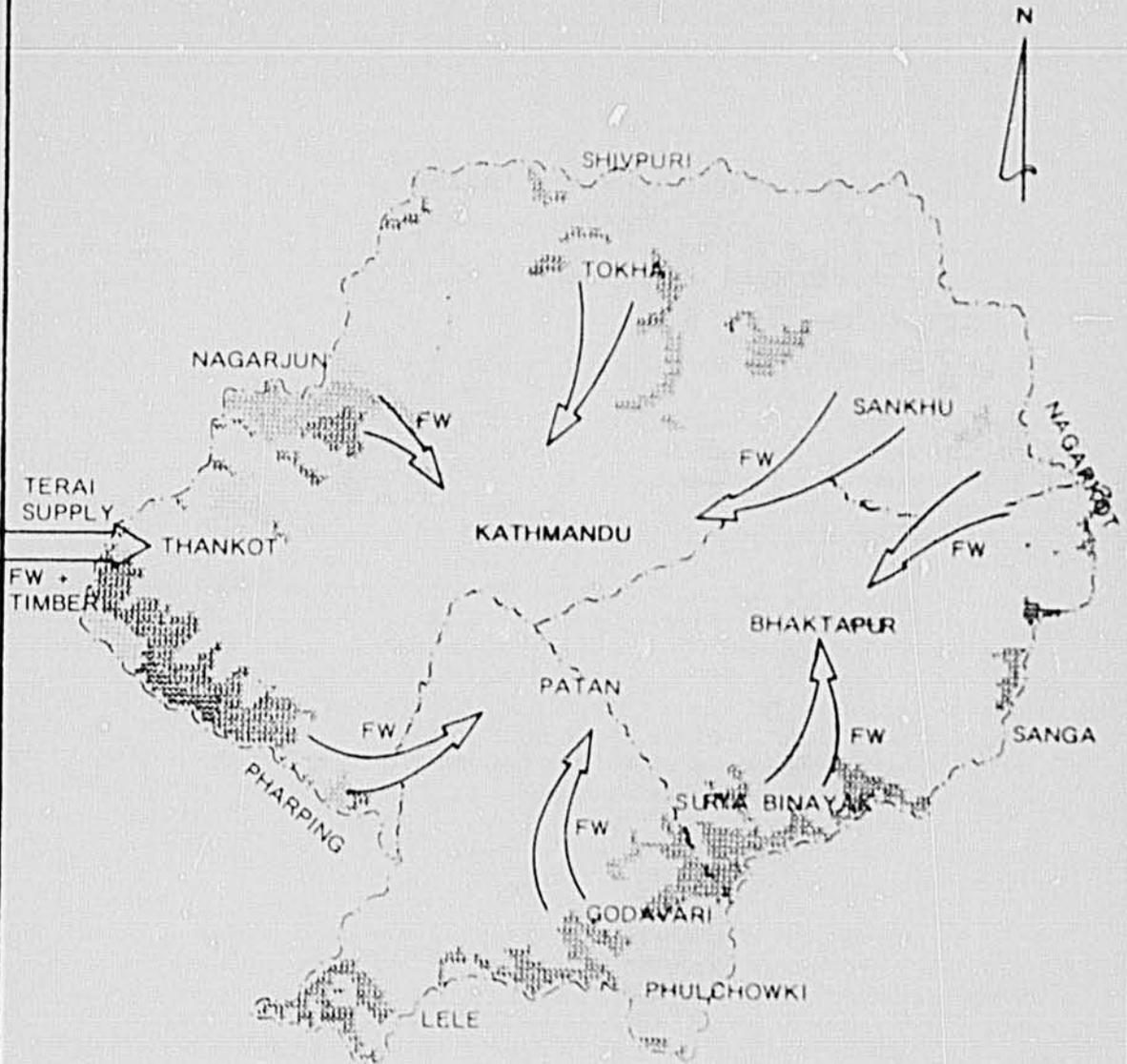
While there is a heavy concentration of population in the Kathmandu Valley (an estimated 475,000 in 1988), available supplies of wood are limited. The surrounding hills provide relatively slow-growing sources of supply with limited access. Therefore, a high proportion of wood needs (95% for fuelwood and 100% for timber) is met from wood which is trucked in from the Terai Plains. Transport distances are long (from 150 to 300 kms), the final passages through the Churia and Mahabhrat ranges are hilly and the road condition is extremely poor. **All of the forest products brought in from the Terai funnel through one road entering Kathmandu and passes through a forest department checkpoint in Thankot.** Around-the-clock roadside monitoring of incoming fuelwood and timber was conducted by Study Team surveyors posted at Thankot, and provided a valuable point of reference against which to check official statistics.

An estimated 5% of woodfuel supply is brought in by backload from surrounding villages within the Valley. Again, the study posted around-the-clock surveyors at each of the key roads coming in to Kathmandu, Lalitpur and Bhaktapur for two periods of one week each, in order to get an independent estimate of supply from this source. The monitoring found no evidence of timber brought in to the Kathmandu area from rural sources within the Valley. That is, timber demand is fully met through supplies trucked in from The Terai.

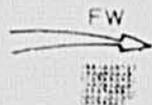
Figure 2.1 provides a schematic diagram of woodfuel and timber flows into the Valley.

Figure 2.1

Schematic Diagram of Fuelwood and Timber Flows
Into the Urban Areas of Kathmandu Valley



Note:



: Fuelwood Supply Routes

: Shaded Areas indicate forested areas in Kathmandu Valley

: District Boundary

2.1 Market Structure

Public vs. Private Sector Roles

In principle, the forest products marketing system is controlled by the Nepal Fuelwood Corporation (NFC) and the Timber Corporation of Nepal (TCN), with official price and permit fee levels specified at each stage of the harvesting, transportation, wholesaling and retailing of forest products. In addition, the Forest Products Development Board (FPDB) plays a role in the pre-sawmilling stages of timber marketing.

In reality, unofficial private suppliers dominate both fuelwood and timber markets, and the official price structure affects only those purchasers who are able to gain access to limited official supplies. Unofficial supplies enter the market via private parties who have obtained official permits in excess of their own needs, via illegal exploitation of public forests and possibly through diversion of official supplies to the much more lucrative private retail markets. Illegal exploitation of public forests by villagers constitutes an important source of revenue for villagers near the main road axes in the Terai and in the Kathmandu Valley (see Chapter 4), but accounts for a relatively small part of the total unofficial flows coming into the Valley.

Price System and Incentives

A dual price structure operates throughout the marketing system. Because official supplies meet only a fraction of demand, most consumers pay free market prices to meet wood needs. Free market prices are 2 to 3 times higher than official prices.

Public enterprises (PEs) pay royalties (stumpage fees) for wood collected from the forest which are well below long term regeneration costs. These royalties are also below what private permit holders are required to pay, and have the effect of increasing the apparent profitability (or lowering apparent losses) of public enterprises. **Retail prices for fuelwood and timber are officially set at levels below what private supply would cost.** Moreover, the public enterprises appear to be less efficient than private suppliers, with higher operating costs per unit of wood supplied. Therefore, TCN runs very large annual operating deficits. The NFC has been more efficient -- it has generated an operating surplus in recent years -- but is indirectly subsidized through the very low wood royalties it pays at the collection point and through its right to collect sizable permit fees from private industrial/commercial permit holders, as detailed in later chapters of this report.

The marketing system is also notable for the complexity of its price and regulation mechanisms. Access to resources which are priced below market is an important source of potential profit. Therefore, the system of seeking and granting permits to private individuals creates both the incentive and the opportunity for corruption. At each stage from harvesting to retail, there are opportunities for bypassing official channels. While wood moving from the Terai to Kathmandu must pass through fourteen official checkpoints, there appears to be no effective means of establishing whether a given truckload has been

legally obtained or is destined for sanctioned uses. As a result, these checkpoints have not been successful at either detecting or controlling the bulk of illegal flows which occur.

The study team surveyed a limited number of households, institutions, and industrial and commercial establishments, in order to determine the prices they normally pay to obtain fuelwood. The results of this survey (shown in **Table 2.1**) clearly indicate the **multiple price structure** consumers face. Three points are worth noting. First, for larger purchasers (institutions, industry/commerce) prices are often negotiated with transporters who bring a truckload directly to the door; depending on the volume of wood purchased and where the transporter/supplier obtains the wood (from retail markets, diverted from permit holder supplies, brought in unofficially without paying the permit fees at the source), negotiated prices may vary. Second, average prices shown in the table reflect the fact that some institutions obtain wood from official NFC depots, while others lacking the same access must buy on the open market (indeed, the same institution may obtain part of its needs from both sources). Finally, prices in retail market prices vary by season, with the highest prices prevailing in the rainy season (June to September).

Table 2.1
Retail Prices of Fuelwood in 1987
(Rs per kg)

Source	Household (1)	Institutions (2)	Industry (3)	Commerce (4)
NFC Official	0.55	0.75	0.55	0.55
IDS Survey Range	0.55-2.00	0.75-2.25	0.55-2.00	0.55-2.00
IDS Survey Average	1.20	1.39	1.55	1.22

SOURCE: IDS/Study Team Survey

- Notes:*
- (1) Households were not surveyed directly but prices for this sector were obtained through interviews with wood cutters and with private depots.
 - (2) Institutions surveyed comprised only hospitals, boarding schools and campus hostels.
 - (3) Industrial prices based on data compiled from the brick and tile industries.
 - (4) Prices for commercial establishments computed from prices paid by tea shops, restaurants and sweet shops.

2.2 Fuelwood Supply Sources

Fuelwood supply to the urban areas of Kathmandu Valley comes from three main sources:

- o the public forests of the Terai
- o illegal roadside suppliers (also in the Terai)

- o backloads carried in from surrounding villages

For 1988, we estimate that 825,000 quintals of fuelwood will be supplied from these three sources, broken down as follows:

Table 2.2
Breakdown of Fuelwood Supplies to Kathmandu Valley

Source	Amount	Percent
From the Terai Public Forests		
NFC Supplies from Public Forests	270,000	32.7
Indus./Comm Permits (via NFC)	160,000	19.4
Other Truckload Supplies	351,000	42.6
Illegal Roadside Supplies	20,000	2.4
Backload Supplies from Within the Valley	24,000	2.9
Totals	825,000	100.00

Source: Study team estimates (see Chapter 4)

Fuelwood Supplies from Terai Public Forests

Fuelwood collected by the NFC comes from three principal forest sites, all of which are within roughly 300 kms of Kathmandu. **Table 2.3** shows the distribution of the NFC collections by district.

Table 2.3
NFC Woodfuel Collection by Site Most Likely to Supply Kathmandu Valley

Site	1985/6		1986/7	
	Chatta	Quintal	Chatta	Quintal
Janakpur	1,322	84,608	1,379	88,231
Birgunj	2,644	169,216	2,005	128,321
Bhairahawa	213	13,632	756	48,411
Totals	4,179	267,456	4,140	264,963

Source: Nepal Fuelwood Corporation

Note: Original data is reports in chattas. 1 chatta = 6.4 MT = 64 quintals

In 1986/87, private industry/commerce permit holders were granted permits to remove approximately 160,000 quintals from Public Forests under NFC permit, as shown in **Table 2.4**. Permit fees for these collections are paid directly to the NFC (See Chapter 4).

Table 2.4
Private Permit Holders' Reported
Fuelwood Collection by Site (from the Terai)

Site	Chattas	Quintals
Bharatpur	266	17,040
Birgunj	312	19,968
Bhairahawa	785	50,224
Hetauda	1,062	67,968
Total	2,500	155,200

SOURCE: Nepal Fuelwood Corporation

The sum of firewood officially collected by NFC and NFC Industry/Commerce permit holders is approximately 430,000 quintals (270,000 and 160,000, respectively). **This total only accounts for 50% of the estimated volume of fuelwood used in the Valley.** To investigate this discrepancy, the team monitored backloads brought in along feeder roads in the Valley and fuelwood brought in on incoming vehicles at Thankot.

The traffic observed during the two weeks of around-the-clock monitoring at Thankot suggests that an annual flow of approximately 800,000 quintals of firewood passes through Thankot. Only 2.5% of this is accounted for by illegal roadside supplies. Moreover, the evidence is quite clear that very little fuelwood (less than 30,000 quintals) comes via backload from within the Valley. **Therefore, about 350,000 quintals more wood enters Kathmandu in private truckloads from the Terai than should have been brought in under the officially granted permits.** This very large volume is attributable to illegal supply (see Chapter 4).

Illegal Roadside Supplies

By definition, there are no official statistics on illegally cut firewood sold on the roadside. This wood is cut by villagers in loads (bharis) of approximately 30-45 kg. each. Because the activity is illegal, stockpiles are typically hidden several meters back from the road. A limited number of bharis is brought to the roadside at night, where passing vehicles can stop to negotiate a quick sale. Purchases are made by all kinds of travellers into Kathmandu and other urban areas, including trucks, passenger buses, private and

official vehicles. One or several bharis may be purchased, and are usually placed in some discreet location in the vehicle, giving rise to the name "silent travellers". Typically, such wood is consumed by the purchasers themselves or sold to neighborhood retailers in the cities. In either event, the incentive to purchase is the substantial price difference between roadside prices in the Terai and retail market prices in Kathmandu or other cities, as shown in **Table 2.5**.

Table 2.5
Terai Roadside vs. Kathmandu Retail Prices

	Rupees/Kg
Terai Roadside	0.50
Kathmandu NFC Official Retail	0.56
Kathmandu Private Retail (Low Season)	1.10
Kathmandu Private Retail (High Season)	1.60

Source: Study team surveys

Note: While NFC Kathmandu official retail prices are only slightly higher than the illegal roadside price in the Terai, most consumers do not have access to the fuelwood supplied at the official NFC price, and must therefore purchase from private retailers.

Figure 2.2 shows the principal roadside locations along which "silent travellers" begin their journeys. There is no fully satisfactory observational method of estimating the volume of this traffic. Stacks visible on the roadside reflect only a small fraction of what may be stockpiled out of view.

The roadside monitoring of incoming vehicles at Thankot did detect a number of "silent travellers", but it is impossible to gauge what percentage passed undetected, given that a good deal of time and trouble was devoted precisely to keep them hidden. Based on a combination of indirect approaches, including interviews with knowledgeable sources and calculation of the unexplained residual supply needed to meet demand, we estimate 20,000 quintals a year from this source.

Backload Supplies from Within the Valley

An estimated 24,000 quintals/year are brought into the urban areas of the Valley by nearby villagers who harvest head or backloads illegally from the forest and bring them in by foot. Earlier studies (Paudyal, 1986) have indicated that for some households this is an important source of cash revenue. The 1986 Winrock study, for example, found that 12% of the households in Bhaktapur area each harvested and sold about 8200 Kgs per year, which would be enough to satisfy the annual requirements of five households. This wood, consisting of small or split pieces, is generally marketed directly to end-users, fetching prices at or near the private retail price of Rs. 1.10 - Rs. 1.60.

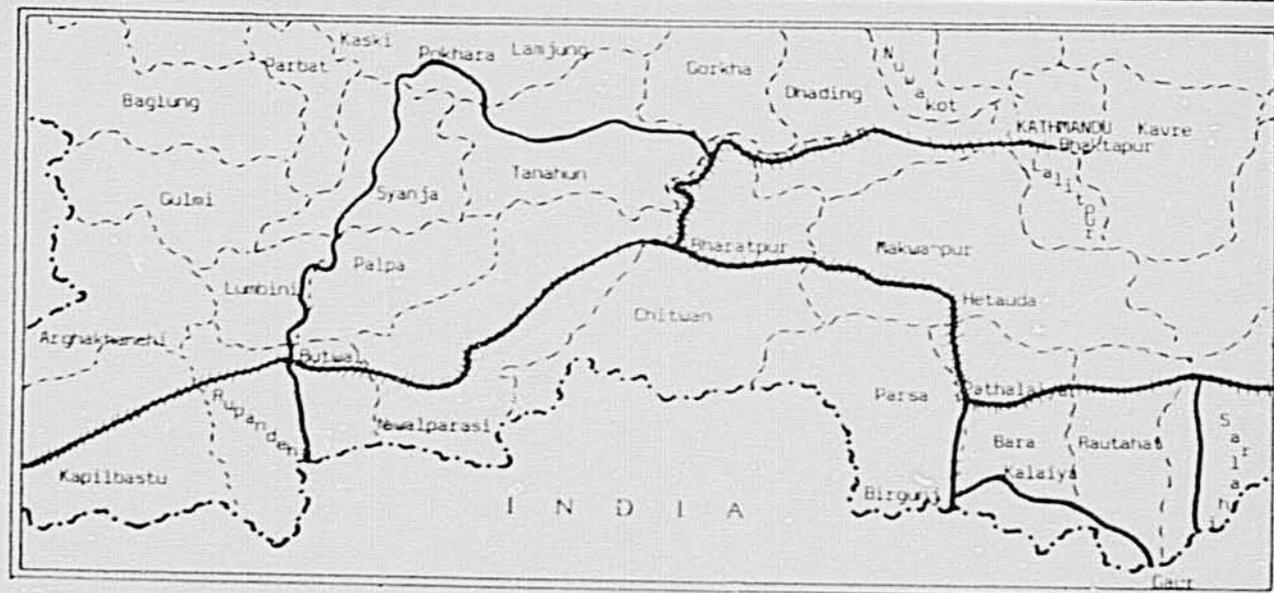


Figure 2.2

Principal Routes of Silent Travellers
Fuelwood Loads into Kathmandu Valley

LEGEND

- — — — International Boundary
- - - - - District Boundary
- Roads
- Principal Routes of Silent Travellers



Figure 4.6 shows the principal transport routes along which this traffic from within the Valley occurs. Each route was the subject of daily monitoring by team surveyors for two periods of one week each (April and November). The circles indicate where surveyors were posted, and the numbers next to each circle show the estimated annual flows from each point based on a seasonally-adjusted extrapolation of the two-week figures.

2.3 Timber Supply Sources

Virtually all of the timber supplied to the Valley comes from public forests in the Terai, entering Kathmandu in the form of sawn wood which is processed either at TCN or private sawmills in the Terai. Timber flows in 1986/87 are estimated at 1.3 million cubic feet. **Figure 2.4** shows the location of the forests exploited for timber, and of the major TCN and private sawmills.

The Timber Corporation of Nepal and the Forest Products Development Board are responsible for timber harvesting by the public sector (see Chapter 5). In addition, permit holders from the private sector are allowed to harvest timber for their own needs. Permits are obtained in Kathmandu. Reported volumes harvested by permit holders in 1986 were only 45,000 cubic feet (cft). There is no breakdown available by site.

Finally, illegal suppliers who harvest trees by the truckload at public forests contribute a share of total supply. There are no statistics available on this activity, although interviews with a wide range of knowledgeable sources at site and elsewhere confirm its existence. A convergence of evidence from two sources supports the belief that this "unofficial" supply plays an important role in the timber market:

- o reported collection by public enterprises and permit holders accounts for much less than the incoming flows observed at Thankot
- o estimated demand in the Valley is also much higher than reported supplies.

Demand figures for timber are less reliable than the fuelwood estimates.¹ Therefore, Thankot observations have been given greater weight in estimating how much timber was brought in. **Figure 2.5** compares TCN sales with private and/or unaccounted supplies. The figure suggests that TCN supplies a very small share of the Valley's timber needs. The basis for this finding is discussed in Chapter 5.

¹ This is true for a number of reasons: more extensive surveys of fuelwood consumption; greater variability in "average" household demand for timber (construction needs are much more a function of socio-economic status than of any per capita standard); timber, unlike fuelwood, is used for a multiplicity of end-uses, including private and institutional construction, construction repair and various types of furniture.

Figure 2.3

Transport Routes Along Which Timber And Fuelwood Move Into Kathmandu Valley.

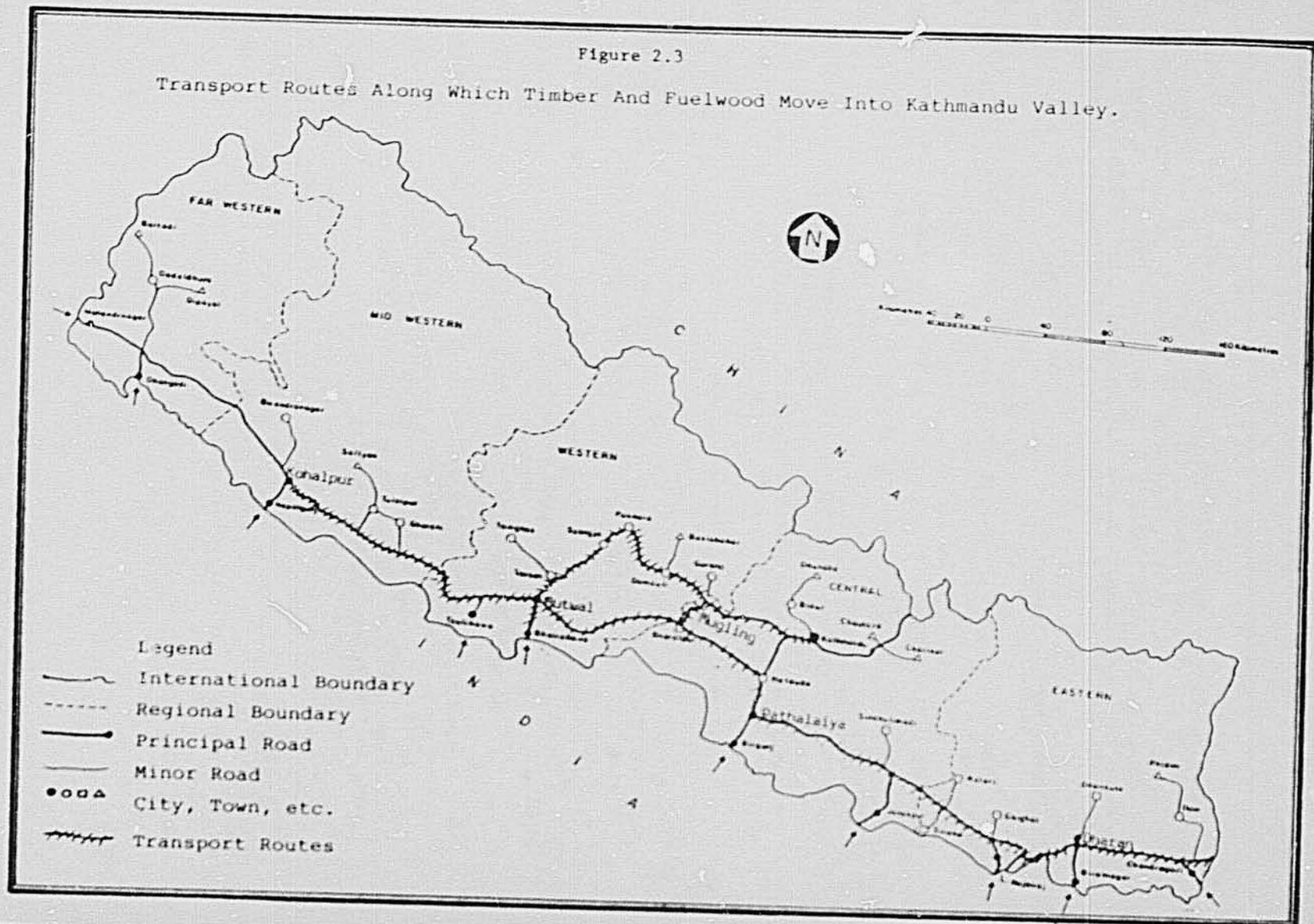


Figure 2.4

Location of Public Forests Exploited in Nepal

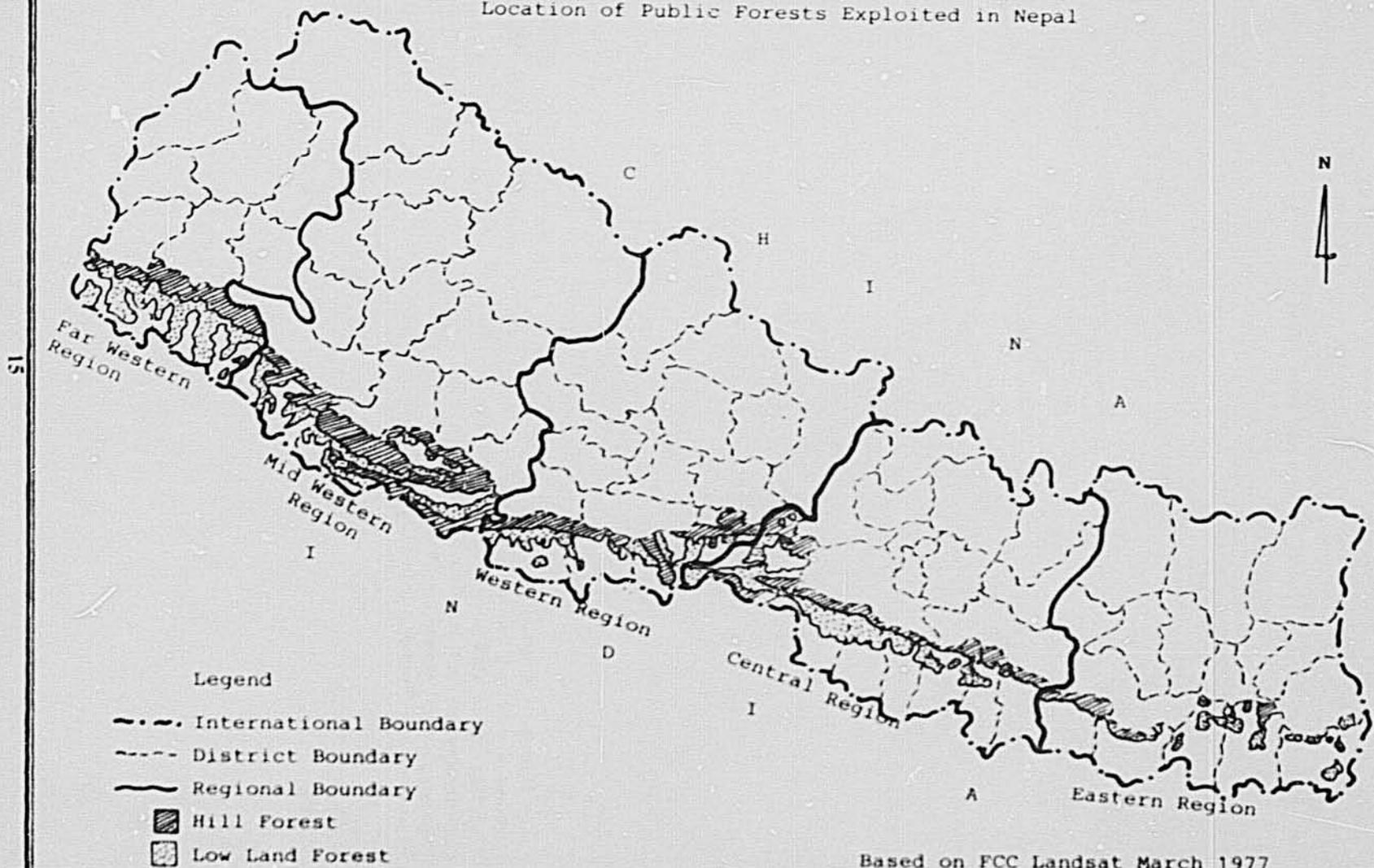
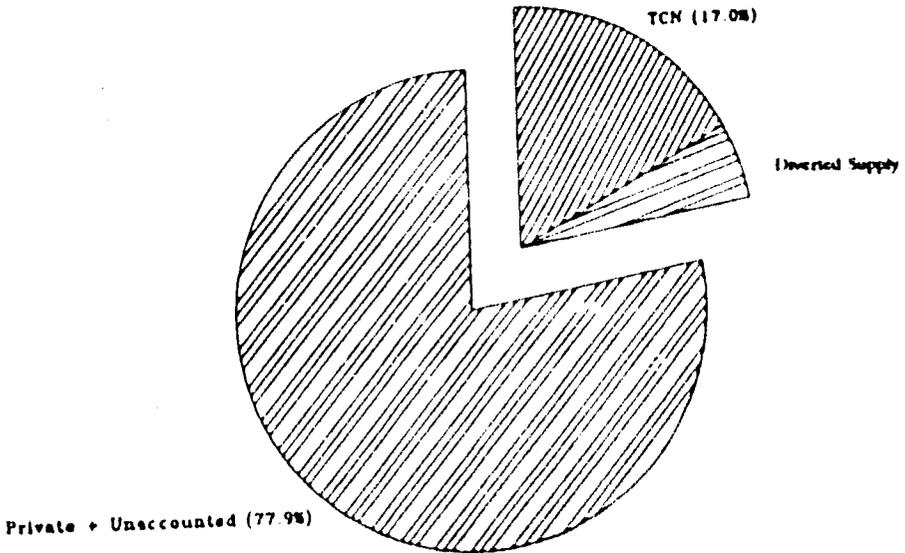


Figure 2.5
TCN vs. Private and Other Supply



Finally, it should be noted that figures for wood collected in the forest are for **roundwood**, whereas estimates of wood passing through Thankot are for **sawn wood**. Therefore, if reported numbers were complete the volume of incoming wood should be considerably less than the amount harvested, because of the waste (sawdust and off-cuts) generated in the sawmilling process. As we have seen, however, the opposite is true: more **sawn wood** came in than the **round wood** allegedly collected.

Chapter 3

Public Institutions

The Nepal Fuelwood Corporation (NFC), the Timber Corporation of Nepal (TCN) and the Forest Products Development Board (FPDB) are the three public organizations involved in fuelwood and timber supply and marketing. These three institutions have different legal and organizational structures, because each was formed under a different act of incorporation. NFC was created under the Corporation Act, while TCN was established under the Company Act of Nepal. Both are seemingly autonomous institutions managed by their own Boards of Directors. In practice, however, the Boards are nominated by His Majesty's Government (HMG) and consist of HMG representatives. Until recently, NFC and TCN were attached to the Ministry of Forests and Soil Conservation. Both organizations were put under the auspices of the Ministry of Supplies as of 1987. The FPDB is directly under government control, even in its organizational structure, as it was formed under the Development Board Act and operates from within the Ministry of Forests and Soil Conservation.

In this Chapter, Sections 3.1 to 3.3 summarize the activities and performance of these three institutions, while Section 3.4 briefly evaluates the role of parastatals and describes the policy context of HMG with respect to their activities.

3.1 Fuelwood Corporation of Nepal

Objectives and Structure

The Nepal Fuelwood Corporation (NFC) was established in 1965 under the Corporation Act of 1964.¹ The stated objectives of the NFC are: (a) to make fuelwood easily available for general customers where fuelwood is scarce; and (b) to provide fuelwood at a fair price in these areas.

Prior to the establishment of the NFC, supplies of fuelwood to the urban areas of Kathmandu Valley consisted primarily of backloads of wood carried in from surrounding villages. No public agency was authorized to supply the Valley, and there is no evidence of privately supplied fuelwood coming in from The Terai. The vast majority of urban

¹ Official notification of its establishment and formal statement of objectives and responsibilities is given in the Nepal Gazette of Nepali calendar Baisak 30th 2022.

households relied on fuelwood for cooking (there was very little use of kerosene and electricity). The substantial woodfuel needs of public institutions, including the army and police, added to urban demand. These factors, coupled with the rapid growth of the urban population, created intense pressure on the limited forest resources within the Valley. This situation gave rise to a legitimate government concern for managing fuelwood supply to Kathmandu Valley -- as well as other urban areas -- through a public sector institution.

The NFC was established with an equity investment of only Rs. 1.1 million. Its current Board of Directors is made up as follows:

- Chairman - Additional Secretary, Ministry of Supplies
- Member - Representative, Ministry of Finance
- Member - Deputy Chief Conservator, Department of Forests
- Member - Deputy Director, Department of Commerce
- Member - Representative, Bagmati Zonal Commissioner's Office
- Member Secretary - General Manager, NFC

Apart from the NFC General Manager, who serves in an ex-officio capacity, the other members are nominated by their respective parent ministries and offices. The Board conducts regular meetings and, with some exceptions, exercises full discretion over NFC operations.

Activities

The NFC undertakes two principal activities:

- o Procurement and retail distribution of firewood directly to household and institutional customers through its retail depots and dealers; and
- o Issuance of permits to industrial and commercial users to collect and transport fuelwood directly from the Terai forest roadside collection depots, for their own use.

The NFC is wholly dependent on the Forest Department for the supply of the wood it can procure and sell. Permits are issued on an annual basis by the Forest Department, which decides where the NFC can engage in wood investing and collection activities. These permits are often issued in conjunction with those for the Timber Corporation of Nepal (TCN). TCN removes the best logs for timber, and NFC collects the remainder for sale as fuelwood. Although NFC is a public enterprise, it relies on private contractors for all harvesting and collection from the forest, and for transportation of fuelwood to urban retail depots.

The NFC has its own weighing bridges in Hetuada and Teku, where truckloads destined for Kathmandu are weighed. All truck loads entering Kathmandu Valley are registered first at the Forest Department checkpoint at Thankot and then at NFC's central depot at Teku. The Teku office serves as the dispatching center which assigns trucks to the network of 14 NFC depots and 6 private NFC dealers in the Valley.

NFC initially extracted fuelwood primarily from within a 100 km radius of Kathmandu, including from within the Valley itself. As supplies from the Valley have diminished, NFC has come to rely exclusively on public forest resources in the Terai. Supply to Kathmandu is now generated from forests within a 300 km. radius of Kathmandu, from Bhairawa in the west to Janakpur in the East. National NFC operations (as opposed to Kathmandu supply) encompass more outlying districts, including Jhapa and Kanchanpur in the extreme eastern and western Terai districts of Nepal.

In recent years, NFC has expanded its coverage. It now operates in 17 urban areas (or town panchayats) and in 14 districts in the inner Terai, in addition to its original operations in Kathmandu Valley (3 districts and 3 town panchayats). The NFC directly employs approximately 520 persons, a large percentage of whom are temporary employees. The NFC also generates indirect employment for an estimated 1,000 people through contractors engaged in harvesting, collecting, transporting, and retailing.

Sales

Total national NFC fuelwood sales were 1.22 million quintals in the fiscal year 1985/86 and 1.66 million quintals in 1986/87. **Table 3.1** shows that there are often large fluctuations in the annual national production and sales of NFC, and that national sales have shown a downward trend (except for fiscal 1986/87). The yearly fluctuations result from variations in the annual Forest Department allocations of forest areas for NFC to exploit. Demand has not been a constraint on sales, and NFC has normally been able to sell 100% of the wood it harvests. The last line of **Table 3.1** indicates that, historically, between 17% and 25% of NFC's national sales have been to the Kathmandu Valley. These percentages are underestimates, however, because they do not include the considerable volume of wood brought into the Valley by private NFC permit holders. Unfortunately, time series data on this flow are not available for comparison.

Even if permit holders are included, the Kathmandu Valley accounts for less than 50% of total NFC sales, the majority of which occur in urban areas throughout the Terai. As in the Kathmandu Valley, NFC meets the household and institutional demand in other urban areas through its retail depots, and grants permits to industrial and commercial customers. The NFC does not have any significant retail operations in rural areas. For several years a rural NFC depot operated in Bara district, but it has been abandoned since. There are no exports of NFC fuelwood through legal channels.

Total NFC sales in the Valley (in 1986/87) amounted to 264,000 quintals, as seen in **Table 3.2**. Sales to households accounted for almost half of this total, with institutions like the army and police together accounting for about 42%.

Pricing Structure and Retail Network

The pricing structure at NFC's retail depots is intended to subsidize households. In Kathmandu, wood purchased in lots of less than 300 kg costs Rs. 0.55/kg, while purchases of more than 300 kg at a time (mostly by institutions) cost Rs. 0.70/kg. NFC retail prices

Table 3.1

NFC FUELWOOD PRODUCTION AND SALES

	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
1. Total National Production (Qt.)	15,57,360	12,56,950	13,80,743	12,28,946	16,68,593	n.a.
2. Total National Sales (Qt.)	15,39,769	12,56,564	10,18,322	9,98,548	16,68,592	n.a.
3. Total National Sales Receipt (Rs. in '000')	29,326	30,676	39,379	45,658	45,082	n.a.
4. Total Dispatch to Kathmandu Valley Depots (Qt.)	3,55,843	2,85,054	3,39,103	2,71,070	2,84,774	2,23,658
5. Share of Kathmandu Valley (4 as a % of 1)	22.8	22.7	24.5	22.0	17.1	n.a.

N.A. = Not available. Source: Nepal Fuelwood Corporation.

Table 3.2
Direct NFC Sales in Kathmandu Valley Urban Area

July 1986 to June 1987 (Fiscal 1986/87) in Quarters

Month	Army	Police	Govt Instt	House- holds	Dealers	Total Sales
1986						
July	5,835	2,684	1,115	9,706	97	19,437
August	4,976	2,618	1,505	10,989	434	20,522
September	5,144	2,759	875	11,008	516	20,302
Quarterly	15,955	8,061	3,495	31,703	1,047	60,261
October	4,834	2,567	1,238	7,565	95	16,299
November	6,520	2,813	1,381	7,700	105	18,519
December	7,204	2,431	1,037	6,543	0	17,215
Quarterly	18,558	7,811	3,656	21,808	200	52,033
1987						
January	7,715	2,660	2,827	14,108	678	27,988
February	7,135	2,644	1,783	16,145	780	28,487
March	6,380	2,075	1,297	14,363	987	25,102
Quarterly	21,230	7,379	5,907	44,616	2,445	81,577
April	7,862	2,459	1,480	12,412	762	24,975
May	9,743	2,297	906	12,789	414	26,149
June	7,897	2,594	1,109	8,242	126	19,968
Quarterly	25,502	7,350	3,495	33,443	1,302	71,092
ANNUAL TOTAL	81,245	30,601	16,553	131,570	4,994	264,963
PERCENT SHARE	30.7%	11.5%	6.2%	49.7%	1.9%	100.0%

July 1987 to March 1988 (first 9 months Fiscal 1987/88)

Army	Police	Govt Instt	House- holds	Dealers	Total Sales
49,432	24,350	10,714	71,484	2,379	158,359

in urban areas of the Terai are a uniform Rs. 0.30/kg. Official NFC prices have remained constant since 1984/85.

Because the NFC can supply only a limited portion of the total demand for fuelwood in the Kathmandu Valley, there is a flourishing private market. Open market prices are about Rs. 1.60 per kg. for split wood. Even after deducting the estimated cost of splitting wood (Rs. 0.15 per kg.), the private market prices are more than double those of the NFC.

Private depots operate in the "gray area" between officially-sanctioned and "illegal" markets: there is no legal restriction on the private sale of fuelwood; **however, there is also little or no wood legally available for sale by private retailers.** Yet private depots are the mainstays of the urban fuelwood retailing system. Either by inquiry or inference, it is difficult to quantify where this wood comes from. What is known is that private retailers serve as something of a "residual" outlet, drawing wood from a wide range of sources. Financial incentive, fueled by the huge differences between official and free market prices, is the driving force in assuring sustained supply to private retailers. This issue is examined in greater detail in Chapter 4.

NFC marketing efforts are constrained by the very small number of retail outlets it operates. For households in particular, it is both difficult and expensive to transport heavy loads of wood over long distances. Yet the NFC has been unable to expand its retail network, both because it lacks adequate supplies to stock them and because urban land prices are prohibitive (retail depots require relatively large spaces for wood storage). As a compromise solution, NFC has appointed six private depots as official NFC dealers. Most of these are small operations established on land owned by the retailers themselves.

Prices for NFC-supplied fuelwood in these private depots are supposed to be the same as official NFC rates. However, dealers earn a 15% commission on NFC sales, and there is considerable scope for unauthorized profit as well. It appears that the NFC makes no effort to assure that official prices are maintained in these depots. The dealers themselves are not required to submit any documentation of sale prices. These private dealers also appear to be free to acquire wood from other sources, which they then sell at the prevailing higher private market prices. Indeed, it is usually impossible to differentiate the NFC supplied wood from other wood in such depots.

The one factor which limits the unauthorized arbitrage possibilities for NFC wood in private depots is the overall supply constraint. **Table 3.2** (above) shows that in 1986/87, less than 5,000 quintals (or about 50 trucks) were supplied to the private dealers. This works out to less than one truck per dealer per month, and is only about 2% of the total Valley sales of NFC.

Financial Position

It is difficult to get an accurate reflection of the current financial position, and hence of the viability, of the NFC. There is a long delay in the preparation of officially approved (audited by the Auditor General's Office of Nepal) financial statements. The most recently completed audited statements for the NFC are for the fiscal year 1984/85. The mere fact

that financial statements are not prepared on time may be taken as indication that all is not well, although delays of three to four years in the full accounting and audit of financial information are common for public corporations in Nepal.

The salient features of the 1984/85 balance sheet and profit and loss statements of the NFC are shown in **Table 3.3**. The NFC reported a net worth of about Rs. 15 million on a total asset base of Rs. 36 million. The major part of liabilities of over Rs. 20 million are unpaid debts and royalties to the Forest Department, and income tax due to HMG of Rs. 6 million. The 1984/85 statements show annual fuelwood production and transportation expenses of Rs. 27 million with sales receipts of Rs. 39 million. Deducting for the NFC salaries and other office expenses as well as for inventory changes, NFC shows a pre-tax operating surplus of Rs. 6.7 million for that year. Thus, unlike most public corporations in Nepal, NFC does not incur annual operating losses. In fact, these surpluses are quite large by Nepali corporate standards. Trial balance sheets for 1985/86, which have not been officially audited, also show operating surpluses. Despite apparently regular annual surpluses, however, NFC has not cleared (or has been unable to clear) its large payments due to the Forest Department and Income Tax authorities. The NFC Audit Report points to several financial irregularities and to delays in settling creditor and debtor accounts. In one example, auditors cited the high reported loss of total wood weight (30%) during the drying process, as suggestive of the possibility that a portion of this "loss" may have been diverted. No serious effort seems to have been made to resolve these irregularities.

The NFC's financial surplus does not imply that all of its major operations are profitable. **NFC loses money on sales of firewood to retail customers.** Losses on retail sales are, however, offset by the large profits NFC earns on the permits it grants to private industry. The NFC pays Forest Department royalties of Rs. 78 per metric ton on wood it allocates to industrial and commercial permit holders. Permit holders, however, have to pay NFC an average of Rs. 542 per metric ton as permit fees. This works out to a surplus of about Rs. 390 per ton. Without these artificial "profits" permitted by the Forest Department, the NFC's finances would show the heavy losses which it incurs in the actual sales of wood through its own depots.

3.2 Timber Corporation of Nepal

Objectives and Structure

The Timber Corporation of Nepal was established in 1960 as an HMG-controlled public limited company with an equity investment of Rs.10 million. It is therefore one of the oldest parastatal institutions in Nepal. The TCN originated in the Saw Milling Project, which had been established in the Terai for five years to supply construction timber for the resettlement of the flood victims of 1955. After its formal incorporation as a separate entity, TCN began operations with a first saw mill in Hetauda in the Central Terai.

TCN's shares are wholly subscribed to by HMG, which owns 91% directly and 9% through shares held by the Nepal Industrial Development Corporation (NIDC), which is a

Table 3.3
NFC Balance Sheet and Income and Expenditure Statement
Fiscal Year 1984/85

Assets		Liabilities	
1. Cash at hand	Rs. 21,864,943	1. Equity	Rs. 1,091,686
2. Fixed assets	2,760,032	2. Staff Welfare Fund	150,056
3. Investments	450,100	3. Accounts Payable	13,314,556
4. Accounts receivable	6,918,627	4. Income tax due	6,070,260
5. Inventory Value	4,011,308	5. Reserves fund	247,000
		6. Net worth	15,128,452
Total		Rs. 36,002,010	
Rs. 36,002,010		Rs. 36,002,010	
Income		Expenditures	
1. Starting Inventory	1,980,562	1. Annual sales	39,378,864
2. Wood harvesting & transport expenses	27,216,572	2. Other income	139,231
3. Administrative	7,588,741	3. Closing Inventory	4,011,308
4. Income tax provision	3,518,565		
5. Net profit (after tax)	3,224,963		
Rs. 43,529,403		Rs. 43,529,403	
Rs. 43,529,403		Rs. 43,529,403	

Source: NFC Auditors Report 1984/85
Figures rounded to nearest Rupee

100% HMG-owned financial institution providing long-term investment and equity finance for industries in Nepal.

The main objectives of the TCN are:

- o To provide sawn timber to general customers through organized and systematic tree felling operations in the Terai;
- o To provide the timber logs required as inputs by officially registered forest-based industries, and
- o To protect and conserve forest resources from unsystematic logging and to plant new trees.

The TCN's Board of Directors is constituted as follows:

- Chairman - Secretary, Ministry of Supplies
- Member - Joint-Secretary, Ministry of Finance
- Member - Chief Conservator of Forest
- Member - Under-Secretary, Department of Commerce
- Member - Deputy General Manager, NIDC
- Member Secretary - General Manager, TCN

As representatives of different government ministries and offices, Board members often have primary loyalty to the interests of their parent organizations rather than those of the TCN itself. Consequently, there has been a great deal of direct ministerial and departmental influence on the activities of the TCN.

Activities

The TCN's main activities consist of:

1. Extraction of roundwood from the forests allocated to it for logging operations by the Forest Department,
2. Milling of roundwood to sawn timber in its network of saw-mills, and eventual sale to households and institutions through its retail network in the Kathmandu Valley and elsewhere,
3. Direct supply of construction timber to various HMG development projects (e.g., hydroelectric projects such as the Marsyangdi Hydel Project),
4. Sale of roundwood as raw materials to authorized forest-based industries (e.g., plywood and match factories) on the basis of permits issued to these industries by the Forest Department, and
5. Sale of roundwood to private sawmills and traders who then supply the resulting sawn timber mainly to Kathmandu through private market channels.

To carry out these activities, the TCN has a network of 42 saw mills in various regions of the Terai, a fleet of 62 trucks for the transportation of the timber, a wood seasoning plant, a wood preservation treatment plant and even a furniture production factory. TCN has a staff of about 1250 people, most of whom are temporary employees.

TCN's seasoning, wood treatment and furniture plants all have been inoperative for some time. More than half of the saw mills (22 out of 42) are closed (see Table 3.4), and according to informed sources only 38 of the 62 trucks are in running condition. The problems with the saw mills and trucks are mainly of maintenance and lack of adequate spares (some of the equipment has not been replaced since the TCN's establishment in 1960). Sawmilling operations are not efficient. The extraction rate of timber from round wood is estimated to be only 60%, whereas private mills easily obtain a rate of 70%.

Table 3.4
Location and Status of TCN Saw Mills

Development Region	Location	No. of Mills Condition	Mills in Running	Closed Mills
Central	Hetauda	4	3	1
Western	Barghat	7	7	0
Mid-Western	Project Office Bardia	10	0	10
Far-Western	Project Office Kailali	7	0	7
	Project Office Kanchanpur	8	4	4
Eastern	Project Office Jhapa	6	6	0
		---	---	---
	Total	42	20	22

Note: Several TCN mills have recently been leased to private operators.

TCN's wood seasoning, treatment and furniture plants are closed in the face of a very strong and profitable demand for their output. Most other furniture factories in Nepal face the problem of not having regular supplies of wood to cater to the market demand, a problem which the TCN is better placed to solve. There is only one other wood seasoning plant in the country (privately operated, in Butwal), which has not been able to adequately cope with the demand for seasoned wood.

These operational performance indicators do not speak favorably of TCN's management and administration. Such failures increasingly force TCN to sell roundwood to private saw mills and traders because it lacks sufficient processing capacity. However, such sales (except as raw materials to authorized forest based industries) were never intended to be part of the TCN mandate.

Production and Sales

Table 3.5 shows TCN's national production and sales of roundwood and sawn timber. Roundwood production and sales are very erratic; there was a pronounced jump in production in 1986/87 to 1.87 million HCft² from 1.2 million HCft in 1985/86, followed by

² "Hcft" = Hoppus cubic feet. It is the unit used to estimate the cubic foot volume of round wood, which, unlike the case of sawn timber, cannot be derived simply by multiplying length times width times height. Throughout the remainder of this report, Hcft

Table 3.5
TCN National Sales and Production

Fiscal Yr	RoundWood (Hcft)		Sawn Timber (cft)	
	Production	Sales	Production	Sales
1982/83	1,525,441	143,782	824,409	719,505
1983/84	1,512,613	256,816	928,750	911,964
1984/85	1,621,145	1,145,986	777,272	765,189
1985/86	1,203,474	894,177	676,069	753,195
1986/87	1,872,364	717,997	685,285	716,543
1987/88 P	1,700,000	n.a.	667,000	n.a.

Source: TCN and Economic Survey 1987/88

Notes: a. 1987/88 production data are provisional estimates.
 b. A brief explanation will help readers in understanding the data presented in this table. Roundwood production (column 1) refers to the total volume of logs removed from the forest. Roundwood sales (column 2) is that portion of roundwood sold directly as logs, rather than sent to sawmills for processing. There is no necessary relationship between the numbers in columns 1 and 2, except that two is always some fraction of 1. Sawn timber production (column 3) refers to the sawmill output from the portion of roundwood production (column 1) which is sent (as an input) to sawmills. Between 35%-40% of the roundwood volume will be lost in the milling process as offcuts or sawdust. Sawn timber sales (column 4) are what the title implies. In any given year, sales can exceed production for a given category (as occurred in 1985/86) if inventory from previous years is sold in addition to that year's output.

a subsequent drop to 1.7 million HCft in 1987/88 (though this is a provisional estimate). As with NFC, these fluctuations are largely attributable to the irregularity of Forest Department allotments to TCN for logging operations, but other less evident factors may also be operative.

In comparison, production and sales of sawn timber are steady, averaging around 700,000 cft. per year. This steadiness reflects the TCN's various milling capacity constraints. The slight decline in current production of sawn timber, as compared to 1982/83 and 1983/84, results from maintenance and equipment problems and from some sawmills going out of production. Some of the TCN's mills which are in working condition now lie idle from a shortage of round logs in the area of the mill. This is also apparent from the fact that annual output (716,000 cft) is only 50% of the potential capacity of the twenty mills which are in working condition. In recent years, TCN has begun the practice of leasing idle saw mills to private operators, who in turn can acquire roundwood from

is used for roundwood volume, and cft (cubic feet) for sawn wood volume. The difference between Hcft and cft is in the method of calculation, not in the result. Therefore, for purposes of understanding the volumes of wood involved, the general reader should assume that 1 Hcft = 1 cft.

other sources, such as the FPDB contractors and industrial permit holders. The practice is itself an eloquent statement of the management and institutional constraints of public vs. private enterprises in the sector.

Because there are no ready alternatives to timber in home construction, TCN timber is in great demand in Kathmandu. In trying to meet this demand, TCN's management problems are compounded by logistical and cost bottlenecks, particularly with respect to wood originating in the Far Western Terai region. Transport costs from these areas are Rs. 40 per cft, as opposed to Rs. 12 - 16 from the Central Terai. Official TCN sales prices in Kathmandu are not sufficient to bear these high transport costs, yet TCN has little local market demand for the wood from Far Western Terai. It would be cheap and profitable to export these logs to India (where they would fetch premium prices), but timber exports are illegal. The bulk of the sawn timber supplied to Kathmandu therefore comes from Hetauda and Bharatpur in the Central Terai, and from Jhapa in the extreme Eastern Terai, which though distant, is more accessible because of the good road conditions of the East-West highway in this sector. Average transport cost for timber from Jhapa are estimated at between Rs. 25 to 30 per cft.

Of the TCN's national sales of 716 thousand cft of timber, about 242,000 was supplied to the Kathmandu Valley. This represents about 34% of the total. Kathmandu Valley is also supplied by timber from private mills by operators who have purchased or obtained permits for the TCN round logs.

Pricing Structure and Retailing Network

The TCN has three different price structures:

- o For sawn timber in Kathmandu and Pokhara;
- o For sawn timber in the Terai saw mills; and
- o For round logs in the Terai mills.

Within each category there is a wide range of prices which differ by the size of the timber and the species of the wood. In general, larger sized timber (in length, breadth, width or girth) costs more. Also, because of its hardwood properties, Sal (*Shorea robusta*) is the preferred species for construction timber, and has a higher price than other species like Asna, which is used in furniture making.

Private timber market prices in the Kathmandu Valley are much higher than TCN prices. Precise comparisons are difficult because private market rates are very volatile, changing from week to week depending on supply conditions from the Terai and the availability of private permits issued by the Forest Department. In June-July of 1988, private market prices of timber ranged from Rs. 230 to over Rs. 300 per cft. (including sales tax and all other charges), which is more than double the TCN official rates (of between Rs. 70 and Rs. 125 per cft) exclusive of sales taxes of 20%.

In the Kathmandu Valley, TCN has 2 sales depots (out of 25 nationally): one in Lalitpur (Balkumari, to which the original Babarmahal depot was moved), and one in Bhaktapur. In view of the excess demand for TCN timber in the Kathmandu Valley, TCN sales are arranged on a quota system. For instance, persons buying timber for a new house construction are allocated a quota of 200 cft on the basis of the construction plans approved by the town panchayat. The wood is provided in several small allotments at specific time periods, subject to availability. Sales from the Kathmandu Valley depots are primarily to households. Institutional supplies such as to public construction projects are arranged directly by the TCN from its Terai saw mills.

Financial Position

The TCN has an unenviable financial position. The latest officially audited balance sheets and income expenditure statements for 1982/83 show operating losses of Rs. 19.3 million on sales of Rs. 39.2 million. Sales receipts are less than the logging plus administrative expenses (staff salaries, overhead, etc.) alone, before accounting for milling, transportation and retailing expenses (See **Table 3.6**). Losses for 1981/82 amounted to Rs. 14.5 million. According to information supplied by TCN, income and expenditure statements for 1986/87 (not yet audited) show further heavy losses, of Rs. 58.3 million.

Accumulated losses are several times larger than TCN's share capital of Rs. 6.9 million. It is understood that the TCN has loan and defaulted interest liabilities of Rs. 40 million on an IDA credit arranged through HMG. In addition, even by 1982/83 the TCN had accumulated unpaid royalty charges to the Forest Department of Rs. 45 million, and unpaid income tax liabilities of Rs. 37 million from previous years. Income tax liabilities have not, of course, increased in recent years, but unpaid royalty fees will have mounted considerably.

In contrast to its current situation, TCN was profitable prior to 1980/81. Since then, sales have declined (operating problems, lack of supply, etc.) and administrative and other expenses have increased dramatically. Poor management has compounded both problems. As an illustration, the staff of closed or inoperative sawmills remain on the corporate payroll, even though they have been without work for many years.³ Any attempt to improve TCN performance must confront the fact that, if capacity constraints are to be eased, substantial further investments would be needed to replace outdated and inoperative equipment. TCN's performance history raises serious doubts as to whether such investments would be a good risk, however.

³ Based on interviews with TCN staff, and corroborated by comparison of historical data on employment, production and sales, and numbers of plants in operation.

Table 3.6
TCN Balance Sheet and Statement of Income and Expenditures
Fiscal 1982/83
(Rs. in million)

Particulars	LIABILITIES	Particulars	ASSETS
Share capital	6.92	Fixed assets	20.89
Reserve fund	10.66	Assets under construction	0.24
Liabilities of which	117.72	Investment in share (Butwal Plywood Factory)	0.85
Royalties to HMG	45.66	Lease account	0.15
Income tax	37.40	Account receivable	39.56
Loans & interests	30.78	Store, machine parts and fuel	6.83
Profits	19.45	Closing stock	47.97
		Cash & bank balance	36.07
		Loss (1981/82)	14.50
		Loss	19.30
Total:	<u>185.56</u>		<u>185.56</u>
Particulars	EXPENDITURES	Particulars	INCOME
Opening stock	45.78	Sales	39.19
Logging expenses	26.67	Misc. income	0.80
Milling expenses	5.47	Closing stock	47.97
Sales expense	11.39	Loss	19.30
Administrative expenses	13.93		
Seasoning expense	0.11		
Depreciation	3.91		
Profit	-		
	<u>107.26</u>		<u>107.26</u>

Source: The Timber Corporation of Nepal

3.3 Forest Products Development Board

Structure and Objectives

The Forest Products Development Board (FPDB) was established in 1976 under the Development Board Act of 1956. The FPDB operates under the auspices of the Ministry of Forests and Soil Conservation.

Under current statutes, a Development Board is a quasi-governmental institution. A Development Board, unlike the TCN and NFC, is typically staffed by HMG civil servants on secondment to the Board. Development Boards are established to carry out very specific functions, usually related to the initiation of a new project or activity, or to the transfer of a function from a regular government department to a corporate body. A Development Board is often seen as a transitional organization which may eventually be converted to a formal corporate structure once its intended activities are under way. The Water Supply and Sewerage Board and Nepal Television Development Committee are examples of Development Boards which have been converted to regular public corporations.

In the face of increasing exploitation of forest resources in the Terai from multiple sources (official, industrial, private with permits and private unauthorized), the FPDB was created to act as the focal point in managing forest resource extraction, with particular attention to the raw material needs of forest product based industries. Its officially stated objectives are:

- a. To restrict direct access to the forests, while providing forest products in a more systematic and regulated manner through the FPDB's own harvesting/collection activities, and through direct sales to users.
- b. To promote forest-based industries by assuring them of regular supplies.
- c. To establish forest based industries within its own administrative and corporate control.
- d. To undertake and manage various forest development projects, including tree plantations and reforestation.

These objectives reflect both the regulatory and production/management aspects of FPDB's role. Unlike the TCN and NFC, FPDB is not intended to play an important role in the forest products supply chain. Its sales are restricted to the transactions taking place at forest depots, and it does not enter into the subsequent steps in processing, transporting and marketing forest products.

Activities

Currently, the FPDB's activities consist of four projects organized under its administrative control: a fuelwood and timber sales and distribution project, and three small to medium-scale plantations.

The study was unable to obtain as detailed financial information for the FPDB as for the TCN and NFC. The three plantation projects are funded through various grants and loans and they have not become fully commercialized. It is unlikely that the FPDB loses money on its roundwood logging and sales, because it merely resells permits obtained from the Forest Department at a substantial markup. Nevertheless, it is known that the FPDB has accumulated large unpaid royalties to the Forest Department, and that its losses from damage to the wood inventory in its yards is high.

Fuelwood and Timber Sales and Distribution Project

This project is effective in twenty districts of the Terai and inner Terai. A committee is formed in each district, under the leadership of the district forest officer. This committee bears the responsibility for the entire operation from harvesting and collection to final sales of wood (mainly roundwood). The committee works independently of HMG and other parastatals, paying the required royalty to the Forest Department.

In fiscal 1987/88, this project had a fixed target of extracting 2 million HCft of wood. It has an operating budget of Rs 12.5 million and provides direct employment to 636 persons. Like the TCN and the NFC, the FPDB also provides indirect employment through its contractors who are engaged for the actual harvesting and collection of wood.

Production sales and proceeds under this project are detailed in **Table 3.7**. In 1984/85 and 1985/86, the FPDB averaged about 1 million HCft of roundwood production and sales. In 1986/87, production increased to 1.6 million HCft, with sales going up to 1.5 million HCft. This substantial increase was partially related to the drastic fall in round log production by the TCN in the same year (see **Table 3.5** above).

The FPDB's major customers are industries requiring wood as raw materials for their production (e.g. plywood and match factories). TCN supplies exactly the same category of customers, but FPDB serves more clients within the category. FPDB also supplies wood to private saw mills and other private operators at the district level. Finally, FPDB sells some of the stumpage left after logging to NFC (for fuelwood).

Plantation Projects

Sagarnath Plantation Project. This plantation project is located in the Sarlahi district of the Central Terai. Its main objective is to convert degraded and unproductive forest into plantations of fast growing trees which can be harvested in allotments to supply fuelwood and timber. The project will eventually cover 10,000 hectares, and has been in operation since 1978-79. Its target is to harvest 1,000 hectares of forest and to plant another 1,000 hectares simultaneously each year. So far, 5,000 hectares have been cleared. Timber production is sold to forest-based industries and fuelwood to the NFC. A large part of this supply enters the Kathmandu Valley market.

Table 3.7
FPDB Production and Sales

Year	Logs		Sales Proceeds Rs.
	Produced Hft3	Sold Hft3	
1982/83	1,006,906	1,791,216	16,009,705
1983/84	664,689	936,998	12,387,469
1984/85	994,010	1,148,058	13,879,021
1985/86	923,705	1,055,568	N.A.
1986/87	1,605,422	1,530,089	N.A.

Source: FPDB

The Sagarnath project has provided valuable operational data and insights on the management of tree plantation projects in the Terai. The project is generally perceived to be successful and efficient. In 1987/88, it had an authorized budget of Rs. 8.25 million and employed about 250 people.

Ratuwamai Plantation Project. The Ratuwamai Plantation Project was established in FY 1978/79 on 2,800 hectares of illegally settled land in the Jhapa District. A plantation of 2,238 hectares has already been completed at the cost of Rs. 9.7 million. The major clients are private individuals and forest-based industries. In fiscal 1987/88 this project had a target of planting 100 hectares at an estimated cost of Rs. 811,000. It employs 34 people directly. An area of 1,500 hectares within the plantation has been handed over to Nepal Tea Corporation for the production of firewood needed in tea processing.

Nepalgunj Forest Development Project. Started in FY 1986-87, the project will clear 5,000 hectares of land for a plantation of fast growing fuelwood trees. It is expected to be in operation by December 1990.

FPDB's Other Activities. A Rosin and Turpentine factory was established in the Kailali district of the Far Western Terai with soft loan funding and technical assistance from the Soviet Union. The resin is collected from the hill districts of this region. The factory has an initial production capacity of 4,000 MT/year, which can be expanded to 6,000 MT. Because FPDB does not engage in resin extraction, and its activities do not extend to the Far Western Terai hills, the factory has now been leased to private operators who use private contractors for the collection of resin. In addition to the Soviet loan, the FPDB also invested about Rs. 49 million of its

Finally, FPDB also has more limited investments in the Herbs Production and Processing Company, another HMG owned public limited company engaged in the collection and sale (mostly for export) of herbs which have traditional medicinal and other uses.

3.4 Public Institutions and the Policy Context

The review given above of the activities of these three parastatals involved in forest products reveals that their performance has been far from satisfactory, and that these organizations are often unable to carry out the main stated objectives for which they have been created. TCN's performance seems to be the worst given the large capital investments made in its saw mills and other plants, and the huge financial losses it has incurred. But financial considerations (i.e. operating profits or losses) alone should not be the main guide to evaluating the role and justification of such parastatals. Thus NFC's apparently favorable financial condition alone does not absolve it of its many problems and inefficiencies, nor does it mean that public policy should not be concerned with reassessing NFC's role.

Established administrative rules, efficient working practices and systematic planning and operational methods are seriously lacking in the activities of public enterprises in the forest products sector. Political influences are also pervasive and often counter-productive. The National Forest Policy provides rules and regulations as well as general guidelines on matters relating to the forest resources of Nepal. It specifies and regulates the felling of trees and other aspects of forest exploitation and protection, but the rules of official policy are easily circumvented. At this juncture, an autonomous role of these institutions within a definite set of objectives and policy perspectives is not well established.

The ineffectiveness of these institutions can also be attributed to the composition of their Boards of Directors. The members of the Board come from different government departments. The interests of the Departments they represent are likely to be more dominant than the interests of the organizations of which they are Board members. Partly as a result, there is a lack of coordination in the activities of these parastatals. On the other hand, these institutions take up activities outside of their original jurisdiction or objectives -- in response to various departmental exigencies of the moment -- which can develop into regular responsibilities.

Some of the problems are of a more technical nature. The technology for forest products harvesting in Nepal is not well developed. Milling technology at the TCN mills is outdated and very wasteful. Although the performance of some private mills may be superior to that of TCN, technology limitations affect both private and public sector operations in the forestry sector of Nepal.

Recent HMG Initiatives

Attempts at Consolidation

Since the functions of the three institutions were overlapping, HMG took a policy decision and some preliminary steps to merge them into a single entity in the early 1980s. As a first step, a single Board of Directors was formed, but it proved ineffective and functioned for only eight months. Eventually, the previous pattern of three independent Boards reemerged. The government has not explained why it abandoned this attempted consolidation. Information sources tend to indicate that financial irregularities and missing inventories of large quantities of timber and fuelwood in collection sites became a serious problem in the attempt to prepare a full account of assets and liabilities of each organization which was to be handed over to the merged entity.

Another stumbling block in the efforts to merge these three institutions is their different legal/corporate status. The FPDB is closest to a regular government department over which HMG has the greatest leeway in terms of reorganizational and restructuring options. At the other extreme is TCN, which is registered as a public limited company. Even though TCN is wholly government-owned, the Company Act of Nepal prescribes specific regulations for changing the legal status and corporate identity of public limited companies. There are also restrictions on the condition under which such a company can be voluntarily liquidated.

Transfer of NFC and TCN to Ministry of Supplies

An important policy change on the parastatals involved in forest products in Nepal occurred in December 1987, when HMG decided to shift ministerial supervision of TCN and NFC from the Ministry of Forests to the Ministry of Supplies. This was part of a wider restructuring of parastatals whereby many public companies and corporations engaged in the purchase and distribution of essential consumer goods were placed under the Ministry of Supplies. Apart from the forest products parastatals, some of the other organizations also transferred to this ministry were the Nepal Food Corporation, the Nepal Oil Corporation, and the National Trading Company.

The major reason for this transfer was to obtain greater coordination and uniformity in the policies and operations of these various entities charged with public procurement and distribution of essential commodities. The Ministry of Supplies was established as a separate Ministry by HMG in 1982. It has the responsibility to plan and coordinate both public and private sector activities relating to the provision, adequate supply and timely marketing of essential consumer products and raw materials, so as to avoid shortages and unwarranted price increases. In discharging these activities, the Ministry was, however, handicapped by the fact that the public institutions involved in the supply and distribution of many essential goods were under the charge of other Ministries and thus outside the administrative control of the Ministry of Supplies. The recent reassignment of some of these parastatals (including TCN and NFC) was designed to remove this bottleneck.

The reassignment of these public organizations also means that now greater emphasis is placed in the marketing and distribution of forest products, stressing linkages with the consumers rather than with the supply source. While this appears a useful change in focus, it also has some disadvantages. Operational problems of some of these parastatals may increase precisely because of the administrative separation from the source of the products they are dealing in. This kind of problem may emerge particularly for the forest products parastatals because their operation is wholly dependent on the permits for forest clearing to be given by the Forest Department. Apart from issues of inter-ministerial lack of coordination, there now is little incentive for the Forest Department to issue sufficient permits to TCN and NFC to cover even currently met share of demand for these products. The Forest Department could justifiably opt for a more stringent forest protectionist stance now that the problems created by an inadequate supply of fuelwood and timber will not be under the responsibility of the Ministry of Forests.

The transfer of NFC and TCN to the Ministry of Supplies does however permit a more systematic and integrated approach to planning of the role of NFC and TCN in the supply of fuelwood and timber, respectively, in line with the larger sectoral perspective of energy and construction materials. For instance, in the fuelwood market, while the Ministry of Forests' concern would by necessity be limited to the offtake of fuelwood from public forests, the Ministry of Supplies has a broader concern for all sources of household and industrial energy demand. Planning for fuelwood supply can be integrated into this broader sectoral perspective and coordinated with the available or projected supplies of alternative energy sources such as kerosene and LPG for cooking and coal for industrial purposes. On the timber side, there seem to be fewer available substitutes (e.g. only from frames to substitute for building timber and metal furniture for wood products), and therefore less scope for integrated planning. Nevertheless, the responsibilities as well as the options available to the Ministry of Supplies (including foreign trade options) are broader than those of the Ministry of Forests.

Coordination and Management

Since the transfer of TCN and NFC to the Ministry of Supplies, HMG has again after (a similar decision was taken six years ago) decided to merge NFC and TCN. Preliminary steps in this direction have begun. It remains to be seen if more concrete progress can be achieved in this task.

Recent policy initiatives with respect to the para-statals involved in the forestry sector in Nepal have focussed mainly on two concerns: i). to streamline and reduce overlapping and redundancy in the operations of these three organizations (as evident in the various attempts to merge NFC and TCN); and ii). to achieve better coordination and planning from an overall sectoral perspective (as evident from the recent transfer of TCN and NFC to the Ministry of Supplies). Efforts in both of these directions are laudable and some increased efficiency and cost reductions can be expected from their successful implementation. It has also become evident that HMG should take a broader policy perspective with regard to the role and operation of these parastatals in view of changing market conditions. In particular, there is now a substantial parallel role of the private

sector in the forest products markets in Kathmandu Valley and in other urban areas of Nepal.

NEC and ICN were created at a time when organized private sector operations in these markets were non-existent or inadequate (e.g. fuelwood loads through informal backload suppliers). There was an imperative for public regulation of access to the threatened resource base. Since then, there has been very high growth in the demand for forest products in the urban areas of Kathmandu Valley. The Forest Department has not been successful in either limiting or regularizing the offtake from public forests solely through the operations of these parastatals. These organizations on the other hand, due partly to the problems imposed by inadequate supplies provided by the Forest Department permits and also partly from their own operational and management inefficiencies, now cater to a progressively declining share of the total market. A substantial private sector involvement in fuelwood and timber products has developed. Private operators often supply more of the market than the official channels. As far as the **average** consumer is concerned when he cannot get access to the low cost timber and fuelwood rationed through the official supply channels, the markets for products have *de facto* been privatized.

In this context it is necessary to reassess the entire role and operations of the public sector organizations. At the least, efforts will be needed to better coordinate their operations. As discussed in the conclusions of this report (Chapter 7), there are strong arguments in favor of abolishing the public enterprises in forest products marketing altogether. **What must be avoided is to continue planning and carrying on activities within these public enterprises as if the large parallel private sector involvement in forest products marketing did not exist.**

Chapter 4

Fuelwood Supply and Demand

Chapters 4 and 5 provide a structured accounting of fuelwood and timber flows into urban areas of the Kathmandu Valley, with details of the principal transactions which occur at each stage in the marketing process. The many discrepancies uncovered¹ are discussed and, where possible, reconciled. The presentation in these chapters is essential for understanding the mechanics of how the wood products marketing system works, and for understanding the current and potential future roles of the public enterprises and private actors in this sector.

The marketing system described in the following sections is complex. There is a potentially bewildering array of public and private actors, of discrete steps in collection, transport, wholesaling and retailing, of permits and access rules, of financial incentives which run counter to policy objectives, of avenues to circumvent market rigidities and of prices and resource allocation mechanisms. **The basic fact is of a market which is highly segmented**—the sources of supply are distant from centers of demand, separated by poor roads through mountain passes, publicly controlled supply at fixed prices is inadequate to meet demand, and coexists with a thriving private trade. The very complexity of official rules on access and transportation results in the ineffectiveness of private sector responses.

To break this system down into structured and easily understood components, fuelwood and timber have been treated in two separate chapters. The two markets are linked, however. The best fuelwood logs brought in by the private sector are sold at much higher prices as timber. A high proportion of the offcuts from sawn wood enter the fuelwood market.

There are three main avenues through which fuelwood reaches the urban markets of Kathmandu Valley: from the public forests in the Terai, from illegal roadside supplies in the Terai, and from illegal backload supplies from within the Valley. Public forests in

¹Two general types of discrepancy are at issue—between officially reported fuelwood supply and actual flows observed during monitoring conducted by the IDS Team, between supply estimates and demand estimates. The two types of discrepancy are related. Through cross-checking data from several independent sources, the study was able to reduce "unexplained" discrepancies to the point that further refinement would not materially affect the validity of the study's conclusions.

the Terai are by far the largest source of fuelwood sold in the Valley, and this flow is therefore given the most detailed treatment.

4.1 Fuelwood from Public Forests in the Terai

Figure 4.1 summarizes overall fuelwood flows from this source. All units are in quintals (one quintal = 100 kgs). Original data occur in a variety of units, including chattas, bharis, kilograms, cubic meters, cubic feet and metric tonnes. For reference, the principal conversion factors used in this chapter are shown below.

Metric Ton (MT)	1,000 kilograms
1 Quintal	100 kilograms
1 Chatta = 6.4 MT	6,400 kilograms
1 Bhari = a headload	30 - 50 kilograms

This section is organized by the "stage" of the marketing process. The discussion focusses on official flows. Discrepancies between supply and demand are reconciled at the end of the chapter. In between, periodic summaries are provided to help keep track of the "macro" picture.

There are eight discrete stages in the fuelwood marketing process:

- o Source
- o Harvest and Delivery
- o Collection
- o Transport (from the Terai to Kathmandu)
- o Wholesale Distribution
- o Retail
- o Delivery
- o End-Use

SOURCE

The source for this flow is the publicly managed forests of the Terai, principally Sagarnath in Sarlahi, Tamagadi in Bara and the forest in and around Nawal Parasi. These forests are controlled by the Forest Department (Ministry of Forestry), which grants permits for removal of fuelwood to the NFC and its permit holders. Collection on site is carried

	SOURCE	HARVEST/ DELIVERY	COLLECTION (Forest)	TRANSPORT	WHOLE/ DISTRIB	RETAIL	DELIVERY	END-USE
NPC	Official Renovals	NPC Contractors	NPC Depots	NPC Contractors	NPC Kath Distribution Depot	NPC Kath Retail Depots		Households
	264,963	264,963	264,963	264,963	264,963	259,970		
NPC PERMIT HOLDERS	Official							
	160,000							
	Recycling	NPC Permit Holders	Private Depots	Arranged Transport		NPC Approved Retailers		Institutions
	14,000	102,000	202,000	202,000		4,993		
SPECIAL PERMIT HOLDERS	Overloading							
	28,000							
	Special Permits	Special Permit Holders	Private Depots	Arranged Transport		Unofficial Retailers		Industry/ Commerce
	81,000	81,000	81,000	81,000				
TIMBER MARKET								Timber Market (Small Lots)
					Timber Off-outs			
					80,000			

(in quintals)

Figure 4.1
Fuelwood Flows to the Kathmandu Valley

out under the supervision of the Forest Department's representatives. Both timber and fuelwood collection may occur at the same site, in which case timber collection takes precedence (the best timber species and logs are removed first) and what remains after timber harvesting is collected for fuelwood.

Permits to remove fuelwood are authorized by the Forest Department, and are arranged through the central office in Kathmandu. Officially, all permits go through the NFC. The NFC can obtain two types of permits: for its **own distribution** and for private industry and commerce **permit holders** who apply to the NFC in order to obtain their permits. Permits for NFC's own distribution are determined by the amount of wood requested, by allocations set aside for each major market area in the country and, in principle², by judgements about sustainable supply from managed forests. For industry/commerce permit holders, there is an established schedule that determines, for each subsector and type of installed capacity (such as brick kilns with one chimney, brick kilns with two chimneys, etc.), the maximum allowable annual fuelwood allocations. It appears possible to obtain a permit without rigorously meeting requirements in the schedule. For this reason, and because the official supply is far less than consumer demand, access to permits (at low official prices) is financially attractive for those who succeed in obtaining them.

For each of the two types of permits granted the NFC, the NFC pays a royalty to the Forest Department. For wood it markets directly, it pays a permit of Rs. 214 per chatta. For wood destined for industry/commerce permit holders, the NFC pays a Forest Department royalty of Rs. 500 per chatta³. Two things should be noted with respect to these royalties:

- o For wood marketed directly by NFC, the Rs. 214/chatta royalty is well below the estimated cost of producing an equivalent amount of wood on a sustainable basis. In effect, the commercial operations of the NFC (which has been profitable in the last few years) are **subsidized** through provision of wood at less than its economic cost.

²It is part of the Forestry Department's mandate to manage forest resources for sustainability. In practice, there has been no systematic analysis of what levels of supply are sustainable, and decisions regarding the areas and volumes to be harvested are ad hoc.

³A chatta is a measure of volume (a stack which is 20ft x 20ft x 5ft). The report uses the conversion rate of 1 chatta = 6.4 metric tons, or 64 quintals. These royalty rates therefore are equal to Rs. 3.34/quintal (for wood to be marketed directly by NFC) and Rs. 7.81/quintal (for wood to be provided to permit holders). The royalty figures are presented in chattas, rather than being converted to quintals, because the conversion from chattas to quintals (a measure of weight - 100 kilograms) is variable, depending on the density of the wood and how tightly it is stacked. Private permit holders appear to be skilled at getting chattas which weigh more than the standard 64 quintals, thereby exceeding their official allocations (see discussion of the "Wholesale" stage).

- o On permits granted to industry and commerce, the NFC makes a large profit. While paying the Forest Department a royalty of Rs. 500 per chatta for this wood, it charges its permit holders between Rs. 2,250 and Rs. 5,750 per chatta, depending on the type of wood and the proximity to market. On average, industry and commerce permits cost about Rs. 3,500, yielding an average profit to the NFC of Rs. 3,000 per chatta. Again, this is an implicit subsidy to the NFC, since it is allowed to capture most of the economic rent on the resources to which it is given access, even though it makes no contribution to preserving or managing those resources.

In 1986/87, official figures on permits for fuelwood to be shipped to Kathmandu amounted to 428,800, as shown in **Table 4.1**. These permits account for about half of the estimated flows to the Valley for the same year, as discussed in later sections of this chapter.

Table 4.1
Permits for Fuelwood from Terai Forests (1986/87)
For Shipment to Kathmandu

Permit For	Chattas	Quintals
NFC Distribution	4,200	268,800
NFC Indust/Comm Permit Holders	2,500	160,000

Source: NFC

A permit specifies the amount of wood to be removed, the source and the destination. Each permit has four copies (an original and three carbons). These documents are needed in each subsequent stage in the chain to show that supplies have been obtained legally. **Figure 4.2** shows a translated copy of an industry/commerce permit granted by the NFC.

HARVEST

The royalties paid to the forest department are for the right to harvest wood, and do not include the cost of harvesting. The NFC uses informal small contractors and casual labor (paid on a unit basis) to harvest wood from the forest and deliver it to adjacent NFC collection depots. The costs for harvest and delivery are therefore a function of the amount of wood collected, not of fixed NFC staff or wage costs. Harvesting is typically a labor-intensive effort, done using hand tools. Transport to the nearby collection depots is, most often, by bullock cart, which is both cheaper and better adapted to forest trails than mechanized vehicles. The cost of collection, loading onto bullock cart, transporting to the depot and unloading at the depot is approximately Rs. 800 per chatta (Rs. 12.5 per quintal).

Figure 4.2

Translated Copy of Permit
Dispatch Letter

FUELWOOD CORPORATION

DATE :

RECEIPT NO:

Bill no.

Branch Office,

Book No.

FUELWOOD DISPATCH LETTER

CHECK POST COPY

All concerned forest check-posts are requested to check and allow the passage of the truck load (one) of wood to the destination mentioned in this letter of dispatch (Chalan)

AS FOLLOWS

NAME OF WHOLESALE TRANSPORTER	FOREST DIVISION	RANGE OFFICE	NAME OF PLOT	QUANTITY		DESTINATION	REMARKS
				CHATTA	TRUCK		

Representative of Forest
Office or sub-committee

Representative of Fuelwood Corp.

Transporters or his Representative.

.....

Full Weight
Empty Truck Weight
Exact Weight
Weight in Maund

While the industry/commerce permit holders obtain their permits through the NFC, permit holders are responsible for their own wood harvesting. They may use contractors and paid labor, or similar teams in their own employ. Harvested wood is extracted from the forest and brought to private roadside depots. Private "depots" tend to be informal roadside collection points where wood is stacked in chattas (a chatta is a 20ft x 20ft x 5ft stack) before loading on trucks. Interviews with private permit holders suggest that their harvesting and delivery costs (from forest to roadside depot) are approximately the same as those cited for the NFC, Rs. 800 per chatta.

It is virtually impossible for NFC or the Forestry Department to verify the amounts of wood on each bullock cart, or the total number of bullock carts entering or exiting the forest: there is a constant flow in every direction. Therefore, the point at which wood removed is verified against permits is at the depot, where each chatta is readily observed and counted.

COLLECTION

The term "collection" is used here to mean the centralized gathering of harvested wood before shipment to Kathmandu. Depots are not differentiated by wood destination, so wood going to any location may be at any given depot. Verification of permits against chattas occurs at the depot. One copy of the permit is taken by the Forest Department at this point. The remaining copies are retained by the truck driver, and will be needed for passage at the fourteen Forest Department, police and army checkpoints on the road from the Terai to Kathmandu.

Because private depots are generally informal roadside collection points, there is little or no overhead. Harvest delivery costs (cited under the 'Harvest' stage above) include unloading and stacking in chattas. Permits are checked and a copy retained. Casual labor is used to load trucks which then proceed to their destinations.

The NFC depots are more formal. They are fenced and guarded and may have a small shed or building for administration. Otherwise, operations are as for private depots: chattas are counted, permits noted and a copy retained, and trucks are loaded. The cost of loading wood onto trucks is included in the cost of transport to Kathmandu, and therefore borne by the private contractors engaged by the NFC for this purpose (see following section "Transport").

The NFC maintains 12 depots in the terai and 8 forest collection sites. They are normally located within a few hundred feet of the exit point from the forest area being exploited. An average collection site may cover a space of 150,000 square feet. In principle, neither wholesale nor retail sales take place at the collection sites. All of the wood is loaded for transshipment.

TRANSPORT

The NFC uses private transport contractors to ship wood from the Terai to Kathmandu. These are not just casual truckers, but regular contractors who maintain fleets

of vehicles specifically for the NFC fuelwood transportation. Each truck is dedicated to fuelwood only, with an average capacity of twelve tons. There is no mixing of the NFC and private supplies to form a truckload. NFC records indicate that the **cost per kilogram** of wood transported to Kathmandu averages (variations depend on the location of the forest-site) **Rs. 0.425**. This cost includes loading at the forest depot, and delivery to the NFC retail depots in Kathmandu, or where appropriate (for army, police and institutions), to the end-user. It does not include the cost of unloading at the destination. There are some local and transport taxes to be paid on transport of this wood. These are borne by the transport contractor and included in the price of transportation. The NFC contractor trucks are weighed on exit from the forest depots. The weight is recorded on the permit. Trucks are weighed again on entering Kathmandu (at the NFC central dispatching depot) as a control.

Private permit holders arrange their own transportation from the Terai. They may use contractors or their own transport. The Study Team's surveys show an average transport cost for permit holders of Rs. 0.33 per kilogram, which is only 78% of average NFC costs.

Of the fourteen checkpoints between the Terai and Kathmandu, the two most important are the Forest Department posts at Naranghatt and Thankot (see map, **Figure 4.3**). At both, all trucks are registered as to destination and contents, and information from permits is entered in a permanent register. It is not sufficient that the permit indicate wood was legally obtained. It must specify that permission was granted to bring the wood to Kathmandu. Thankot is the most important checkpoint because **all** incoming vehicles from the Terai must pass through it. Incoming fuelwood trucks give one copy of the permit to the Forest Department agents at Thankot.

SUMMARY OF STAGES FROM SOURCE TO TRANSPORT

To this point, movement is fairly straightforward, as summarized below:

SOURCE: The Forest Department gives allocations to the NFC against royalties. A portion is for the NFC distribution and the remainder is available to industry and commerce, who obtain permits from the NFC for their allocations. In 1986/87, the NFC took 270,000 quintals for itself and gave permits for a further 160,000 quintals.

HARVEST/DELIVERY: Both the NFC and permit holders use contractors to harvest and bring wood to depots. All of the wood collected is brought to depots. Harvest/delivery costs include unloading and stacking wood in chattas.

COLLECTION: Wood removed from the forests is collected in adjacent depots. There, permits are verified, wood is held for loading and then loaded on trucks for shipment.

TRANSPORT: The NFC uses regular private transport contractors. Permit holders arrange their own transport. To pass the fourteen roadside checkpoints, a truck must have a valid permit to bring wood to Kathmandu.

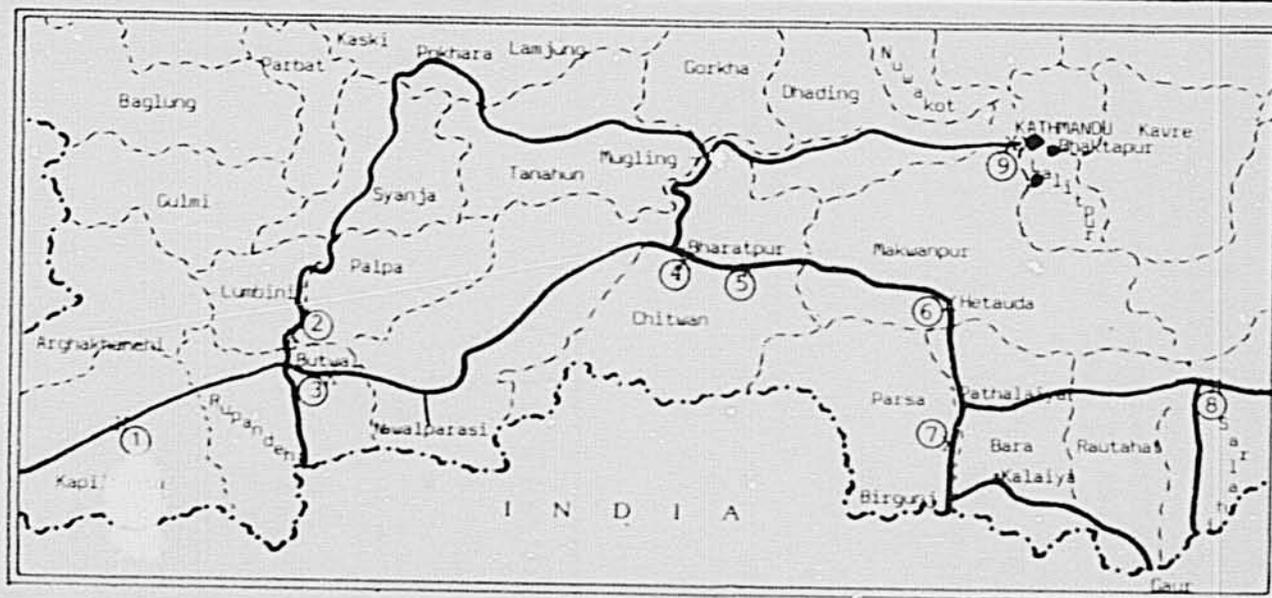


Figure 4.3

Map of Checkposts on Terai Supply Route
to Kathmandu Valley

Checkpoint Locations [X]

- ①. Gorusingha, Kapilbastu
- ②. Dovan, Palpa
- ③. Bhaluhi, Rupandehi
- ④. Ramnagar, Chitwa
- ⑤. Tandi, Chitwan
- ⑥. Hetura, Makwanpur
- ⑦. Simra, Bara
- ⑧. Sagarnath, Sarlaha
- ⑨. Thankot, Kathmandu

LEGEND

- · - · - International Boundary
- - - - District Boundary
- Road



MAP OF NEPAL

In principle, 270,000 quintals of the NFC wood and 160,000 for permit holders pass through these routes.

WHOLESALE

Neither the NFC nor permit holders have formal wholesaling operations, *per se*. There is no wholesaling for permit holders because they are the end-users. The NFC has a "wholesale" depot located at Teku. However, it is more a weighing and dispatching center from which truckloads are directed to retail depots or end-users. Trucks are not unloaded at this depot, and wood remains in the hands of the NFC (or its contractors). The NFC trucks are weighed at this point to verify that amounts brought in correspond to what left the forest. The remaining copy of the permit is surrendered at this point.

It is at this wholesaling "stage" in the marketing process that the hitherto easy to track flows branch off to several different points. The principle reason for this is the fact that the wood is now **close to its market**, where there is the greatest pressure to meet the needs of dispersed end-users.

NFC. The NFC reported that it brought in 264,968 quintals of fuelwood to the Kathmandu Valley in 1986/87. From this stage, wood can follow one of four avenues:

A reported 259,975 quintals (98%) were forwarded to the **NFC retail depots**, for sale to households, institutions and the government.

4,993 quintals were reported to have been sent to the **NFC approved private retailers**. Because the NFC does not have sufficient capacity at its fourteen urban retail depots, it has authorized a limited number of private depots to retail fuelwood as well.

Some portion of the NFC supplies are unofficially **diverted to private retailers not sanctioned by the NFC**. There are no reported figures on this, nor do we find any discrepancy in official figures which would suggest that this is a large flow. Nevertheless, private individuals report its existence, and the team has seen some evidence of it, although the estimated amounts are small -- under 5,000 quintals per year.

Similarly, private industry and commerce (**non-permit holders**) report being able to buy firewood from the NFC wholesale depots. The NFC does not report any sales to this sector, nor did the team find any

substantial evidence of such sales. It is possible that such flows did exist in the past but no longer do (in any substantial amount).⁴

Private Permit Holders. Private permit holders are not required to keep records of what happens to the wood they bring to Kathmandu under permit, so there is no reported data on this flow. From detailed interviews and market spot checks, the study identified three main "branches" for this flow once it reaches Kathmandu:

A portion of the permits obtained are in excess of the needs of the permit holder. Open market retail prices are Rs. 1.60. This is considerably higher than the costs of obtaining an NFC permit and shipping the wood. Therefore, there is incentive to obtain as much wood as possible, and sell the excess on the open market. We estimate that between 10,000 to 15,000 quintals of permit holders' supply is **sold on the open market** (based on interviews with concerned parties).

The majority of permit holders' wood goes directly to the **permit holders themselves for the intended uses**. It should be noted that there is no incentive for permit holders to divert their supplies to the retail markets if they have an unmet demand themselves. If they did so, they would have to buy the same wood back at a higher price (with retailers' markups added) to meet their own needs. At least 115,000 to 120,000 quintals out of the 160,000 for which permits are granted is thought to go to the permit holders themselves. As we will see in a later section, there are reasons why this number may be higher.

The most lucrative use of permit holders' fuelwood, by far, is to **sell it as timber**. **Approximately 20% of the private wood shipments brought in as fuelwood are sold as timber**, for use in furniture making, wooden frames, etc. When logs are of sufficient size and quality to be used for timber, they are sold as roundwood by the cubic foot for Rs. 53.10 /cft. The kilogram equivalent price -- Rs. 2.50/kg -- is 56% higher than the private market retail price of fuelwood. Therefore, **even if a permit holder has an unmet demand for fuelwood, it pays to sell as much wood as is suitable as timber.**

The last point merits a brief explanation. The minimum size for roundwood in the forest which can officially be taken as timber is 5-7 feet. There are many pieces, including some of the better species, which fall just below this minimum and are taken as fuelwood. The "secondary market" (after the TCN and the NFC have carried out their classifications)

⁴While the study found no evidence of this flow for the period covered by the analysis, it is cited both because future research may yield such evidence and because it is possible the practice will become more important in the future, as it apparently was in the past.

of private suppliers applies a finer grading than the public enterprises, however. Good logs of 3-5 feet are set aside as timber by private permit holders (and illegal suppliers). There is a ready market in Kathmandu among furniture makers and others for timber of this size. The team had the opportunity to conduct detailed discussions with both suppliers and purchasers of this "informal timber". The 20% figure used above is a reasonable estimate, although several individuals say it goes as high as 40% of a given truckload.

The percentage of a truckload of fuelwood which is useable as timber is determined largely by the skill of the truck driver, which may in turn be honed by the attractive cash incentives offered by his employer: that is, all chattas are not created equal. One which is composed of mostly large logs from good species will have two advantages: greater density (less air space, denser wood) and hence more kilograms per unit of volume (chatta or truckload); higher value per unit of weight and volume. We were given detailed information on specific financial incentives drivers are offered if they meet or exceed certain weight to volume targets by selecting the best chattas (or convincing harvesters to create better chattas for them). The scale starts at Rs. 100, and a driver may be given a bonus of up to Rs. 1,000 per truckload for practicing this art well.

At this stage, it is worth introducing two topics which will be developed later in the chapter, when supply and demand are reconciled.

First, to this point the chapter has focussed on wood removed under NFC permit. The total amount being tracked is 430,000 quintals (270,000 for NFC plus 160,000 for permit holders). Total estimated demand for all end-users is nearly twice this figure. Adding to the already complex criss-crossing of wood flows at this stage is, therefore, the **further input of substantial amounts of wood from unofficial or semi-official sources** (see Section 4.3).

Second, this is also the stage at which the fuelwood and timber markets first become linked. In addition to the fuelwood which is sold as timber, most of the timber off-cuts brought into the Valley are sold as fuelwood. An estimated 56,000 quintals of off-cuts from sawmills in the Terai are legally shipped to Kathmandu by private suppliers. About 20% of these are of sufficient quality to be used as timber by the informal sector, but the remaining 80% (45,000 quintals), enters the fuelwood market. As above, all pieces which qualify as timber are sold as such, with only what remains becoming fuelwood.

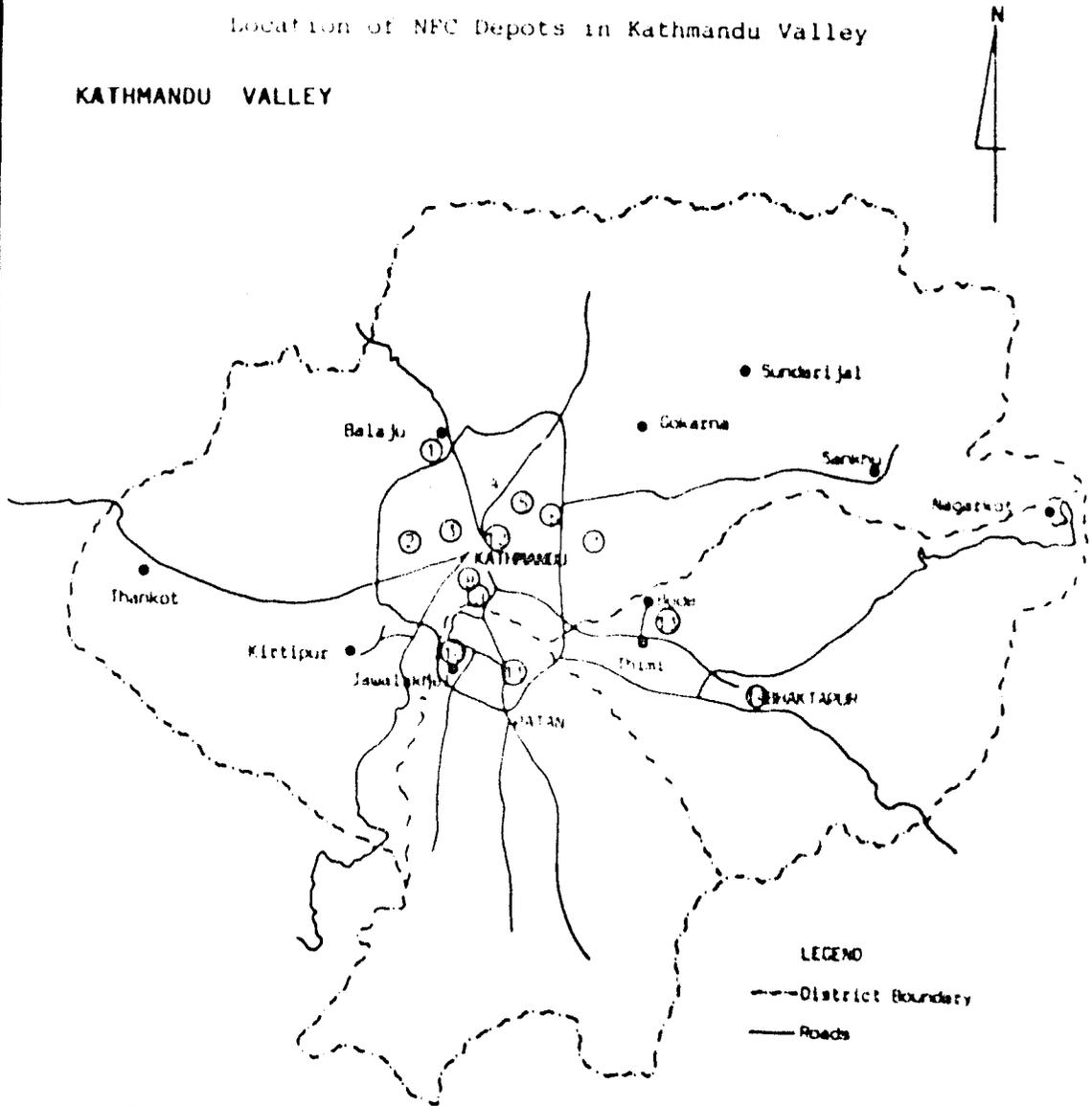
RETAIL

There are fourteen NFC retail depots in the urban areas of Kathmandu, Lalitpur and Bhaktapur (see map in [Figure 4.4](#)). The typical depot is an enclosed compound of between 2,740 and 21,900 square feet with open air storage. Trucks coming from the Terai are dispatched from NFC's central distribution depot in Teku, and come to the retail depot for unloading. The cost of transportation from Terai does not include the cost of unloading, which is performed by paid staff of the NFC employed at the depot. Unloading costs are estimated at Rs. 4.90 per quintal.

Figure 4.4

Location of NFC Depots in Kathmandu Valley

KATHMANDU VALLEY



LEGEND

- District Boundary
- Roads

NFC DEPOT

- | | |
|---------------|-------------|
| ① Bala Ju | ⑫ Balkumari |
| ② Swyambhu | ⑬ Thimi |
| ③ Dhobichaur | ⑭ Bhaktapur |
| ④ Lainchaur | |
| ⑤ Bisalnaagar | |
| ⑥ Mitra Park | |
| ⑦ Pashupati | |
| ⑧ Lagan | |
| ⑨ Toku | |
| ⑩ Jawalakhel | |
| ⑪ Lalankhel | |

Wood is normally allowed to dry for a few days to one week before sale. Splitting into bundles is performed by casual labor employed on site, paid per unit, at the expense of the purchaser. Splitting costs are typically Rs. 0.15 per kilogram. Retailing costs (an average of Rs. .02/kg) include sales and administration. There is a two tier price structure for NFC retail sales. Households can buy at Rs. 0.55 per kilogram. All others purchase at Rs. 0.70/kg. As discussed in Chapter 2, the effective means of differentiating between a household and "other" purchaser is by size of purchase: under 300 kgs is household, over 300 kgs is "other". Some non-household purchases are therefore made in lots of 300 kgs or under, as a means of qualifying for the household price.

Of the 259,970 quintals going for NFC retail sales (in 1986/87), in practice only the amount destined for households (131,567) is unloaded and sold at NFC retail depots. The remaining 128,403 quintals is shipped directly in incoming trucks to army, police and government institutional destinations. **Figure 4.5** shows the breakdown of NFC sales by end-user for 1986/87.

The NFC-approved private depots receive 4,993 quintals from the NFC, which they sell exclusively to households. The NFC provides this wood to approved retailers at a price of Rs. 0.47, and they are expected to sell it at the official NFC household price of Rs. 0.55/kg. It is, however, virtually impossible to enforce this, and the wood is actually sold at the free market price of Rs. 1.60/kg. This particular flow, while small, is therefore one of the most profitable in the supply chain.⁵

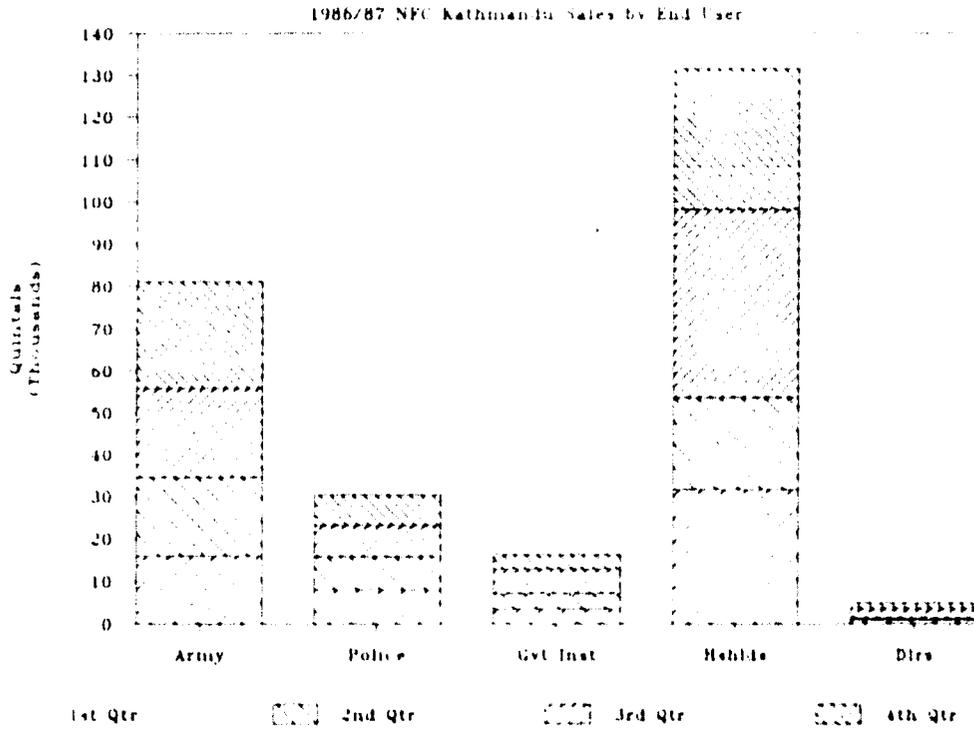
While it is highly desirable to buy from the NFC depots (at Rs. 0.55 vs. the open market price of Rs. 1.60), the majority of households are forced to buy from the open market because there is not enough wood available from the NFC to meet more than a fraction of the market demand.

The gap between official supply and market demand is filled by a multitude of small-scale private retail outlets which exist in most communities. The fact of selling wood on the open market, while "unofficial", does not violate any legal sanction. It is illegal to remove wood from the forest or to ship it to Kathmandu without a permit, but not to sell it once it is there. The retail market price of split wood is Rs. 1.60 per kg in the rainy season (when supplies are scarce), and as low as Rs. 1.10 to Rs. 1.30 per kilogram from September through May. Most of the wood is in fact sold unsplit, and the purchaser negotiates a splitting price with one of the independent splitters who normally offer their services in front of the outlet.

The term "unofficial private retailers" is meant to refer to the "unofficial private retail system", which receives supplies from a variety of sources. It is important to understand that in reality these supplies don't flow to some central point, or even set of

⁵Retailers obtain wood from NFC at below the official household price, which is itself below NFC's cost of supply and much below the private cost of supply.

FIGURE 4.5



points. The unofficial private retail system is the full set of individuals or businesses which sell fuelwood outside the NFC retail channels. Neighborhood retail outlets may purchase supplies at "wholesale prices" (i.e. less than the retail sales price), but there are a number of individual -- most notably backload suppliers who walk wood in from villages within the Valley -- who sell directly to households without passing through an intermediary.

4.2 Kathmandu Valley Backloads and Terai Roadside Supply

This section discusses flows from the informal sector: backloads of wood cut by village households within the Valley and brought in by foot for sale directly to households or other end-users; wood cut by villagers near access roads in the Terai and sold to occupants of vehicles en route to Kathmandu. Neither of these sources accounts for a large proportion of the fuelwood entering Kathmandu. Valley backloads seem to have been a more important source of wood a few years ago than they are today (especially in Lalitpur and Bhaktapur) because accessible supply has been depleted in several areas and because local demand outside the urban periphery (such as for brick and tile factories) has grown.

Kathmandu Valley Backloads

Wood is cut from the public forest by one or several members of the household. Normally several backloads are brought home and then transported to market the next day. We estimate that it takes one person approximately four hours to collect a backload of 40 kgs. of firewood and bring it home. It takes another four hours roundtrip to carry the backload to market and return. That is, collecting and selling 40 kgs. of wood is roughly a full day's work. Our interviews suggest that this time requirement has increased -- particularly for transport -- as nearby forest resources have diminished. The financial rate of return has, however, been at least maintained by the rapid increases in fuelwood prices.

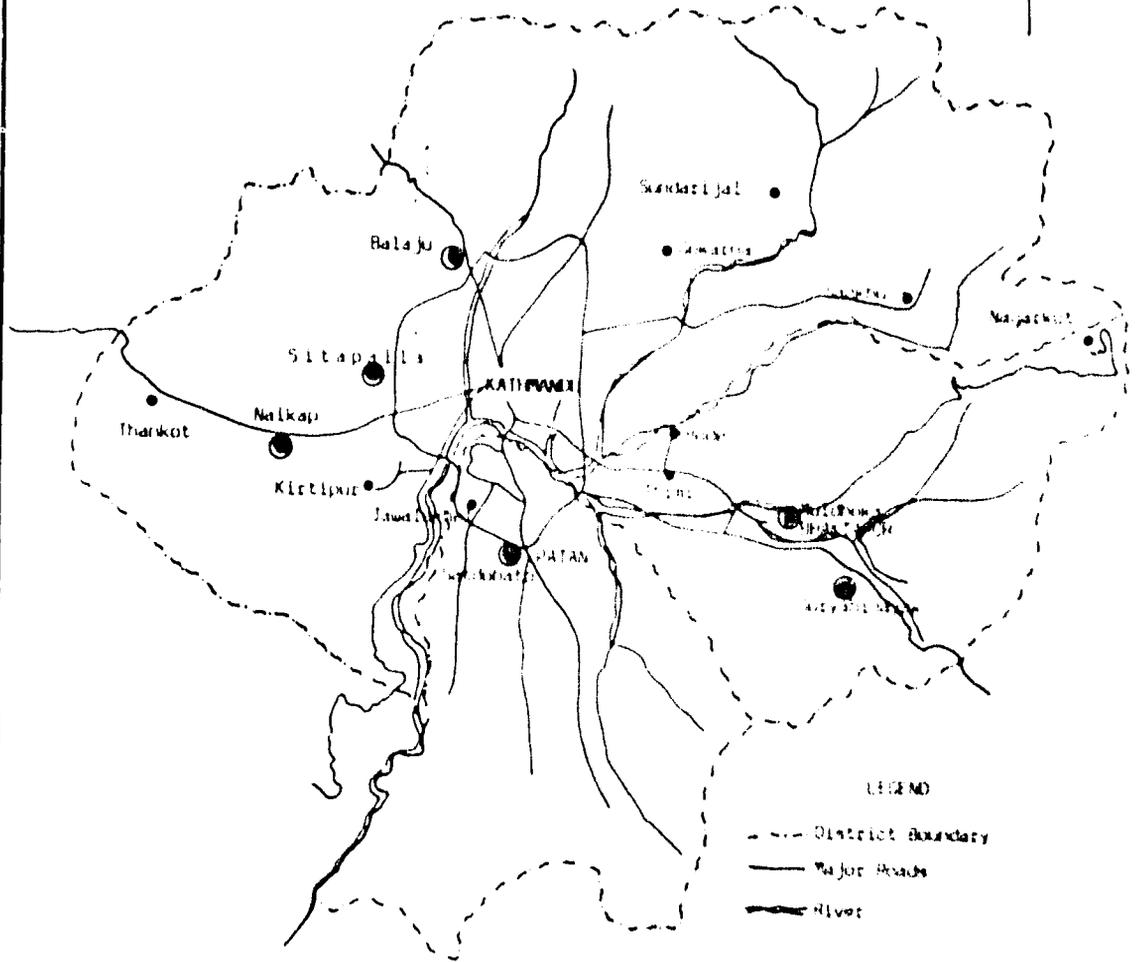
Because backload supplies are sold directly to end-users, they return a price of about Rs. 1.50 per kilogram, or Rs. 60.00 per backload. On the face of it, this is over twice the going wage for alternative adult employment opportunities (Rs. 25 per day). The apparent rate of return, however, is diminished somewhat by the possibility of being caught by forestry agents, which can result in confiscation of the wood collected and/or imposition of a fine. As shown in Chapter 6, the activity remains an attractive source of income generation for villagers, even with these risks.

To estimate the amount of this flow, roadside monitors were posted along the points shown in **Figure 4.6**, from 4:30 AM to 10:30 AM each day for two 7 day periods (April and November). The results confirm the existence of the flow, but also showed some anomalies. Notably, no backloads coming in to Lalitpur were detected during either monitoring period. This result is counter-intuitive, and cannot therefore simply be assumed to be correct. Further investigation has revealed two possible explanations:

Figure 10

Within Valley Fuelwood Inflow Routes and
Survey Road Monitoring Sites

KATHMANDU VALLEY



Estimated Annual Inflow from Each Observation Site:

Balaju	8731 Qt
Sitapaila	4298 Qt
Naikap	3269 Qt
Satdobato	N.R.**
Suryabinayak	4942 Qt
Muldhoka	2983 Qt.

● Location of Road Monitoring Sites
 ** N.R. = Not Recorded

- o There are several tile factories at Harisiddhi on the road into Lalitpur. A considerable amount of backload supply along this road is absorbed by the factories (outside the study's checkpoint) and therefore does not go past the checkpoint and enter the urban market.
- o There are other, smaller access roads which were missed in the monitoring, and some traffic may move along these roads.

The overall monitoring effort detected an amount of incoming wood which would correspond to an annual flow of 24,000 quintals. This number needs to be adjusted upward for two reasons: first, to allow for the possibility that some incoming wood was not detected in the monitoring; second, because an extrapolation from two weeks' of observation to an annual figure (a conjectural process at best) must be seasonally adjusted. Given these two considerations, we believe that the range is likely to be between 35,000 and 50,000 quintals from this source.

Roadside Supplies from Terai

Wood is collected by villagers near the main roads leading in from the Terai. Earlier surveys and analysis done by IDS and by the Forestry Master Plan found that collection time for wood in the Terai is similar to that in the Valley (i.e. four hours for a headload/backload), but "transport to market" takes considerably less time because the market is the roadside. Driving through the Terai, one sees ample evidence of this traffic, both in the movement of villagers carrying backloads or headloads of wood, and in the widespread presence of stacks of wood for sale. This wood is not just destined for Kathmandu. All of the urban areas in the Terai are potential destinations.

There is some variability in the findings about the weight of a "bundle" of such wood, the range going from 30 kgs to as high as 52 kgs. We have used 40 kgs as the average. Depending on the purchaser, the intent may be to save some money, in the same way that travellers purchase fruits, vegetables or other locally inexpensive goods to bring back during a trip. For some buyers, like truck and bus drivers, they may sell as many bundles as they can fit onto their larger vehicles for additional income from each trip. In either event, the typical purchase is not large.

The price of roadside wood in Terai was found to vary between Rs. 10 and Rs. 20 per bundle; Rs.0.50 per kilogram is thought to be a reasonable estimate. Given that there is no incremental transport cost, this yields a savings of Rs. 1.10 per kilogram for purchasers, relative to Kathmandu retail prices. Purchasers who sell this wood in Kathmandu (as opposed to keeping it for their own use), realize a lower profit because they sell to middlemen at less than final retail prices. Chapter 6 estimates the return to suppliers (Terai villagers) for this activity. Even with the much lower price they receive relative to Valley backload suppliers, it appears to be profitable (confirmed by the fact that people do it).

The two around-the-clock monitorings of the Thankot checkpoint recorded a considerable volume of these "silent travellers". During the 14 days of monitoring, surveyors sighted a quantity of bundles on incoming vehicles which would correspond to an annual flow of 12,000 quintals (at an average size of 40 kg/bundle). It is reasonable to assume that for every one silent traveller seen, there was at least one not seen, especially since the Team's surveyors had no authority to search vehicles. We therefore would put a minimum figure of 24,000 to 30,000 quintals on this flow.

Controls at the Thankot checkpoint have been tightened in recent months. The rate of flow observed in November 1987 and April 1988 may have changed since then. However, a minimum of 24,000 quintals per year appears to be justified for 1986/87 (see Section 4.3).

4.3 Reconciling Supply and Demand

Table 4.2 summarizes the supply from the three reported and observed flows considered to this point.

Table 4.2
Fuelwood Supply from Reported or Observed Sources

Source	Amount
NFC	270,000
NFC Permit Holders	160,000
Terai Roadside	24,000 - 30,000
Valley Backloads	35,000 - 50,000
Total	489,000 - 570,000

Source: Study Team Estimates

The objective of this section is to determine if this accounts for most of the supply. In order to do so, we have considered five independent sources of evidence:

- o Estimates of total demand
- o Records from the Forest Department checkpost at Thankot
- o Results of the independent Thankot monitoring
- o Reported supply figures

- o Non-quantified, but reliable information gathered from interviews with individuals who know the sector well, and/or with those engaged in bringing in fuelwood, officially or otherwise.

While the Thankot checkpoint keeps detailed records on every incoming vehicle, including the amount of wood, type of wood, source, permit number, etc., **this information has never been compiled and published.** The Study Team obtained the full daily records from Thankot for the fiscal year 1986/87 (the base year of the analysis) and tabulated the flows for each category (fuelwood, timber, offcuts, pieces, TCN, NFC, private, etc.). The study did not tabulate data for more recent years, both because they were not yet fully available, and because 1986/87 was the most recent year for which fairly complete data were available from all sources. For 1987 through the present, a limited "random sample" of 10-20 weeks' data was conducted to look for changes in pattern.

None of the five independent sources of evidence yields exactly the same number. Nevertheless, the convergence of evidence from the five sources used permits us to narrow the range of variability, and to draw conclusions with reasonable certainty.

The following sections examine population and demand estimates, which are then reconciled with supply side information to arrive at final estimates of fuelwood flows to the Kathmandu Valley.

Population Estimates for Kathmandu, Lalitpur and Bhaktapur

Table 4.3 shows population estimates from most recent census (1981):

Table 4.3
Population and Growth Rates for Kathmandu, Lalitpur
and Bhaktapur (1981)

City	Population	Growth Rate
Kathmandu	235,160	4.57%
Lalitpur	79,875	3.07%
Bhaktapur	48,472	1.91%

Source: 1981 Census

To obtain an estimate of 1986/87 population, we have applied the appropriate growth rate to these population figures, as shown in **Table 4.4**:

Table 4.4
Population Estimates for Kathmandu, Lalitpur
and Bhaktapur (1986/7)

City	Estimated Population
Kathmandu	300,446
Lalitpur	94,294
Bhaktapur	53,780
Total	448,521

Source: Study Team estimates

Demand Estimates

Households.⁶ The Forestry Master Plan estimates annual household woodfuel consumption at **268 kilograms per capita**, for those who use fuelwood. This number, a **national average**, is considerably higher than found in the 1981/82 APROSC surveys, which estimated per capita demand and the percentage of households using fuelwood separately for each of the three cities, as shown in **Table 4.5**:

Table 4.5
APROSC (1981/82) Estimates of Household Woodfuel Demand

City	Per Capita Demand (Kgs)	Pct Using Fuelwood
Kathmandu	220	72.5%
Lalitpur	180	72.5%
Bhaktapur	160	90.0%

Source: APROSC

⁶ The study did not conduct its own household demand surveys, but instead relied on previous work and secondary sources to estimate demand.

There are several reasons to conclude that both per capita demand and the percentage of families using fuelwood have declined since the APROSC surveys. Retail prices for fuelwood have risen steadily, over the past five years. Moreover, the share of total demand met by NFC has decreased. Since NFC prices are much lower than those in the open market, this means the effective prices paid by households as a group have risen even faster. Finally, the major alternative cooking fuels are LPG and kerosene. Sales of both have grown rapidly. In developing an estimate of demand for woodfuels, we have used the "strong case" assumption: that both per capita demand and the percent of households using fuelwood declined by 20% between 1981 and 1986/87. This assumption is conservative, and errs, if at all, on the side of **underestimating** demand rather than overestimating it. **Table 4.6** shows the household fuelwood demand estimates developed for this study.

Table 4.6
Estimated 1986/87 Household Fuelwood Demand (Kgs)

City	Population	Pct Using Fuelwood	Per Capita Demand	Estimated Demand
Kathmandu	300,446	58	176	30,690,706
Lalitpur	94,294	58	144	7,870,605
Bhaktapur	53,780	72	128	4,956,406
Total (Kgs)				43,517,717
Total (Quintals)				435,171

Source: Study Team estimate

Industry and Commerce. A limited survey of industrial wood energy was conducted, and its findings used in combination with the results of previous studies. **Table 4.7** cites each of the major sources of data on industrial and commercial fuelwood use, and shows how the demand estimate was developed. From this information, industrial and commercial fuelwood demand is estimated to be a minimum of 250,000 to 280,000 quintals for the reference year 1986/87.

Institutions. As with industry and commerce, we carried out limited surveys of wood using institutions (hospitals and schools), and have used several independent sources in order to formulate an estimate. The most important starting point is the NFC's reported sales. Information indicates that the army, police and government institutions obtain virtually all of their fuelwood needs through official NFC channels. For 1986/87, the NFC reported 133,000 quintals of Kathmandu sales to these institutions. To this we add the results of our surveys with respect to private

Table 4.7
Demand for Firewood of the Industry/Commerce Sectors
in Kathmandu Valley, 1986-1988

Source	Estimate	Year	Coverage
Donovan, 1981 (1)	34,414 149,207 204,044	1986/87	All industrial establishments in the valley Industrial/Commerce
World Bank (2) 1983	257,048	1986/87	Industry/Commerce sector in Kathmandu Valley
APROSC, 1983 (3)	268,590	1987	Industry/Commerce in urban areas of the valley
Study Survey 1987 (4)	199,599	1988	Industrial establishment in the valley covering brick and tile factories bakeries, chemicals/soaps and carpets
	264,897		Industry and commerce which includes restaurants, tea shops and sweet shops
	272,956		Industry and commerce where demand for commerce = 36.75% of industry demand (World Bank, 1987)

- (1) *Donovan estimated the industrial demand for fuelwood in the three districts of Kathmandu for 1972/73 from which an extrapolation was made to arrive at the 1986/87 figures using population growth rates in the three districts of 4.57 (Kathmandu), 3.07 (Lalitpur) and 1.91 (Bhaktapur). The demand estimates so arrived at appears to be a gross under estimation.*

Using a growth rate of 16%, the rate at which fuelwood consumption grew in the industrial sector in Nepal during the decade 1971/81, however, the demand estimate increases by about four times. But even this figure is much below the estimates made by other sources.

The demand estimate for industry/commerce was obtained for 1986/87 by computing consumption by taking the ratio of commerce; industry from the World Bank estimate for 1986/87 and adding it at value to industrial demand for 1986/87.

- (2) *The UNDP/World Bank report has estimated the national fuelwood demand of the industrial/commercial sectors for 1980/81. Using the Kathmandu national industrial establishment ratio and multiplying the ratio with the national demand figure, the demand for Kathmandu was arrived at. The 1980/81 figure so arrived was extrapolated by the national population growth rate of 2.67 per annum to obtain the industrial fuelwood demand of Kathmandu for 1986/87.*
- (3) *The APROSC study first estimated the urban demand of the industrial/commercial sectors of Kathmandu Valley in 1982 by conducting a sample survey of industrial establishments using fuelwood. The average requirement of each type of industry was then multiplied by the total number of like industries and these were all added up to arrive at the demand for 1982. Projections were made for 1987 by compounding the demand figures with the annual population growth rates during the decade 1971/81, i.e. growth rates of 4.6 (Kathmandu), 3.2 (Lalitpur) and 2.3 (Bhaktapur) percent were used for demand projection.*
- (4) *The survey estimates of industrial demand have been arrived by through a sample survey of brick industries. Total fuelwood consumption in the brick and tile industries registered in the last five years with the Department of Cottage Industries, with the average fuelwood consumption figure obtained from the sample. Normal for the other industries were borrowed from the sample average of the ISC industrial survey undertaken for WERDP by ISC and these figures were multiplied with the total number of like establishments obtained from the Census of Manufacturing Establishments, 1980/81. The total industrial demand was obtained by adding the total of all the estimates.*

institutions, in order to obtain an estimated total institutional demand for fuelwood of between 150,000 and 160,000 quintals.

Results from the Thankot Checkpost

Official Thankot Checkpost Records

Table 4.8 shows the results of the compilation of entries in the registers of the Forest Department checkpost at Thankot, for the 1986/87 fiscal year.

As the table shows, the official data total from Thankot is greater than the reported flow of wood from the NFC and private permit holders. Thankot's NFC figure of 236,000 quintals is a little below the NFC's own reported shipments and sales of 265,000 quintals, while the private fuelwood recorded at Thankot is almost twice the official permit holders' figure (307,000 vs 160,000 quintals).

An important point needs to be made here to avoid misinterpretation. If a shipment is recorded at Thankot checkpost, it is, almost by definition, legal: that is, it comes in with a valid permit for Kathmandu. Every entry in the Thankot register contains the permit number and vehicle license number for each truck. If an "unofficial" truckload were brought in, it could only pass with the cooperation of the agent of the checkpost, in which case it would make no sense to record it in the register. What this does imply is that, although we made repeated inquiries with all concerned parties, more permits were granted in this period than the 160,000 quintals about which we were able to obtain information.

Thankot Roadside Monitoring by the Study Team

As a final cross-check, we have compared the results of the study team's roadside monitoring at Thankot during the weeks of November 26 to December 2, 1987 and April 5 to 11, 1988. For fuelwood, study surveyors saw incoming amounts as shown in **Table 4.9**.

The results of each one-week monitoring period were converted to monthly averages, which were then seasonally adjusted to reflect the monthly flow pattern of reported fuelwood flows in 1986/87. This method yielded two separate seasonally-adjusted estimates -- one based on April's monitoring results, and one based on November's. The two estimates range between 750,000 and 800,000 quintals.

Reconciliation

Two conclusions are readily apparent from comparison of various sources of supply data:

1. Much more wood entered the Kathmandu Valley than was reported by NFC and private permit holders.

Table 4.8
 Thankot Checkpost Data on Incoming Fuelwood
 (October/November 1986 to September/October 1988)

	1986/87												Annual Total
	Oct/Nov	Nov/Dec	Dec/Jan	Jan/Feb	Feb/Mar	Mar/Apr	Apr/May	May/Jun	Jun/Jul	Jul/Aug	Aug/Sep	Sep/Oct	
NFC Own Supply													
Recorded	12,528	25,360	15,136	24,832	24,176	20,864	20,400	22,941	15,238	10,752	17,718	26,578	236,523
Estimated	17,645	35,718	21,318	34,975	34,051	29,386	28,732	32,311	21,462	15,144	24,955	37,434	333,131
Private Supply													
Recorded	4,360	22,468	40,396	60,844	54,784	38,852	32,192	26,436	9,236	5,400	7,900	4,380	307,248
Estimated	6,141	31,645	56,896	85,696	77,161	54,721	45,341	37,234	13,008	7,606	11,127	6,169	432,744

	1987/88												Annual Total
	Oct/Nov	Nov/Dec	Dec/Jan	Jan/Feb	Feb/Mar	Mar/Apr	Apr/May	May/Jun	Jun/Jul	Jul/Aug	Aug/Sep	Sep/Oct	
NFC Own Supply													
Recorded	16,672	13,072	14,304	23,429	17,280	21,680	18,058	20,064	20,624	7,744	15,728	188,655	
Estimated	23,482	18,411	20,146	32,999	24,338	30,535	25,434	28,259	29,048	10,907	22,152	235,711	
Private Supply													
Recorded	560	12,128	45,072	27,632	48,416	64,592	36,544	15,346	9,232	3,312	2,992	255,826	
Estimated	789	17,082	63,482	38,918	68,192	76,890	51,470	21,614	13,003	4,665	4,214	360,318	

Source: Compilation of Thankot Checkpost records

Note: The first set of figures ("Recorded") is based on the actual stated load of a truck indicated in the dispatch letter deposited at the Thankot checkpost. On this basis, the average truck load of fuelwood comes to 1.42 chittas (90.9 quintals). However, most trucks are known to carry a heavier load. There is incentive to private truck drivers especially to carry more than the amount stated in their permits/letters. The second set of figures ("Estimated") is calculated on the assumption that the average truckload is, in fact, 2 chittas (128 quintals).

Table 4.9
Results of Thankot Monitoring by Study Team - Fuelwood

	---Trucks---		---Quintals---	
	Nov	April	Nov	April
NFC	58	57	7,424	7,296
Private	58	101	7,424	12,928
Totals	116	158	14,848	20,224

Source: Study Team Survey

Note: 1 truck load assumed to be 2 chattas = $2 \times 64 = 12.8$ quintals

2. Data from all sources is quite consistent with respect to NFC flows in 1986/87:
 - o The Forest Department gave NFC permits to remove 270,000 quintals (4,500 chattas) from the forests for its own use.
 - o Thankot records show 236,000 quintals of wood brought in via NFC.
 - o The study team's Thankot roadside monitoring showed between 250,000 and 280,000 quintals (based on seasonally-adjusted extrapolations of observed flows) for NFC.
 - o NFC's reported 1986/87 sales in Kathmandu were 264,963 quintals.

This consistency in NFC figures supports the finding that the discrepancy between reported and actual flows occurs on the 'private supply' side.

Table 4.10 reconciles the estimates of fuelwood demand with supply estimates from the various sources used in this study. Starting with Demand, the table deducts the supply estimates for each of the principle fuelwood flows addressed in this chapter, to obtain an Initial Gap between demand and supply. Because the demand estimates used are thought to be minimum levels, and given the reported and observed results from Thankot, the evidence strongly suggests that there are additional sources of supply. The quantitative evidence on this is reinforced by qualitative information from interviews. These potential sources are discussed below, and quantitative estimates of supplies from each are shown in the table:

Fuelwood from Household Compounds and Dung

A small proportion of the household energy consumption in the urban panchayats of the Valley can be attributed to two sources not considered to this point: fuelwood

Table 4.10

Reconciliation of Supply and Demand Estimates

	Households	Industry/ Commerce	Institutions
DEMAND	435,171	250,000	160,000
ALLOCATED SUPPLY			
Official NFC Depots	131,567		128,403
NFC Approved Depots	4,993		
Valley Backloads	45,000		
Terai Roadside	29,000		
Permit holders		160,000	
Dung (1%)	3,300		
Own Land (5%)	22,000		
Total Supply	235,860	160,000	128,403
DEMAND MINUS SUPPLY	199,311	90,000	31,597
TOTAL ESTIMATED DEMAND (from above)		845,171	
ALLOCATED SUPPLY (from above)		504,263	
INITIAL GAP		340,908	
"UNALLOCATED SUPPLY"			
Special Permits (1)	36,000		
Special Permits (2)	45,000		
Recycling of Permits	14,000		
Overloading	28,000		
Timber offcuts	80,000		
Total unallocated supply		203,000	
SUPPLY FROM UNKNOWN SOURCES		137,908	
(Initial gap minus "unallocated supply")			

collected from residents' own compounds, and dung. We did not systematically collect information on either source, but did conduct limited interviews in order to get an "informal sense" of their importance. Up to 5% of household demand for wood can potentially be satisfied through wood from compounds. Dung, we found, is used very little, if at all -- largely by the poorest households. We have given it a maximum of 1% of household demand. The sum of the two therefore accounts for at most a further 25,000 to 30,000 quintals.

Excess Loads

It is common practice for private suppliers to overload trucks. As seen in Section 4.1, drivers are paid incentives to select the best chattas of wood, thereby increasing the value of a truckload (a higher percent can be sold as timber) and the weight to volume ratio (greater density of wood). In addition, suppliers typically exceed the stated volume capacities for a truckload as a means of bringing in more wood than permits allow. Thankot officials do not actually verify how much wood is on a truck: that is, a permit for one-and-a-half chattas will allow a "truckload" to pass, even if it contains 20 or 30% more than the permit shows. Financial incentives systematically favor overloading, and operators report that the practice is common. The study's findings indicate that it is reasonable to assume excess loads for all incoming private trucks of at least 10%, as shown in **Table 4.10**.

Recycling of Permits

An obvious question which arises when looking for discrepancies between reported and estimated inflows of firewood is whether it is possible to "recycle" a permit by using it more than once. We have only anecdotal information to rely on, but this information, including specific case examples, confirms that it occurs. It is, however, uncertain and carries a reasonable risk of apprehension. Interviewees indicate that it cannot occur in more than 10% of the cases.

Timber Off-Cuts

Supplies from this source (as discussed in Section 4.1) account for a further 80,000 quintals.

Special Permits

Two sets of "special permits" appear to have been granted in 1986/87 to private fuelwood end-users (industry/commerce), for a total of 81,000 quintals.

***Unofficial* or *Unknown* Sources**

We make a clear distinction between "unofficial" (and potentially illegal) flows and "unknown" flows, which may result from permits granted but not officially reported. For purposes of the summary table, we label these "unknown" so as not to prejudice the issue.

We cannot account, through any reported or known flow, or any reasonable estimate of overloading or recycling of permits on those flows, for nearly 138,000 quintals. All of the qualitative evidence support the finding that this amount is supplied through unofficial channels.

4.4 Summary

An estimated 845,000 quintals of fuelwood was used in the urban areas of Kathmandu Valley in 1986/87. This figure is consistent with independent information from both the demand and supply side. Of this total, households used 51%, industry and commerce 30% and institutions 19%.

Only 31% of the demand is supplied directly by the Nepal Fuelwood Corporation. Another 19% is brought in under official permits granted to industry and commerce. The remaining 50% of demand is met through unofficial private channels or (for 9.5% of the total) through "Special Permits".

Seventy percent (70%) of the supply is effectively available at the higher free market price, and only 30% at official NFC prices. In terms of the three demand sectors (households, industry/commerce, institutions), institutions obtain the highest percent of their demand at low official prices (80%). Indeed, **public** institutions satisfy almost all of their needs at official prices. Industry and commerce obtains 64% of its needs through officially-granted permits, but not at the low NFC retail price. Finally, households get only 54% of their estimated needs at the subsidized official rate. There is no assurance that this subsidized supply goes to the poorest households.

Chapter 5

Timber Supply and Demand

This chapter covers three main topics: the flow of timber into the urban areas of Kathmandu Valley; the estimated demand for timber within the Valley; and a reconciliation of supply and demand. The flows of timber **supply** are covered in the greatest detail, for two reasons: the analysis of demand (in this and previous reports) is based on the techniques of survey and estimation, the methodology of which results can be presented briefly; the supply side analysis sheds more light on the role of public enterprises vs. that of the private sector, and cannot be understood without describing the specific incentives to which market intermediaries respond.

The remainder of this chapter is divided into three main sections:

- o Timber Flows from the Public Forests in the Terai
- o Estimates of Timber Demand
- o Reconciliation of Supply and Demand

5.1 Timber Flows from the Public Forests in the Terai

This section is structured in the same way as Section 4.2, which divides fuelwood flows into stages of the marketing process. There are eight stages in the timber marketing process, as for fuelwood. The differences relative to the fuelwood flows are worth noting, however: FCN supplies a smaller share of timber than NFC does of fuelwood; virtually all the supply entering the Kathmandu Valley is first transformed (sawn) in the Terai, the existence of private sawmills multiplies the potential sources of legal supply, and therefore increases the number of opportunities for diverted supply; wood collected as fuelwood is sometimes sold as timber (where its size and quality allow) because timber has a higher market value than fuelwood. Finally, it is useful to recall that all timber supplied from the Terai must pass through the Forest Department checkpoint at Thankot. The study examined official Thankot records and conducted its own monitoring to verify flows at this point.

The stages of the timber supply flow are as follows:

- o Source
- o Harvest and Delivery

- o Collection/Sales
- o Transformation
- o Transportation
- o Retail
- o Delivery
- o End use

SOURCE

Timber supply originates from the public forests of the Terai. These forests are legally owned by His Majesty's Government, and fall under the jurisdiction of the Forestry Department. The Timber Corporation of Nepal and the Forest Products Development are authorized to remove trees designated for felling by the Forest Department, against payment of a royalty. Two private furniture industries are also permitted to remove wood directly from the forest by the Forest Department, paying the same royalty rates as the public enterprises.

Forests of the Central Terai supply most of the timber for Kathmandu. The Kanchanpur and Kailali districts (in the Far Western Terai) are both too far and too inaccessible (poor road conditions) to be used for satisfying demand in Kathmandu.

Government decisions to fell trees are *ad hoc*, and do not reflect any formal forest management plan. Once a decision is made, the trees are counted and marked by the District Forest Controller's Office (DFCO). Two types of felling are the most common: clear felling of trees for agricultural purposes or development activities (road construction, electric transmission works, irrigation channels etc.); the selection of dead, dying or mature trees, which are then marked for felling. Lists of areas to be worked and trees to be felled are given to the field offices of TCN/FPDB by the concerned DFCO. In principle, the DFCO keeps records of the volume of trees to be felled, and reconciles these with the actual volume of wood removed. In practice, this is not done. The TCN and FPDB are generally granted allotments in different zones.

Royalties paid by TCN and FPDB are based on roundwood volume (cubic feet), and differ by species. Royalty rates for the same species are uniform throughout Nepal. Timber royalties to the Forest Department are considerably lower than either the replacement cost of the wood or than the residual value (market price minus costs of harvesting, processing, transportation and retailing). **Table 5.1** shows the royalty rates (per cft) for the major species used for timber in Nepal. It is estimated that 70-80 percent of timber removed from the Terai by TCN and FPDB consists of Sal (*Shorea robusta*). Ten to fifteen percent is comprised of Asna (*Terminalia tomentosa*) and the rest consists of Karma (*Adina cordifolia*), Jamun (*Eugenia jambolana*) and others.

Table 5.1
Stumpage Royalty Rate (Rs per cft)

Species	Royalty rate per cft
- Sal (<i>Shorea robusta</i>)	Rs 20
- Asna (<i>Terminalia tomentosa</i>)	Rs 11
- Jamun (<i>Eugenia jambolana</i>)	Rs 10
- Karma (<i>Adina kordifoliya</i>)	Rs 10
- Siris (<i>Albizia spp</i>)	Rs 8
- Sissoo (<i>Dalbegia sissbo</i>)	Rs 30

HARVEST/DELIVERY

Once an authorization to harvest trees is obtained by the local TNC/FPDB office, it employs its contractor to harvest trees in the areas designated for felling. There are two ways to arrange for a contractor:

- o The most prevalent form of contracting is for sealed offers to be provided by contractors to the local TCN/FPDB office for harvesting and delivery of specified volumes of wood. With approval from the central TCN/FPDB offices, contracts are awarded to the lowest bidders.
- o A much less used form of contracting is for an authorized committee to determine the price of a given harvesting/delivery operation and select a contractor for the task. The contractor then mobilizes the necessary labor and other resources, and is paid for actual volumes delivered.

Table 5.2 shows the typical breakdown of harvest and delivery costs for the Kailali District, in an area worked by the FPDB. Cost is composed of two elements: harvesting (cutting, logging, debarking) and delivery (transportation). Transport cost is a function of the distance covered.

Table 5.2
Cost of Harvest and Delivery

Activities	Cost per cft (Rs)
Cutting and logging	1.1
Debarking	1.3
Delivery	
0 - 03 km	4.1
4 - 08 km	5.5
9 - 12 km	6.0
13 - 16 km	8.5
17 - 20 km	9.5
Loading/unloading	1.1
Stacking/yarding	0.4
Total: Between Rs. 8.0 and Rs. 13.4 depending on distance	

The cost of harvest and delivery is not the same in each district, due to variations in accessibility, labor costs and distance of delivery points. **Table 5.3** shows typical harvest and delivery costs in seven additional districts.

Table 5.3
Typical Costs of Harvest and Delivery

Districts	Total Cost (per cft)
a. Bara, Parsa, Rautahat	7.5
b. Sarlahi, Mahottari (Sagarnath Project)	5.5
c. Udaypur	11.2
d. Rupandehi	6.2

Harvesting is comprised of tree felling, logging and debarking. The contractor employs a semi-skilled labor team to carry out the operation and he, too, pays the laborers on the basis of the volume of logs prepared. Axes and hand saws are used in harvesting. The contractor employs his own trucks or arranges for trucks to deliver logs to the depot. TCN, as opposed to FPDB, also uses its own trucks for some of the transportation of logs from the forest. Loading, unloading and stacking are also very labor intensive activities.

Each log prepared in the forest is measured for both length and girth (at the center). Logs are recorded by species. This accounting is done by DFCO staff and TCN/FPDB

record keepers, who put hammer marks on both ends of each log once it has been recorded. As a technical note, it should be mentioned that the volume of round wood (logs) is measured differently than for sawn wood. A simple calculation of length times width times thickness is an accurate measure of sawn wood volume. For round wood, the "Hoppus cubic foot" method is used. This method estimates the area of the circle whose circumference is the girth of the log, and multiplies this area by the length of the log. The acronym Hcft used in this section refers to this method of calculating the volume of round wood (see table of conversions).

After logs are marked and recorded, they are transported (usually in trucks) by contractors to a depot or directly to a sawmill. Based on a "dispatch certificate" prepared at exit from the forest, the volumes of incoming wood are reconciled with volumes on the certificate at the reception point (depot or sawmill). The dispatch certificate has four copies: one is retained by DFCO staff; one goes to TCN/FPDB staff at the collection site; two are taken by the truck driver, who submits one to the contractor for clearing his bill, and surrenders the last one at the delivery point, to verify the volume of wood dispatched.

Private furniture industries authorized to remove wood from the forest follow the same basic steps at this stage as the TCN/FPDB.

COLLECTION/SALES

Logs transported by private contractors or in TCN trucks are delivered to TCN or FPDB depots or sawmills, as specified in their contracts. There they are stacked by species and by length. FPDB sells only round wood, whereas TCN sells both logs and sawn timber. The important distinctions at this stage of the process, however, are not between TCN and FPDB flows, but between logs sold at depots (TCN or FPDB) vs. logs brought to sawmills (TCN and private industries) for processing before sale. The following discussion considers each of these categories separately.

Collection Depots (TCN and FPDB)

In 1986/87, TCN and FPDB shipments of round wood from the forest to their depots were of 1,872,000 and 1,530,000 Hcft, respectively. **Less than half of the wood brought to TCN depots is sold as round wood (717,997)**, and the rest is transhipped to the TCN sawmills. Many TCN depots are located near its sawmills. A typical sales depot of TCN/FPDB may have an area ranging from one to five hectares. Small wooden sheds accommodate junior staff and casual laborers. Most sales depots are located in the areas of public forest adjoining paved roads. Both households and local industries (mostly private sawmills and furniture factories) can buy logs from these depots.

With a "recommendation letter" from the district panchayat, a household can purchase up to 300 Hcft of round wood. Local industries are required to have a "recommendation letter" from the Ministry of Forestry and Soil Conservation, addressed to TCN/FPDB headquarters, which then authorizes the depot manager to sell a maximum of 5,000 Hcft to the holder of the letter. Timber depots in the Terai are therefore important points for both wholesaling and retailing activities. Two points should be noted with respect

to this retailing and wholesaling activity. First, there is no rational basis for the allocation of scarce supplies to consumers. The required letters of recommendation are obtained through a variety of formal and informal means which bear no necessary relationship to market principles of resource allocation. Second, for consumers who do obtain recommendation letters, prices are well below those in the open market (especially the urban markets of the Kathmandu Valley). For both reasons, a sizable portion of this timber is diverted to Kathmandu and other urban markets, rather than being used by the purchasers.

Prices charged to households and local industries are the same. Prices are a function of species, length and girth. Official prices are uniform at depots throughout the Terai. **Table 5.4** shows prices for various dimensions of Sal (*Shorea robusta*), which accounts for 80% of timber sales. Prices are set by the Boards of the TCN and FPDB. Household and industry purchasers pay an additional 20% sales tax over the prices shown in the table.

Table 5.4
Selling Price of Roundlogs (Sal) in Sales Depots of TCN/FPDB
(Sizes in feet. Prices in Rupees)

Length\	Girth				
	Below 3'	3'-4'	4'-5'	5'-6'	6' & above
3 - 6'	26.00	30.00	35.00	40.00	45.00
6 - 8'	-	36.00	41.00	46.00	51.00
8 - 11'	-	40.00	45.00	50.00	55.00
11 - 14'	-	45.00	50.00	55.00	60.00
14 - 17'	-	50.00	55.00	60.00	65.00
17' & above	-	55.00	60.00	65.00	70.00

Note: Sales tax of 20% is added to the consumers' purchase price.

Table 5.5 shows reported round wood sales of both TCN and FPDB for each of the five years from 1982/83 to 1986/87.

Table 5.5
Roundwood Sales of TCN/FPDB
(Hcft)

Fiscal year	TCN	FPDB	Total
1982/83	143,782	1,791,216	1,934,998
1983/84	256,816	936,998	1,193,814
1984/85	1,145,986	1,148,058	2,294,044
1985/86	894,177	1,055,568	1,949,745
1986/87	717,997	1,530,089	2,248,086

Source: TCN and FPDB

To this point, "overhead" costs incurred by the FPDB are estimated at Rs. 4 per Hcft. Overhead costs for TCN are considerably higher, at approximately Rs. 10 per Hcft. The higher TCN costs are related both to its relative management efficiency and to the impact of its unprofitable sawmilling operations on total overhead costs.

Sawmills (TCN and Private Industries)

TCN has its own sawmills throughout the Terai (see Chapter 3). Of the 42 TCN mills, only 22 are in working condition. For 1986/87, TCN reported approximately 1,156,000 Hcft to have been shipped to its sawmills. The 45,000 Hcft of timber harvested by private industry is brought directly to TCN or private sawmills by the industries themselves or by their contractors.

On average, both TCN and private industries are estimated to pay Rs. 4.50/Hcft for transport to the sawmills, and Rs. 1.60/Hcft for loading, unloading and yarding (stacking).

TRANSFORMATION

There are 24 private and 22 TCN operating sawmills in the Terai. Officially, there are three **original** sources of logs brought to them: TCN, FPDB and the private industries granted permits directly by the Forestry Department. There is a distinction to be made between the **original** source of the wood and the **immediate** source. The latter includes intermediaries who have purchased logs from TCN and FPDB depots, in principle for their own use. This category includes households, furniture makers and of, course, private sawmills themselves.

TCN brought 1,156,000 Hcft of logs to its sawmills, and produced 685,000 cft of sawn timber in 1986/87. This corresponds to about 50% of the installed capacity of its operating mills. In the same year, it sold 716,000 cft of sawn timber, the difference being explained as having come from old stock. The 2,248,000 Hcft of total TCN and FPDB (1986/87) sales of round wood shown in **Table 5.5** are processed mostly at private sawmills (a limited amount goes directly to small furniture-making shops). The 45,000 Hcft allotted directly

by the Forestry Department to private industries also goes to private sawmills, implying a total of approximately 2,300,000 Hcft of round wood sawn at private mills. The study was unable to obtain independent data on the output from private sawmills. From the volumes of logs reported going in, however, it is estimated that at least 1.6 to 1.8 cft of sawn timber was produced in private mills. Based on the above data, we conclude that 2.3 to 2.5 million cft of sawn timber was legally produced in the Terai area in 1986/87.

Table 5.6 shows the sawn timber sales for TCN and private sawmills. Column 2 of the table identifies the **source** of round logs for the sawn timber outputs shown in column 3.

Table 5.6
Total Volume (cft) of Timber Sold in 1986/87

Agency	Roundwood (Hcft)	Sawn (cft)
TCN sawn	-	716,543
Private		
1. Roundwood from TCN	717,997	502,598
2. Roundwood from FPDB	1,530,089	1,071,062
3. Permit holder	45,000	31,500
Total		2,321,703

At the transformation stage, there are two major cost categories to be considered: a government excise tax (on roundwood) and the cost of sawmilling. The average cost of sawmilling is Rs. 15/Hcft at TCN mills, and only Rs. 9/Hcft at private mills. The excise tax is the same for TCN and private mills, but varies by species. For Sal, it is Rs. 7/Hcft.

TRANSPORTATION

To this point, we have followed flows of logs from the forest to the sawmills, without differentiating between wood destined for Kathmandu or for other markets. The two flows separate after the sawmilling (transformation) stage.

TCN itself reports shipping 242,467 cft of sawn timber (34% of its reported sales) in its own trucks to Kathmandu Valley in 1986/87. A portion of the remaining 66% of timber TCN sells is purchased by private parties who obtain permits (from the Ministry of Forestry and Soil Conservation) to bring it to Kathmandu as well. Thankot records show 423,129 cft of timber brought in as having originated at TCN sawmills, implying that approximately 180,000 cft (423,000 minus the 242,000 shipped by TCN itself) of this comes in private trucks. It is reasonable to assume that these flows include diverted supplies from households and industries who purchase roundwood from FPDB and TCN depots in the Terai. Finally, a portion of the output of **private sawmills** in the Terai is also authorized for shipment of Kathmandu. Private furniture makers who are granted rights to buy timber

from TCN sawmills must pay a surcharge on the normal TCN sales prices of 40%, 30% and 20% in Jhapa, Lumbini Zone and Hetauda, respectively.

The TCN does not need a permit from the DFCO to bring sawnwood to Kathmandu or to other urban areas of Nepal. Nevertheless it prepares three copies of dispatch certificates when sending sawn timber from the TCN sawmills of the Terai to Kathmandu Valley: one is held by the dispatching mill depot, the second is given to the Thankot check post and the third is retained by the truck driver who subsequently surrenders it to the TCN sales depot in Kathmandu or Bhaktapur. These dispatch certificates contain the name of the driver, truck number, dispatch location, destination, dimensions and species of timber, and date of dispatch. Transport costs to Kathmandu for TCN timber are about Rs. 16 per cft. Loading and unloading is done by TCN's own laborers, at an average cost of Rs. 1.40/cft. Stacking wood by species and length costs a further Rs. 0.40 per cft.

Private parties bringing sawn wood to Kathmandu must arrange their own transport. Permit holders require a transport certificate from the concerned DFCO. The DFCO will issue such a permit based on the amount of round wood the permit holder has obtained from the Forestry Department. Each permit details the dimensions of logs, species, departure point, destination point, truck number and the date of issue of the permit. Over ten copies of the permit are given to the truck driver, who then submits one at each forest, police or army checkpost encountered en route. It takes at least a day to bring a truck load of timber from the Terai to Kathmandu.

Loading and unloading costs for private transport are estimated at Rs 1.25 per cft. Transport costs depend on distance between the place of origin and Kathmandu, but average roughly Rs 15 per cft. A typical truck carries 300 cft of sawn timber. Miscellaneous costs per truckload are approximately Rs 4 per cft.

RETAIL

TCN Retail in Kathmandu

There are two TCN sales depots in the Kathmandu Valley. One is located in Lalitpur to serve Kathmandu and Lalitpur households and the other one is in Bhaktapur. In 1986/87, 190,228 cft were sold from the Lalitpur Depot at Balkumari, and 52,239 cft were sold from the Bhaktapur Depot at Tinkune. Of these totals, 10% is sold to rural areas within Kathmandu Valley, 10% is sold to institutions for their construction needs, and roughly 80% (193,000 cft) is sold for households' construction requirements.

To buy timber, a household **must** have a detailed house plan approved by the Town Panchayat or by the appropriate Village Panchayat. An application, accompanied by such an improved plan, is submitted to the depot manager, who can then sell a maximum of 200 cft to that household. In practical terms, this means households can only purchase timber for house construction. For institutional construction, an application is submitted to the General Manager of TCN, who, after reviewing the case, can authorize the depot manager to supply the requested timber.

The retail price of **sawn timber** from TCN depots depends on the species, length, thickness and width of the timber. **Table 5.7** shows sawn timber prices in the Kathmandu Valley. The discrepancy between officially regulated and free market prices is even greater for timber than it is for fuelwood. TCN sells Sal for prices that range between Rs. 70 and 125 per cft. The market price for the same species and quality of timber is between Rs. 230 and 300 per cft. As a consequence, there is tremendous pressure on supplies available from TCN depots. Most households wait at least one month to obtain their 200 cft allotments. Often the full allotment can only be obtained in increments over a period of several months. The presence of odd-sized and broken pieces in an allotment can be the subject of prolonged negotiations with the depot manager. Those who succeed in obtaining an allocation of timber for house construction must either spend a great deal of time (for repeat visits) or money (for "buying access"), or must have influence with decision-makers. Timber purchased from TCN depots is routinely resold in the open market for three times the price. Some of the profits from this trade are used to finance further access to scarce and underpriced TCN supplies.

Private Retail in Kathmandu

Timber from both TCN and private sawmills in the Terai come to **private retail** markets in Kathmandu. The original sources of this wood include:

- o round wood harvested by TCN, sawn at TCN mills and sold to private industries
- o logs purchased by private sawmills from FPDB or TCN round wood sales depots in the Terai, and either shipped directly by the sawmills to Kathmandu or sold to private industries at the milling site
- o logs purchased from TCN or FPDB depots in the Terai by households or local furniture makers, and then diverted to the sawmills for eventual resale to Kathmandu.
- o diverted supply from offcuts and fuelwood

Thankot records show a total of 851,000 cft of sawn timber as having entered Kathmandu Valley through private parties in 1986/87. The way in which Thankot records are kept, timber brought in privately but originating at TCN sawmills is shown under the heading of TCN. An additional 182,000 cft of timber was brought in by private parties who purchased it from TCN sawmills. Therefore, the total recorded flows which entered private retail timber markets in Kathmandu amounted to approximately 1,033,000 cft in 1986/87 - over four times what was sold from TCN depots in the Valley. For Sal, prices for sawn timber are between Rs. 230 and 300 in private retail markets (see **Table 5.7**).

Table 5.7
Kathmandu Valley Retail Prices for Sawn Timber
 (Spring, 1988)
 Prices in Rupees per cft

Source	Type of Wood	Price Range
TCN Depot	Sal	70-124
Private Market	Sal	230-300
	Saj	90-150
	Haldu	90-150
	Aap	70-120

*Note: TCN prices include the additional transport charge levied but excludes sales taxes of 20%.
 Private market prices for Sal increased sharply in June/July of 1988.*

Private timber retailers in Kathmandu range in size from furniture factories having their own sawmills to very small shops. The cost of retailing is between Rs. 2 to Rs. 7 per cft, and retailers markups are in the order of Rs. 30/cft. A typical timber retail depot will have an area of one quarter hectare where timber is stocked. End users purchase finished products, order semi-finished door or window frames, or buy sawn wood and use their own carpenter on site to make construction frames and even furniture. Transport from the retail outlet to the end-use point -- arranged by the user -- normally costs Rs. 10 to Rs. 14 per cft, including loading and unloading.

Diverted Supply From Offcuts and Fuelwood

Twenty-five to thirty percent of the wood volume entering sawmills exits as offcuts (small or broken pieces, generally unsuitable for the normal uses of sawn timber). Most of this is used in the Terai itself, for furniture making, for construction of simple rural dwellings and as fuelwood. A portion comes to Kathmandu, both through TCN and private suppliers. It is generally sold (except for the best pieces which can be used for small furniture) at prices slightly above those of split fuelwood. TCN sells offcuts for Rs. 80 per quintal, and private retails for Rs. 200 per quintal.

Thankot records show 56,000 quintals of offcuts entering Kathmandu in 1986/87, 42,000 of which originated at TCN sawmills in the Terai, the rest coming from private sawmills. Interviews with retailers and suppliers suggest that roughly 80% of offcuts entering Kathmandu are sold as firewood, and 20% -- the equivalent of 53,000 cubic feet -- is sold as timber.

A second source of additional timber supply is from large, quality pieces of fuelwood diverted to the timber market. Through the process described in Chapter 4, private permit holders give strong financial incentives to their drivers to select the best fuelwood logs for a given truckload, both to maximize the weight to volume ratio and to increase the

proportion of wood which can be sold in the more lucrative timber market. Estimates of the percentage of permit holders' fuelwood supplies used for timber range from 10% to 40%. The Fuelwood Corporation of Nepal is less efficient at selecting the best logs than its private permit holders, and a smaller percentage of NFC logs -- approximately 5% -- are suitable for timber uses. Allowing for a high percent loss in transforming these fuelwood logs into sawn wood, we estimate that another 55,000 cft enters the private timber retail market in this way.

Finally, Thankot recorded 8,700 "loose pieces" entering in 1986/87. These are mostly door and window frames or pieces of furniture brought in as complementary loads. Assuming an average of 1 cft per piece, these loose pieces would add another 8,700 cft to private retail timber supply in the Kathmandu Valley.

Table 5.8 summarizes timber flows to the Kathmandu Valley, based on the supply data presented in Section 5.1.

Table 5.8
Total Timber Flow to the Kathmandu Valley
(Cft Sawn Equivalent)

Source	Volume	Percent
1. TCN Official	242,467	17.4
2. Private from TCN Mills	180,642	13.0
3. Industry Permit Holder	31,500	2.3
4. Private (roundwood from TCN/FPDB)	820,310	58.9
Subtotals	1,274,919	91.6
5. Diverted Supply		
Offcuts	58,000	3.8
From Fuelwood Logs	55,500	4.0
Loose Pieces	8,700	0.6
Subtotals	117,200	8.4
Totals	1,392,000	100.0

Source: Study Team estimates

This section compares reported supply information with three independent points of reference, in order to obtain a more refined estimate of actual timber flows. The discussion below is divided into four parts:

- o Demand Estimates
- o Thankot Check Post Records

- o Results of the Independent Thankot Monitoring
- o Reconciliation of Supply and Demand

5.2 Estimates of Timber Demand

Demand estimates

Per capita demand of timber

The Forestry Sector Master Plan estimates per capita demand for timber at 2.58 cft (roundwood) per year for all uses. Fifty eight percent of this is for housing. The rest is divided equally between household furniture, institutional construction and institutional furniture. This per capita demand estimate is based on several "global" assumptions applicable to Nepal as a whole rather than to just the urban areas of Kathmandu: (i) that construction of a house requires 283 cft of roundwood (ii) that houses will last an average of 40 years and (iii) that every 20 years another 141 cft of solid wood will be required for repairs. In urban areas, especially Kathmandu where wood is scarce, less wood is used per house. On the other hand, household furniture and institutional construction and furniture needs comprise a larger share of total timber demand than the rural areas. For these reasons, independently derived estimates, rather than those of the Master Plan, have been used for this study.

For household timber demand, the following assumptions are used: (i) that the average house has a plinth area of 1,000 square feet, requiring 100 cft of sawn wood (ii) that there is an average of 6.4 people per house (iii) that a house will last 40 years. This yields a per capita demand for household construction timber of 0.48 cft per year. For household furniture, it is assumed that each household (6.4 people) will have 50 cft of furniture which will last for 15 years, giving a per capita demand for household furniture of 0.56 cft per year.

The estimates of institutional construction and furniture requirements used in this study are dramatically different from those of the Forestry Master Plan. Kathmandu is the capital city of Nepal. It accommodates all the government and corporation offices of Nepal. Major educational institutions, hotels, foreign embassies and donor offices are also located in the city. According to the "Feasibility Study Report on Modern Furniture Industries in Kathmandu" published in 1983, total expenditure on furniture by these public and private institutions is about 1.6 times the furniture expenditures of households. This suggests per capita timber consumption for furniture by public and private institutions of about 0.9 cft per year. Finally, an equivalent amount is used by these institutions for construction. **Table 5.9** summarizes the per capita timber demand estimates for the urban areas of Kathmandu Valley by demand category.

Table 5.9
Per Capita Timber Demand in Kathmandu Valley Urban Areas
(cft/capita/year)

End Use	Volume (sawn wood)	Percent
1. Household construction	0.48	16.8
2. Household furniture	0.57	19.8
3. Offices/Schools/ Commercial Buildings	0.90	31.7
4. Offices/Schools/ Commercial Furniture	0.90	31.7
Total	2.85	100.0

Source: Study Team estimates

Population Estimates for Kathmandu Valley Urban Areas

The population figures used for estimating timber demand are the same as the numbers used in Chapter 4 for developing the demand estimate of fuelwood consumption.¹

Total Timber Demand

Based on per capita demand and population, Table 5.10 shows the estimated 1986/87 demand for timber in the urban areas of Kathmandu Valley.

¹ For reference, these are: Kathmandu, 300,754; Lalitpur, 94,338; Bhaktapur, 53,790. The total urban population in the Valley is put at 448,882 for 1986/87.

Table 5.10
Total Timber Demand in Kathmandu Valley Urban Areas
(Sawn Timber in cft)

	Demand
By Urban Area	
Kathmandu	858,051
Lalitpur	269,146
Bhaktapur	153,618
Total	1,280,660
By End Use	
Household Construction	215,464
Household Furniture	253,618
Offices/Schools/Commercial Construction	405,789
Offices/Schools/Commercial Furniture	405,789
Total	1,280,660

5.3 Reconciliation of Supply and Demand

Results From Thankot Checkpost

The official records at the Thankot checkpost show the following volumes of timber entering the Kathmandu Valley.

Table 5.11
Thankot Checkpost Figures
(Cft Sawn Wood Equivalent)

Source/Type	Cft
TCN	423,109
Private	851,810
Loose Pieces	8,700
Offcuts	53,000
Fuelwood	55,500
Total	1,392,119

Source: Forest Department Checkpost at Thankot

Notes: Figures for Loose Pieces assume each piece to be 1 cft. Figures for offcuts and fuelwood converted from original data in quintals - offcuts, 56,280 quintals, fuelwood, based on the estimated percent of incoming fuelwood logs sold as timber

Independent Thankot Monitoring

A survey team was constituted to monitor the flow of timber at Thankot during November and April, 1988. For timber our surveyors saw the following truck loads of timber coming in:

Table 5.12
Results of Thankot Monitoring

Type	April	May
Truckloads Monitored	386	270
Capacity per Truck (Avg cft)	300	300
Total Volume (cft)	115,800	81,000

Reported Supply

The reported supply of timber (**Table 5.8**) is 1,274,919 cft of sawnwood. Another 117,200cft comes from diverted supply, bringing the total supply coming to the Kathmandu Valley to about 1,350,000 cft. It is estimated that at least 10% of this total supply is used in rural areas of the Valley and other urban areas adjoining the Kathmandu Valley. This leaves 1,212,850 cft of sawn timber that is available and is used in Kathmandu Valley urban areas.

Reconciliation

The data on timber flows to the Valley from all sources confirm an estimate of approximately 1.2 million cft. **Table 5.12** compares the supply and demand estimates developed in this chapter. The discrepancy between reported supply and estimated demand is very small (5%). This stands in sharp contrast to the situation with respect to fuelwood. On the surface, this match between supply and demand figures would suggest that illegal flows are less important in the timber market. It should be noted, however, that nearly 75% of timber supply comes through private channels. This includes large volumes of wood which was brought 'unofficially' to sawmills in the Terai before being processed and shipped to Kathmandu.

The minor differences between supply and demand shown in **Table 5.13** falls within the margin of error of our estimates. They may also, in some part, be due to flows not captured in the analysis, all of which are thought to be quite small. These include:

- o Some timber may come in from adjoining areas of Kathmandu (i.e. Trisuli), without passing through Thankot.

Table 5.13
Comparison of Supply and Demand (cft)

	HH Construction	HH Furniture	Instit Construction	Instit Furniture	Total
Demand	215,464	253,618	405,789	405,789	1,280,660
Supply					
FCN Official	166,938	29,460	21,822	-	218,22
Priv Retail	15,811	153,154	383,967	376,273	929,207
Diverted	32,715	32,715	-	-	65,430
			Subtotal Supply		1,212,857
Unaccounted					67,803

Source: Study Team Estimates

- o Ready made furniture also comes to Kathmandu from the Terai. We do not have an exact accounting of this flow.

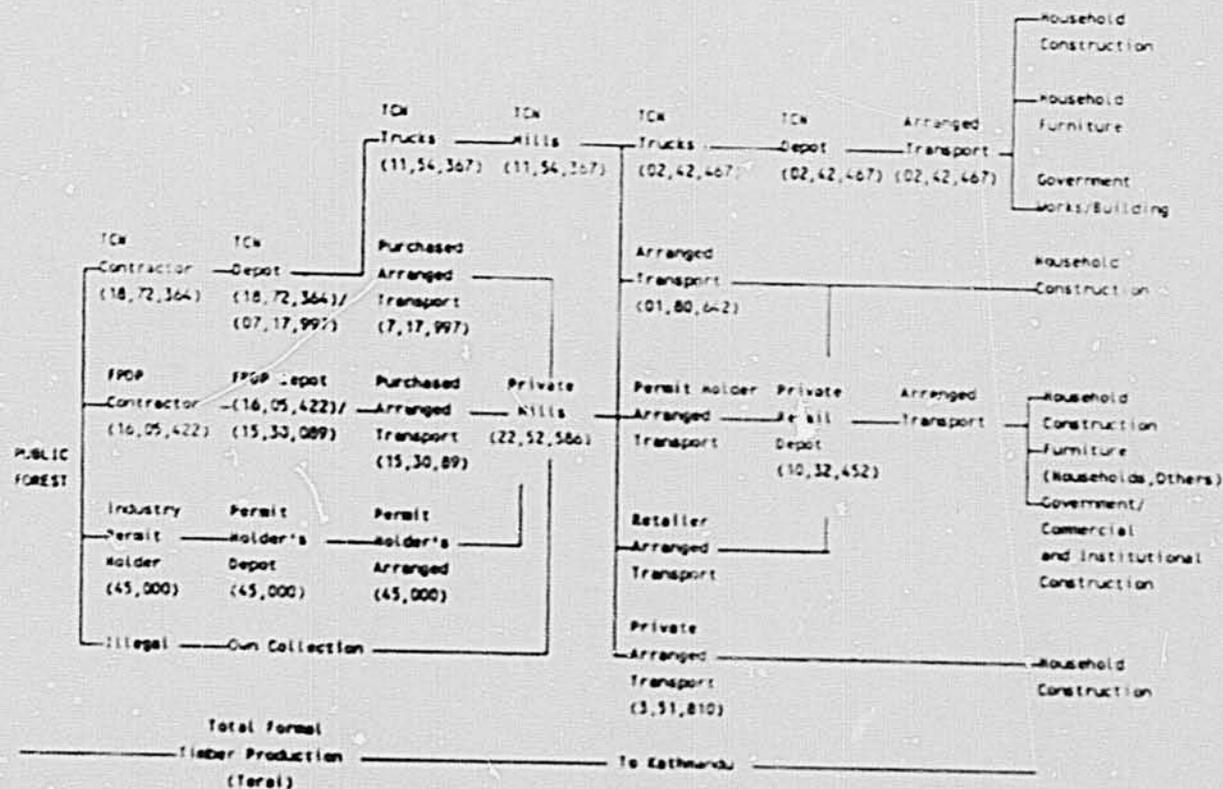
5.4 Summary

Figure 5.1 summarizes the timber flows described in this chapter.

TIMBER FLOW IN TERAI AND KATHMANDU (CFT)

THANKOT

SOURCE	HARVEST/ DELIVERY (ROUND TIMBER)	COLLECTION/ SALES (ROUND TIMBER)	TRANSPOR- TATION (ROUND TIMBER)	TRANSPOR- TATION (ROUND TIMBER)	RETAIL (SAW TIMBER)	DELIVERY (SAW TIMBER)	END USERS (SAW TIMBER)
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Timber Flow in Terai and Kathmandu (cft)

Figure 5.1

Chapter 6

Financial Flows

Chapters 4 and 5 estimate the physical flows of forest products into the urban areas of the Kathmandu Valley. This chapter investigates the associated revenue, cost and profit flows. In addition, the chapter carries out a benefit-cost analysis of village level production options. An understanding these financial flows provides the necessary link in moving from the current structure of the forest products market to a more sustainable long term natural resources management strategy in Nepal.

6.1 The Fuelwood Supply Chain

The four major chains identified in the fuelwood flows are:

- o NFC official flows
- o NFC permit holders
- o Terai roadside supplies
- o Valley backload supplies

In each chain, several intermediaries operate. For example, roadside supplies from the Terai (silent travellers) are collected by villagers along the major road axes, transported by a wide variety of actors, ranging from government officials and private citizens visiting the Terai to commercial truckers. The discussion below estimates the levels of profit at each stage, and highlights the intermediaries to whom the profits accrue.

NFC Official Flows

Table 6.1 breaks down financial costs in the marketing process (as described in Chapter 4) for official NFC flows. The second to last column shows the cost per kilogram to NFC for operations at that stage. The last column shows the cumulative cost of all previous stages plus the current stage. Most of the information contained in the table is based on official or collected data, converted to a per kilogram basis. For example, the royalty paid to the Forest Department by the NFC is Rs. 214 per chatta. At an average of 6.4 MT per chatta, this converts to approximately Rs. 0.033 per kg. Some information has been estimated based on interviews and review of financial operations information from the relevant actors.

In addition to the costs at each individual stage, we have applied the NFC overhead costs to the total, as shown in the last row of the table.

Table 6.1
Financial Costs and Returns on NFC Fuelwood Flows
All costs in Rupees

Stage	Type of Cost	Payment To/ Cost Incurred By	Cost/Kg	Cumulative Cost/Kg
SOURCE	Royalty	Forest Dept	214	0.033
HARVEST	Harvest Labor	NFC Contractor	0.125	0.158
DELIVERY	Transport and Unload at Depot			
COLLECTION	Storage Guard Labor	NFC Seasonal Staff	0.002	0.160
TRANSPORT	Loading at Depot Transport to Kathmandu Local & Transp Taxes (Paid by Contractor)	NFC Transport Contractor	0.425	0.585
WHOLESALE/ DISTRIBUTION	Weighing/ Dispatching Staff Weighing Bridge	NFC Staff Equipment	0.002	0.588
RETAIL	Delivery Unloading Retailing Costs	(In Price of Transport) NFC Staff	0.000 0.005 0.030	0.588 0.593 0.623
NFC OVERHEAD COSTS	Central Stal; Offices Communic Furniture Stationery Printing Etc	3,411,404	0.129	0.752
TOTAL COSTS FOR NFC SUPPLY PER KG			0.752	
NFC SALES PRICE PER KG - INSTITUTIONS			0.700	
NFC SALES PRICE PER KG - HOUSEHOLDS			0.550	
NET PROFIT - INSTITUTIONS			-0.052	
NET PROFIT - HOUSEHOLDS			-0.202	

Figure 6.1 shows the proportional share of each cost category in total estimated costs. The largest cost item is for transport from the Terai to Kathmandu (Rs. 0.43 - 56%). This is paid by the NFC to transport contractors for "door-to-door" service from the forest collection points to the retail depots. It includes loading and transport and local taxes, but not the cost of unloading. Data from private NFC permit holders suggests that the private sector has 25% lower costs of transportation than does the NFC (see **Table 6.2** below).

The second largest cost items are the NFC overhead costs (Rs. 0.13/kg - 17%) and the harvest/delivery process (Rs. 0.13/kg - 16.6%). Here again, private sector costs are found to be somewhat lower (**Table 6.2**) than those incurred by the NFC.

With respect to the overall cost of fuelwood supply vs. the prices collected from consumers, several important points can be noted:

- o The total NFC financial cost of supply per kilogram is estimated at Rs. 0.75. The sales price to institutions is Rs. 0.70/kg. Assuming some margin for error in our cost estimates, the NFC appears to approximately break even or run a small to moderate loss on institutional sales.
- o NFC loses a substantial amount of money on wood sold to households. It is sold at Rs. 0.55/kg, leading to a loss of about Rs. 0.20/kg.
- o These transaction losses in sales to both institutions and households occur despite the fact that the NFC pays royalties to the Forest Department which are lower than what the private sector must pay and well below the long-term costs of regenerating the forest. Private permit holders, for example, pay between Rs. 2,500 and Rs. 5,400 per chatta as a royalty to the NFC -- 10 to 20 times what the NFC pays to the Forest Department.

Two questions emerge from this analysis: first, what is the subsidy implicit in this cost structure from the fact that the NFC pays below sustainable costs for royalties? Second, how are these transactions losses consistent with the fact that the NFC has shown a financial surplus in recent years?

NFC permit holders pay an average of approximately Rs. 3,500 per chatta as a royalty for firewood. If the NFC had to pay similar royalties (which are thought to be fairly close to the actual cost of forest regeneration), then operating losses on firewood transactions would be much higher, as shown in **Table 6.2**.

Figure 6.1

Cost Breakdown of NFC Fuelwood
Royalty (4.4%)

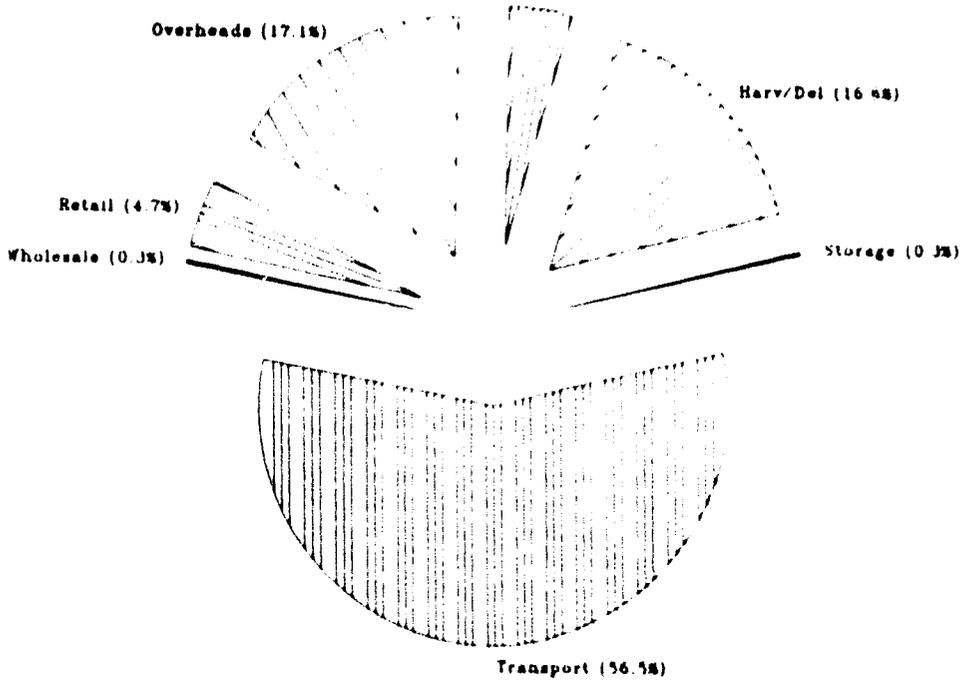


Table 6.2
Actual and Implicit NFC Operating Losses

	Actual	If Royalties Equal Regeneration Cost
Royalties Per Chatta	214	3,500
Royalties per Kg	.033	.55
Other Costs (as per Table 6.1)	.72	.72
Total Costs per kg (Rs.)	.75	1.27
Loss on Institutions Sales (Price = 0.70)	.05	.57
Loss on Households Sales (Price = 0.55)	.20	.72
Implied losses on total 1986 sales (Rs)	3,380,000	14,930,000

That is, operating losses per kilogram would be over nine times more on sales to institutions and over three times higher on sales to households if the NFC paid for something approaching the full regeneration cost of wood. Based on the 264,000 quintals of the NFC sales shown in Chapter 4, with sales of 131,500 quintals to institutions, 128,400 quintals to households and about 5,000 quintals to private retailers, this amounts to a total **implicit** subsidy of approximately Rs. 15 million per year on direct sales, as shown above.

Despite these substantial implied losses, we know that the NFC has showed an operating surplus in recent years. This surplus comes from the markup NFC charges on permits to industry and commerce: it pays a Forest Department royalty of Rs. 500/chatta and charges an average of Rs. 3,500 per chatta to permit holders. For the 160,000 quintals (2,500 chattas) of permits granted in 1986/87, this corresponds to a profit of Rs. 7.5 million, which more than offsets the estimated operating losses of Rs. 3.4 million on direct sales shown in the above table.

In economic terms, society should collect from those who exploit the forest a sufficient royalty (stumpage fee) to replace that forest. Private permit holders are indeed paying sufficient royalties, but they are paying them to the NFC rather than to the agency which is responsible for maintaining the forest. Rather than paying for forest management, these revenues subsidize those who purchase directly from NFC (institutions, households). About 50% of this subsidy therefore goes to **public institutions** (army, police, etc.) who purchased 131,000 quintals from the NFC in 1986. Because wood sold directly by the NFC at the official household price of Rs. 0.55/kg is so hard to get, we have seen that a fair proportion of it in fact goes to those with special access or privilege. Therefore, there is a powerful cross-subsidy at work in which private consumers subsidize the public sector and those with privileged access to it.

NFC Permit Holders

Table 6.3 repeats the same cost categories as in **Table 6.1** for the NFC private permit holders. This table is best understood in terms of how it differs from **Table 6.1**.

The largest single cost items for permit holders is the royalty paid to the NFC (Rs. 0.55 - 42%). This is over 14 times what the NFC pays as a royalty for wood it markets directly. In general, other costs for private permit holders appear to be between 20% and 30% below NFC costs, based largely on more efficient and cost-conscious operations.

Total costs, given the high royalty, are about 60% higher than the NFC's equivalent financial cost. There is, however, an enormous difference on the price side. The majority of wood to private permit holders is destined for their own consumption. In the absence of obtaining permits, they would have to buy fuelwood on the open market for between Rs. 1.50 and 1.60 (depending on the quantity and terms of the purchase). Therefore, permit holders save between Rs. 0.28 and 0.38 per kilogram relative to what they would pay for purchases on the open market.

Finally, permit holders can increase these profit margins substantially in several ways:

- o By increasing the amount of wood taken out under a given quantity permit.
- o By getting more weight per unit of volume through selecting the "best chattas" (with larger, heavier pieces).
- o By selling the larger logs as timber rather than fuelwood.

If we assume a 10% surplus from the combined impact of the first two items, and allow for the fact that increased quantities of wood thereby obtained do not result in increased royalty fees, profits per kilogram for which permits are obtained would rise to about Rs. 0.46/kg.

The third item -- selecting the best chattas with logs of 3-5 ft length which can be sold as timber -- is especially profitable. We found that approximately 20% of the fuelwood obtained by permit holders is sold as timber. Costs remain unchanged because the royalty fee and transport/handling cost structure per kg. is the same. Timber prices for small logs are, however, about Rs. 2.3 per kg vs Rs. 1.60 for firewood, yielding a profit of Rs. 1.229/kg.

In 1986, the NFC gave permits for 160,000 quintals of fuelwood to private industry and commerce. Based on this number, we can estimate overall financial flows in this supply chain as follows:

Table 6.3
Costs and Profits in Supply Chain
Industry/Commerce NFC Permit Holders
All costs in Rupees

Stage	Type of Cost	Payment To/ Cost Incurred By		Cost/Kg	Cumulative Cost/Kg
SOURCE	Royalty	NFC	3500	0.547	0.547
HARVEST/ DELIVERY	Harvest Labor Transport and Unload at Depot	Permit Holder	700	0.109	0.656
COLLECTION	Storage Guard Labor	Permit Holder		0.002	0.658
TRANSPORT	Loading at Depot Transport to Kathmandu Local & Transp Taxes (Paid by Contractor)	Permit Holders Own Transport	0.44	0.331	0.989
WHOLESALE/ DISTRIBUTION	No Wholesale Stop	--		0.000	0.989
RETAIL	Delivery	(In Price of Transport)		0.000	0.989
	Unloading	Permit Holder Staff		0.030	1.019
	Retailing Costs			0.021	1.040
	Splitting Costs			0.150	1.190
OVERHEAD COSTS	Arranging Permits Unofficial Payments etc	700.000		0.109	1.300
FUELWOOD OF SUPPLY COST/KG				1.300	
PERMIT HOLDERS SALES PRICE - FUELWOOD				1.600	
PROFIT/KG FUELWOOD				0.300	
TIMBER COST PER KG				1.150	
PERMIT HOLDERS SALES PRICE - TIMBER				2.300	
PROFIT/KG TIMBER				1.150	

Table 6.4
Estimated Financial Flows: Fuelwood to Permit Holders

(1) Total permits granted (kgs)	16,000,000
(2) Royalties paid to NFC (kgs x 0.47)	7,504,000
(3) Actual amount of wood removed ((1) + 10%)	17,600,000
(4) Transport/handling costs ((3) x 0.75)	13,235,200
(5) Market value of quantity used as fuelwood ((3) x 80% x Rs. 1.60)	22,528,000
(6) Market value of quantity sold as timber ((3) x 20% x Rs. 2.30)	8,096,000
(7) Total revenues ((5) + (6))	30,624,000
(8) Total costs ((2) + (4))	20,739,200
(9) Total profits ((7) - (8))	9,884,800
(10) Profits per kg of permits obtained ((9)/(1))	Rs. 0.62
(11) Profit as percentage of costs ((10)/(8))	47.6%

In short, it is very profitable to obtain a permit from the NFC for fuelwood, and there is little market risk involved.

Terai Roadside Supplies

Because the Terai roadside supplies and Valley backload supplies are both unofficial flows, we have taken a different approach to estimating costs and markups than was used in the two preceding sections. For the same reason, the data are more speculative and the margins of error greater. In both cases, our approach is centered around the recognition that illegal wood cutting is an important source of **supplemental income** for villagers who engage in it. The risk of being caught (and the attendant fines) must also be factored in to villagers' decision and motivation processes. Finally, this marketing chain is based on the actions of thousands of individual villagers, so our analysis uses what is thought to be a representative case of an individual villager who spends a high proportion of his/her free time on firewood supply to Kathmandu.

The assumptions used are based on interviews with wood cutters and discussions with third parties, but not on any systematic survey of wood cutters.

For illegal roadside supplies from the Terai, we assume the typical villager engages in wood cutting for 8 months of the year (excluding the peak agricultural season), spending roughly every other day (8-10 hours in a work day) in wood collection or transport. In about 4 hours, an individual can cut or collect one headload of firewood weighing approximately 40 kgs. Transport from the forest to the roadside is estimated at 1 hour. The "opportunity cost" wage rate (that is, an estimate of how the individual values his/her time given alternative opportunities) is put at Rs. 12.00 per day.

Based on the above inputs, we obtain a total of about 195 headloads (7,780 kgs) collected and marketed in a year. The annual labor cost of this collection is approximately Rs. 1,460.

When a villager is caught by authorities, the wood is confiscated (thereby lowering revenues), and a fine is imposed (increasing costs). Typically, the fine is equal to the **market value** of the wood confiscated. The retail market value is taken at Rs. 1.50/kg, or about Rs. 60 per headload, even though the villager himself sells wood for much less to roadside intermediaries. Our interviews showed that even when caught, villagers are not always fined, so we put the likelihood of paying a fine when caught at 50%.

Table 6.5 summarizes the findings using the above assumptions. It is clear that illegal wood cutting not only provides a daily wage well in excess of the best estimated opportunity cost wage, it also provides a large volume of potential annual income in an environment in which alternative sources of steady cash income are limited. A villager, if our assumptions are correct, can earn supplemental income of nearly Rs. 2,000 per year (line (14)), which is roughly \$100. Because this activity need not be limited to the primary agricultural production workers in a family, it can take place without jeopardizing the base agricultural income. Given the volume of market demand, there does not appear to be any limitation on the number of family members who can be involved in wood cutting, increasing the potential supplemental cash income to a given family further.

Table 6.5
Revenues and Costs
Illegal Terai Roadside Wood Cutting

(1) Days spent cutting/transporting	122
(2) "Opportunity Cost" wage (Rs./day)	12.00
(3) Labor cost (Rs./yr)	1458.00
(4) Risk of being caught	20%
(5) Risk of being fined if caught	50%
(6) Amount of penalty if fined (at Rs./headload)	60.00
(7) Headloads cut, transported & sold per year	194
(8) Expected annual fines ((7) x (4) x (5) x (6))	1166.00
(9) Total costs ((3) + (8))	2624.00
(10) Headloads confiscated ((7) x (4))	39
(11) Headloads marketed	155
(12) Roadside price - Rs./headload	20.00
(13) Annual revenue ((11) x (12))	3100.00
(14) Total cash income ((13)-(8))	1934.00
(15) Implied daily wage ((14)/(1))	15.90

The above table incorporates an important finding which links it to the next step in this marketing chain: we found that the roadside price for wood is approximately one third of the retail market price in Kathmandu. Who earns the surplus?

The largest share of the surplus accrues to the transporter. Bringing in silent travellers does not increase the cost of transport for a vehicle which is passing that way in any case. Some transporters (civil servants, travellers, etc.) appear to use the wood for their own consumption. In that case, they forego an expense of Rs. 1.50/kg for open market purchases, reaping the surplus of Rs. 1.00/kg directly. Others, including drivers of commercial vehicles and those who make the journey to the Terai on a regular basis, sell the wood to retailers at a price between Rs. 1.00 and Rs. 1.20 per kilogram -- earning a profit of 50% to 60% while still leaving sufficient room for a sizable retailer's markup.

We have earlier estimated the total volume of this flow to be in the order of 24,000 quintals per year (2.4 million kgs). If the estimates in **Table 6.5** are in the correct range, this implies that between 500 and 1,000 villagers earn about Rs. 1.2 million in supplemental income from this source. It is important to note that the actual number of villagers involved and volume of wood sold on the roadside is much higher, because wood is not sold only to traffic coming in to Kathmandu. Outside every major city and large town, there is a thriving roadside wood trade, including, of course, cross-border traffic with India.

Valley Backload Supply

The approach used in analyzing backload supplies from within the Valley is similar to that in the preceding section. But there are very important differences in the revenue earned by villagers.

As before, we assume wood cutting goes on 8 months a year, every other day. Backload/headload weight is taken at an average of 40 kgs. The risks of being caught and of being fined, as well as the average value of the fine, remain unchanged (20%, 50% and Rs. 60, respectively). Survey and economic data suggest that the "opportunity cost" wage within the Valley is considerably higher than in the Terai. We have used an estimate of Rs. 25/day.

Unlike the situation in the Terai, most villagers transport backloads of wood directly to the retail market. This gives rise to two significant differences: first, more time is spent transporting wood (4 hours vs 1 hour), lowering the number of backloads which can be cut and transported per day; second, villagers themselves receive close to the full retail market price: there are no middlemen.

Table 6.6 shows the analysis of Valley backload supplies. Except for the points raised above, all other assumptions are identical to those for **Table 6.5**.

Table 6.6
Revenues and Costs
Illegal Valley Backload Supply

(1) Days spent cutting/transporting	122
(2) "Opportunity Cost" wage (Rs./day)	25.00
(3) Labor cost (Rs./yr)	3050.00
(4) Risk of being caught	20%
(5) Risk of being fined if caught	50%
(6) Amount of penalty if fined (at Rs./headload)	60.00
(7) Headloads cut, transported & sold per year	122
(8) Expected annual fines ((7) x (4) x (5) x (6))	732.00
(9) Total costs ((3) + (8))	3782.00
(10) Headloads confiscated ((7) x (4))	24
(11) Headloads marketed	98
(12) Sales - Rs./headload	60.00
(13) Annual revenue ((11) x (12))	5880.00
(14) Total cash income ((13)-(8))	5148.00
(15) Implied daily wage ((14):(1))	42.20

Valley backload supplies appear to be even more profitable (relative to the opportunity cost wage) than the Terai roadside supplies. However, there is a natural limit to wood from this source. Supplies in the close proximity of urban areas are dwindling, and this will show up in terms of increasing time and distance for transport. Subject to this caveat, this supply chain (from which we have estimated 30,000 quintals (3 million kgs) of incoming firewood) provides nearly Rs. 4.5 million of cash revenue to between 800 to 2,000 villagers around the urban panchayats.

6.2 The Timber Supply Chain

TCN Supplies

Available information on the costs of TCN supplies is not sufficiently reliable to serve as the basis for evaluating this flow. Table 6.7 shows these costs and revenues, based on available information. It suggests that TCN comes close to covering its transactions costs in timber sales. This does not appear credible for two reasons: first, TCN is known to run very large annual deficits; second, many of the line item costs shown in Table 6.7 are lower than equivalent costs for the private sector (Table 6.8).

In particular, we feel that the sawmilling costs are seriously underestimated. At a minimum, TCN's sawmilling operations cost 10-15% more than equivalent costs at private

Table 6.7

Financial Costs and Returns of TCN Timber Supply to Kathmandu
All costs in Rupees per cft

Cost of Production			
1	Cost of round logs at TCN Terai depot	40 00	
2	Cost of sawn timber at TCN sawmills (including adjustment for wastage in milling)	43 00	
	Subtotal Through Milling	83 00	
3	Excise duty to FMO	7 00	
4	TCN Terai offices overhead	4 00	
5	Transport to Kathmandu	17 00	
6	Stocking and Kathmandu retail and overhead costs	4 50	
	Total Costs at Kathmandu Retail Depot	Rs	115 50 cft
Sales Prices			
	On average timber size (10ft x birches x birches)	106 00	
	On highest price timber	123 00	
Net Profits			
	On average timber size (loss)	Rs	-9 50 cft
	On highest price timber	Rs	7 50 cft

sawmills. To this must be added the fact that the full-cost of TCN's sawmills would include the facts that (a) half the mills lie idle and (b) there is low capacity utilization at the functioning mills. **Table 6.7a** shows "adjusted" TCN costs based on the team's judgement, rather than on reported information.

Private Sawmills

Table 6.8 shows the financial flows in timber supplied by private sawmills purchasing roundlogs from TCN. The principal differences with respect to TCN are the higher costs of obtaining logs (line 1), "miscellaneous expenses for arranging purchases from TCN" (line 2)¹ and the much higher retail sales prices. The net profit for private sawmills, given the strong demand for timber, is 36% of sales revenue and 56% of costs.

Industry Permit Holders

Table 6.9 shows the financial flows with respect to timber supplied through industry permit holders (who obtain permits directly from the Forest Department). The table indicates that profits for this flow are nearly 57% of total sales revenue.

6.3 Financial Analysis of Alternative Supply Options

The potential for increasing wood supply within the Valley from private production is of interest to both policy makers and farmers. From a policy standpoint, there are three principal advantages:

- o Given dwindling supply and increasing wood transport distances within the Valley, increasing supply can only come, over time, through increased production rather than through accelerated exploitation of existing forests.
- o Sustained resource management is necessarily a decentralized process, requiring management by local populations. The most recent Master Plan policy paper (December 1988) clearly places emphasis on farmer-led small scale production as one of the principal options to be considered over the next twenty years.²
- o There are economic advantages to increasing production within the Valley: the sharply reduced transport cost (vs. wood from the Terai) can make Valley production competitive with exploitation of existing Terai forests; increased production is one of the available means of making supply more sustainable.

¹ These are, essentially, costs paid to intermediaries in order to gain access to the limited supplies of TCN wood.

² See Chapter 7, Section 7.2 for discussion of this policy paper.

Table 6.7a
Financial Costs and Returns of TCN Timber Supply to Kathmandu
Adjusted to Reflect Higher Sawmilling Costs
All costs in Rupees per cft

Cost of Production			
1	Cost of round logs at TCN Terai depot	40 00	
2	Cost of sawn timber at TCN sawmills (including adjustment for wastage in milling)	53 30	
	Subtotal Through Milling	93 30	
3	Excise duty to FMOs	7 00	
4	TCN Terai offices overhead	4 00	
5	Transport to Kathmandu	26 00	
6	Stacking and Kathmandu retail and overhead costs	4 50	
	Total Costs at Kathmandu Retail Depot	Rs	134 80 /cft
Sales Prices			
	On average timber size (10ft x 3inches x 6inches)	106 00	
	On highest price timber	123 00	
Net Profits			
	On average timber size (loss)	Rs	-28 80 /cft
	On highest price timber	Rs	-11 80 /cft

Table 6.8
Financial Costs and Returns of Private Sawmill Timber Supply
All costs in Rupees per cft

Cost of Production		
1	Cost of round logs from F&N	60 00
2	Miscellaneous expenses for arranging purchases from F&N	22 00
3	Cost of sawn timber at sawmills (including adjustment for wastage in milling)	41 00
Subtotal Through Milling		123 00
4	Excise duty to FIMG	7 00
5	Transport to Kathmandu	20 00
6	Stocking and retail costs	10 00
Total Costs at Kathmandu Retail Depot		Rs 160 00 cft
Average Sales Price (May 1988)		250 00
Net Profit		Rs 90 00 cft

Table 6 9
Financial Costs and Returns for Timber
Industry Permit Holders (Forest Department Permits)

All costs in Rupees per cft

Cost of Production	
1 Cost of round logs (royalty, harvesting, collection, etc.)	45
2 Cost when converted to timber (including wastage)	29
Subtotal Through Milling	74
3 Excise duty	7
4 Transportation to Kathmandu	20
5 Stocking and retailing costs	7
Total Costs	Rs 108 /cft
Average Sales Price (May 1988)	250
Net Profit	Rs 142 /cft

For farmers within the Valley, there is an opportunity for increased and relatively stable cash income. However, it must be noted that this incentive must compete with alternative uses of their time, including, for farmers in the closer-in areas, illegal wood cutting as it now occurs.

We have analyzed a ten hectare plantation producing joint products: poles, fuelwood, fodder and grasses. Our analysis of single product plantations producing fuelwood only shows this option to be non-viable, and has therefore not been shown here.

Table 6.10 shows the financial analysis of this plantation. Cost and benefits are evaluated over a twenty year production cycle. Input assumptions (wage rates, prices, etc.) are consistent with those used by the Forestry Master Plan and upcoming forestry development projects for the Valley. All other cost and revenue projections are shown in the table. Costs and prices are in real terms.

We obtain an Internal Rate of Return (IRR) for the project of 17.5%. This result indicates that the investment is viable and may be attractive to some farmers. However, the return is relatively low given the risks involved and the front-end investment requirements. These disadvantages are somewhat offset by the following:

- o The rate of return calculated in **Table 6.10** factors in the cost of **farmers' labor time**, which is valued at the same "opportunity cost" wage used in earlier sections of this chapter. From a villager's perspective, however, access to relatively stable **cash income** is an important incentive. Rather than considering labor as a cost, farmers implementing the project may consider the wage component as a source of supplemental cash income which increases the attractiveness of the project.
- o The key sensitivity variables over the next twenty years are the **relative prices** of forest products, especially fuelwood and timber. As we have seen, official NFC and TCN supplies have not kept pace with demand, which continues to grow. Free market retail prices have risen dramatically from one year to the next. Master Plan and other long perspective projections suggest that even current levels of supply from the Terai may not be sustainable. Therefore, there is a strong case to be made for the argument that forest product prices will rise, in real terms, much faster than we have projected. Particularly to the extent that this occurs in the earlier years, it would substantially increase the rate of return.

The above considerations notwithstanding, **farmer perceptions** of how profitable an investment is likely to be will almost completely determine if it is undertaken. It may be unlikely that farmers will make complex calculations as to the projected change in relative

Table 6.10
Village Private Plantation
Internal Rate of Return Calculation

JOINT PRODUCTS
10 HAS

All figures in Rupees.

Activity/Yr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
INCREMENTAL COSTS																				
Equipment & Tools	280																			
Nursery Tools	180																			
Plantation Tools	100																			
Seedling Production	17335																			
Nursery Construction	1585																			
Nursery Operation	15000																			
Nursery Maintenance	750																			
Silvicultural operations																				
Survey	750																			
Site Cleaning	750																			
Pitting	12000																			
Seedling																				
Transportation	1000																			
Planting	5750																			
Casualty Replacement		5225																		
Weeding	6375	6375																		
Materials	4716	450																		
Nursery Construction	216																			
Polypot	4500	450																		
Maintenance	9125	9125	9125	9125	9125	913	913	913	913	913	917	913	913	913	913	913	913	913	913	913
Other Costs	30000	15250	15738	16348	18111	20832	25071	28914	27359	25858	26657	28029	29494	31171	124945	24827	25986	26078	27358	187146
Harvesting Costs (fuelwood & poles)			168	378	641	1124	2583	3906	3371	2510	3129	3601	4106	4683	36697	2499	2898	2930	3370	58458
Harvesting Costs (grass/fodder)		5250	5250	5250	5250	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048	6048
Ropeway																				
Transportation	3000				1000					1000										
Tractor Transport (fuelwood & poles)			320	720	1220	2140	4920	7440	6420	4780	5960	6860	7820	8920	69680	4760	5520	5580	6420	111120
Tractor Transport (grass/fodder)		10000	10000	10000	10000	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250	11250
TOTAL																				
INCREMENTAL COST	88081	36425	24663	25473	27236	21745	25984	29827	28272	26771	27570	28942	30407	32084	125858	25740	26899	26991	28271	188059
INCREMENTAL REVENUE																				
Fuelwood			2400	5400	9150	16050	36900	55800	48150	35850	44700	51450	58650	66900	445350	35700	41400	41850	48150	749400
Poles/Timber															26162					40640
Grass and Fodder		9000	9000	9000	9000	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520	11520
TOTAL																				
INCREMENTAL REVENUE	0	9000	11400	14400	18150	27570	48420	67320	59670	47370	56720	62970	70170	78420	483032	47220	52920	53370	59670	801560
NET INCREMENTAL REVENUE	-88081	-27425	-13463	-11073	-9086	5826	22437	37494	31399	20600	29651	34029	39764	46337	357175	21481	26022	26380	31400	613502
IRR	17.11%																			
NPV	168496																			

prices of forest products. The role of the public sector in "selling" the concept to participants, and in sharing the risks that expectations will not be realized, should not be minimized, as has been shown in successful small-scale forestry projects throughout the world. The emphasis placed in the December, 1988 Master Plan Policy Paper on providing incentives for small farmer forestry production (including through training, extension support and research) is an important step in the right direction.

Chapter 7

Conclusions and Recommendations

This report has addressed the physical and financial flows within the forest products marketing system in the context of its institutional arrangements. Chapters 2 through 6 draw a number of specific conclusions about the functioning of the forest products market. This chapter presents overall conclusions of the study, focussing on a limited set of issues which affect the potential future rôles of public enterprises.

7.1 Principal Results of the Study

The study has undertaken a particularly exhaustive review of the forest products marketing system in the urban areas of the Kathmandu Valley. It has gathered original data through roadside monitoring at Thankot, along incoming roads from rural areas within the Valley and through surveys of private sawmills, private fuelwood depots, furniture factories, tea and sweet shops and restaurants. In addition, it has been able to compile an important body of data which has never before been compiled: the daily records of incoming fuelwood, timber and wood products maintained at the Forestry Department checkpost at Thankot.

For the most part, it has been an effort based on detective work. No single piece of evidence provides an accurate picture of the whole. Official records often understate and sometimes misstate the actual workings of the market. The complex web of incentives created by partial controls often run counter to intended policies. The study has therefore relied on four principal and relatively independent sources of quantitative data: official Thankot records, roadside monitoring carried out by the study team, reported official supplies and independent estimates of demand based on population and evidence from both household and industry/commerce surveys.

The most important information resource, however, has been access to knowledgeable individuals -- including illegal operators -- who have been key actors in forest products marketing for several years. Consistently throughout the study, the understanding of the system has been transformed by discussions with a market "insider" whose insights shed new light on the otherwise incomplete picture created by available data.

This effort has led to three major outcomes:

- o A comprehensive and consistent picture of the whole. This overview is useful for the purposes of this study, but is also a detailed and **updatable** set of data for the record. That is, the study has not just "marshalled the facts" needed for its case -- indeed, the team had no preconceived notions before beginning -- but has created as objective an information base as possible, including the identification of gaps and remaining contradictions. We stress the importance of continuing to refine this valuable core of information.
- o Sufficient reliable information to firmly draw policy conclusions, and to comment on subsidiary topics of interest to policy makers. The main conclusions are shown in Section 7.3. Secondary topics analyzed include the financial viability of plantations within the Valley, identification of where profits occur within the marketing system and the potential for future policy initiatives.
- o Most importantly, the study provides a better understanding of the current and potential roles of the major public enterprises involved in the forest products marketing in Kathmandu Valley.

7.2 Recent Changes in Forestry Sector Policy

Since this study was begun, important new changes in HMG policies have either taken place or been initiated. Two sets of changes are particularly relevant to the conclusions and recommendations of the Forest Products Marketing Study: (i) the substantial increases in the official NFC and TCN royalty rates and retail prices for fuelwood and timber¹, and (ii) the recommendations contained in the Forestry Sector Policy paper issued by the Master Plan for the Forestry Sector in Nepal in December, 1988. Each is addressed below as a prelude to the findings of this study.

Increased Royalty Rates and Retail Prices

Nepal Fuelwood Corporation

Prior to the price increase, NFC sold fuelwood to households (for purchases under 300 kgs) at Rs. 0.55/kg, and to institutions (over 300 kgs) at Rs. 0.70/kg. **The new retail price is a uniform level of Rs. 0.95/kg applied to both household and institutional purchasers.**

¹ As of November, 1988

This increase has a number of immediate impacts:

- o it eliminates the dual NFC price structure, reducing both incentives and opportunities for corruption.
- o it increases the financial viability of direct NFC retail sales. The analysis of Chapter 6 shows that, at 1986/87 costs, NFC would clear a profit of nearly Rs. 0.20 per kilogram at the new prices. At the very least, even if operating costs have increased more than prices, it will reduce losses.
- o it raises the cost of energy for consumers who purchase from NFC. It should be recalled that half of these purchasers are public institutions, and that households who succeed in gaining access to below-market NFC supplies are often influential, rather than poor.

Royalty rates paid to the Forestry Department by the NFC have also increased. Specifically, the royalty on wood supplied to private permit holders has increased from Rs. 500 per chatta to Rs. 1,000 per chatta (Rs. 7.8 and Rs. 15.6 per quintal).

Royalties on wood sold to households remain unchanged, at Rs. 214 per chatta (Rs. 3.34 per quintal). In effect, since the retail price change eliminates the price difference between households and institutions, this means that the royalties on all direct sales by the NFC remain unchanged.

Finally, the average selling price charged by NFC to industry and commerce permit holders (at the Terai depots) has risen from Rs. 3,500 per chatta to Rs. 4,100 per chatta.

It is apparent that, in addition to the positive impact of retail price increases, NFC will benefit from increased margins in two ways: first, average retail prices have increased by 54%², but royalties for NFC direct sales have not changed; second, the average prices charged industry/commerce permit holders have risen by more than the increase in royalties for wood supplied to permit holders (Rs. 600 vs. Rs. 500). **The implicit subsidy to NFC may therefore rise, even as budgetary subsidies decrease.**

Timber Corporation of Nepal

TCN retail prices for both sawn wood (sold at Kathmandu depots) and round logs have increased sharply, by amounts ranging from 70% to 110%. Royalty rates paid to the Forestry Department by TCN have also risen. For Sal³, the rate has gone from Rs. 20 per

² The household price has risen by 73% and the institutions price by 35%. Since sales are about evenly split between these two subsectors, this yields the average increase of 54%.

³ The most widely used species

cft to Rs. 55 per cft (an increase of 175%). For other species, the average has risen from Rs. 17 to Rs. 44 per cft (158%).

While the **percentage** increases for royalties are higher than for retail prices, the **absolute** retail price increases are much greater (three to five fold, on average), dramatically increasing the TCN's margins, and creating the potential for an operating surplus on sales transactions⁴.

The Master Plan Forestry Sector Policy Paper

In December, 1988, the Master Plan for the Forestry Sector in Nepal⁵ issued an important policy paper which makes recommendations for the development of the forestry sector over the next twenty years. The paper is the culmination of years of detailed analysis conducted by the Master Plan office with respect to objectives, legislation, policies, sector development strategies and implementation programs. The paper's wide ranging recommendations will form the basis for future forestry sector development. The paper covers the entire forestry sector of Nepal, as opposed to the more limited coverage of this document.

Four major thrusts of the policy paper directly affect issues addressed in the conclusions and recommendations of this report. These are described in the following sections.

Long Term Sustainability of Natural Resources

The principal thrust of the paper is its focus on maintaining the long term sustainability of the natural resource base: "The existing forestry legislation was formulated to resolve the problems of the past, related to protection, rather than the present and future needs for better management and increased production". This is a major shift from existing policy as reflected in the activities of the forestry sector parastatals.

Emphasis on Decentralization and Local Resource Management

The MPFS policy places clear emphasis on the need to decentralize resource management by granting management rights to local populations. It points out that sustainable management can best be carried out by long-term resource users, and that current legislation systematically discourages such management.

⁴ As opposed to sawmilling operations. The impact of these price increases on the financial viability of sawmills is not year clear.

⁵ Ministry of Forests and Soil Conservation

Removal of Trade and Transport Restrictions

As a means of promoting private sector involvement, the policy calls for the removal of all restrictions on the internal trade and transport of forest products.

Incentives to Production

Several new incentives to forestry production are recommended. User-groups, village and panchayat committees and other local organizations will be empowered to manage local resources, regulate their exploitation, charge royalties and taxes on forest products and derive the benefits from increased forestry production. Major initiatives to provide fiscal incentives, enhanced legal rights and long term loans to private commercial forest plantations are also recommended.

Privatization and Institutional Change

Finally, the policy paper makes clear recommendations with respect to the future roles of existing forestry sector parastatals: "Of the parastatals, only the Herbs Production and Processing Company Limited and the Forest Products Development Board will have a permanent role, and will be under strict control, to ensure that they contribute socially and economically to the country. *All other parastatals will be privatized or dismantled as appropriate*" [emphasis added].

These MPFS policy recommendations are consistent with the findings of the Forest Products Marketing Study, and closely parallel the recommendations made in Section 7.4 below.

7.3 Main Conclusions

CONCLUSION 1: At current rates, the supply/demand balance in the areas of the Terai being exploited for the Kathmandu market cannot be kept in equilibrium on a sustainable basis.

Supply already far exceeds the natural regeneration capacity of the forests being exploited. Forests in many parts of the Terai are being degraded at an alarming rate. Most of the supply for Kathmandu comes from harvesting public forests, rather than through new production. The historical emphasis on **protection** has not succeeded in preventing over exploitation -- legal or illegal -- of natural forests. The emphasis on protection has, however, diverted attention from the more important objective of stimulating new production and bringing new areas under sustainable management.

CONCLUSION 2: In the long run, increased stimulus must be provided for forestry production. Resource prices are rising as the supply-demand balance worsens. They must eventually approach the marginal cost of production if new supply (from produced rather than collected wood) is to be sustainable.

The December 1988 Master Plan Forestry Sector Policy Paper shows the need to induce widespread local participation in resource management and production. It also calls for further incentives to private plantations. For both, producers will have to recover sufficient revenues to cover the costs of production, or new supplies will not be forthcoming.

It will not be sufficient to simply raise the resource prices for wood coming from the Terai. Given the institutional context described in this report, it has proven impossible to control the flow of illegally-collected wood; as "official" prices rise, so would the incentive for illegal exploitation. Ultimately, **market forces rather than public policy will place upward pressure on producer prices.** The "niche" for public policy will be to provide stimulus to decentralized smallholders and private plantations so that production increases can begin to reflect this growing resource scarcity. Successful mobilization of rural populations and the private sector would, over a twenty year time frame, have much greater impact than attempts to establish higher "official" prices which cannot be enforced.

CONCLUSION 3: The NFC was established to meet two major objectives. Neither is being met.

The NFC's objectives are to provide fuelwood to consumers at a "fair price" and to assure supply to areas of fuelwood scarcity. Yet the NFC meets only 31% of total fuelwood demand in the urban areas of the Kathmandu Valley (264,000 quintals out of 845,000). Over half of this amount (131,000 quintals) goes to public institutions at subsidized prices. **The NFC supplies only about 19% of non-public consumers of firewood in the Valley.** Because its subsidized supply is so scarce relative to demand, those who succeed in gaining access to this supply are not necessarily the poor families who most need the subsidy.

With respect to the objective of assuring supply in areas of scarcity, the goal is manifestly not met. There is acute scarcity of official supply, and the private sector meets the vast majority of non-public demand at prices which are two to three fold higher.

CONCLUSION 4: The TCN was established to meet four major objectives. All four are either completely or partially unmet.

The four objectives of the TCN are to sell timber to consumers at a fair price, to meet the demand of general consumers and of forest products industries, to harvest trees systematically with due consideration of conservation of the forests and to develop viable timber plantations.

Supply at official prices remains scarce; supply to both general consumers and forest products industries has been unreliable; harvesting and supply do not take place on a

sustainable basis that conserves forest resources; only 50 to 100 hectares of timber plantations -- whose financial viability remains to be established -- have been undertaken.

CONCLUSION 5: Increasing the share of consumers to whom public enterprises provide supply at subsidized prices will not solve the problem.

Neither the NFC nor the TCN meets its objective of supplying to areas of scarcity at a "fair price" because they supply such a small portion of total demand. It does not follow, however, that if they increase the percentage of consumers they serve, this failure would be remedied. The reason is that **supply and demand are linked**. If sufficiently large amounts of wood are available at very low prices, demand is likely to expand (further aggravating the supply/demand imbalances) and budgetary subsidies to grow.

CONCLUSION 6: Consumers in general pay for the subsidies provided to the public enterprises and their direct clients.

Both parastatals in question run large operating deficits in their direct sales operations (as discussed earlier, the NFC offsets direct sales losses through profits on permit fees; the base operation remains unprofitable). The general consumer bears this cost in several ways:

- o The long-term degradation of society's forests which results from providing forest products to the public enterprises at less than the resource replacement cost. The consequences include soil erosion, increasing scarcity and higher prices over time.
- o Direct subsidy of operating losses through public budgetary outlays.
- o The inefficiency and waste of parastatal operations relative to the private sector. Public sector costs are considerably higher per unit than comparable costs in the private sector.
- o Skewed competition in private retail markets. Nearly a third of total demand is directly controlled by public enterprises. A large part of the remainder is controlled by a limited number of actors who obtain permits and other access rights from the public sector. The complex system of ineffective regulations, while it does not lead to sustainable management of the forests, creates a dependent private sector whose profits are affected more by privilege and access to publicly-controlled supply than by the efficiency of their operations.

CONCLUSION 7: Actual exploitation of the forest is already taking place through private contractors, even when commercialization is controlled by parastatals.

The argument that it is too dangerous to allow private control of the forest products marketing system is weakened by the fact that private contractors already harvest the wood destined for the NFC, the TCN and the FPDB. In public forests which are commercially

exploited, the important issue is not public control of the commercialization system, but rather of the resource base. This would not change if commercialization were privatized.

CONCLUSION 8: If prices are officially set at levels below the marginal cost of sustainable supply, privatization of the marketing system will not solve the problem of wood scarcity in local markets, nor will it eliminate the existence of unofficial parallel markets.

Two conditions appear necessary to improve the reliability of supply:

- o Free market prices. Where prices are fixed, price no longer operates as the allocation mechanism. Instead, access to limited supplies comes from privilege and other special arrangements. There is some reason to believe that the retail prices which 80% of consumers already pay would not rise any faster in the absence of the forestry sector parastatals, if increased competition is fostered in private markets.
- o A more open and competitive process for gaining access to permits to remove wood from the forests. The large middleman profits throughout the system suggest that even unofficial retail markets are not now very competitive. Part of the reason for this is that influential actors now control a high percentage of the permits granted. Because forest exploitation should not be uncontrolled, government must be vigilant in assuring that permits are granted on a more competitive basis.

CONCLUSION 9: Substitute fuels (kerosene, LPG, electricity and coal) are increasingly competitive with fuelwood on a financial basis. They are likely to meet an increasing share of urban demand in Kathmandu in coming years. This trend has economic advantages and disadvantages.

Middle and upper income households are switching to substitute fuels at a rapid rate. Supply of LPG bottles has been as much a constraint to growth as have price and consumer acceptability.⁶ As forests degrade, fuelwood prices will continue to rise faster than prices of alternative fuels, making fuelwood less attractive to even poorer consumers. There are obvious negative implications for balance of payments and national energy independence. However, three things should be noted:

- o Even if the market mix between fuelwood and alternative fuels does stabilize, it will not do so until kerosene, LPG and electricity have captured significantly larger shares of the market. The reason for this is simple: wood prices will only level off after improved management and increased production have had sufficient impact to arrest the on-going rise in prices. Impacts will take ten

⁶ The supply constraint on LPG bottles which has prevailed over the last several years has now eased.

years if the major initiatives called for in the Master Plan are begun right away.

- o Given transport costs and the low value of the end product, it may be unlikely that fuelwood can ever be produced in the Terai at a cost which is competitive with alternative sources, if stumpage prices reflect the full cost of production (this is not true for timber).
- o Despite the negative balance of payments effects of switching away from fuelwood, deforestation and environmental degradation are also very costly, including (indirectly) in balance of payments terms. Moreover, they directly affect the rural agricultural production base, which is the country's most important economic asset on which 90% of the population depends.

Energy independence *per se* is not necessarily a desirable goal. Overall benefits to the economy should be the criterion by which the importation of substitute fuels are judged.

CONCLUSION 10: Improved wood stoves can have a useful transitional impact in reducing demand per capita during the period that supply enhancement options are coming on stream.

Improved cookstoves are cheap, can be financially attractive to consumers who pay for the wood they use (as occurs in urban areas), can substantially reduce consumption of households which use them, and can have an impact as of when they are adopted. Despite the poor record of stoves programs in Nepal, experience from other countries which have successfully introduced improved stoves shows that a massive publicity and marketing effort based on local artisan producers has often been the most important ingredient in success. This experience also shows that apparent failure over many years (as in Nepal) has often been the necessary "softening up" period before market acceptance rises sharply.

OVERALL CONCLUSION

Public enterprises in this sector have failed in their attempt to fulfill the objectives of government policy. The marketing system is, for most consumers, already privatized. The problems in the marketing system reflect more **fundamental problems on the resource management side**. Resource management deficiencies will not be solved through increased controls or price subsidies. They will require sustained effort to increase incentives for decentralized and private production, and to promote **transition strategies** which reduce demand through efficiency improvement and substitution.

7.4 Recommendations

The following recommendations are intended to provide a consistent vision of the principles which can guide a transition from the current system to a more rational private market, and which can permit sustainable operation of such a privatized market.

Strategy Recommendations

1. The forest products **marketing system should be privatized**. Public enterprises operating in the retailing system should be closed, and officially-set retail prices abolished.
2. Emphasis should be given to measures which improve **decentralized local resource management** -- the core problem -- rather than those which attempt to control resource flows. This will require changes in land and resource tenure policies, legislation concerning local resource management rights, provision of financial incentives and technical support to producers and changes in pricing policy.
3. HMG should undertake a careful assessment of the **economic tradeoffs in moving to substitute fuels** (kerosene, LPG, electricity, coal), even if they require increased imports. Based on the results, accelerated programs to promote fuel substitution in urban areas should be seriously considered. Such programs should cover all demand sectors: households, industry and commerce and institutions.
4. As part of a strategy for moving towards better demand management, **substitutes for timber** should be further investigated (including iron frames, fiberboard from waste wood, cement blocks for bricks, etc.), and promoted where appropriate.
5. Improved cookstoves programs should be pursued with **sharply increased emphasis**. Experience from other countries shows that stoves programs are most successful when part of a highly visible and sustained campaign. Early failures have been typical in most countries where improved stoves have been introduced. They should not prevent further effort.
6. The transition toward a privatized forest products market should **begin immediately**. There is already sufficient information available to show that it is both appropriate and necessary. The Forestry Sector Policy Paper of December 1988 addresses the steps required in such a transition.

Transition Recommendations

1. The NFC and the TCN should be phased out over a period of approximately **one year**. They do not currently serve a useful purpose, cost a great deal to maintain and foster inefficiency through the control they exercise.
2. TCN sawmills and inventories of timber should be **sold** to the private sector.
3. FPDB should be the only remaining parastatal involved in forest products flows. Neither FPDB nor any other public enterprise should play a role in the **retailing** of forest products. Vigilant control of forest **sources** should be maintained through responsible agencies or local resource management organizations.

4. Long run forest resource prices **should not be fixed** by the public sector. They should be allowed to change to reflect higher prices of regeneration (as necessary) because this better reflects the true economic value of the resources being used.
5. In the transition period, timber should be guaranteed to forest products industries, who have made investments based on prevailing prices, at some agreed set of prices. This **transitional guarantee** should be for no more than ten years, after which these industries will have to acquire logs through the private market.
6. Clear cut forest areas should be turned over ~~for~~ **private leases** for forest production. These leased should be combined with an **incentives package** -- including tax incentives -- which assures that leased lands are used for forestry production. In this first instance, such leases can be given to forest products industries which have an internal demand for the output.
7. Current rules should be modified to permit **larger scale private forest management**. If private production is to have a long-term impact on the supply/demand balance, larger scale commercial operations will be necessary for greater economies of scale. **Timber** should be the primary focus for such private plantations, as fuelwood production is not likely to be competitive by itself.
8. Increased **incentives** must be provided at the **village level** for small-scale forest management. Such incentives can include free seedlings, greater technical support through extension, and enhanced local resource management rights and responsibilities. These would be consistent with the current trends in public policy. Combined timber, fuelwood and forage production within the Valley appears to be **financially viable** even at current prices.

Appendix A

Methodology Employed in the Study

The Forest Products Marketing Study uses a methodology which draws from two principal sources:

- o previous work on forest products marketing chains carried out in West Africa by France's Centre Technique de Foresterie Tropicale (CTFT)
- o the accounting framework - the Reference Energy System (RES) - developed by Brookhaven National Laboratory (New York, U.S.A.) for tracking energy flows in the national economy

Relevant elements from each of these sources were brought together in a structure which was adapted to meet the specific institutional and market circumstances of the forest products sector in Nepal.

The objectives of this annex are threefold: to briefly summarize the CTFT and RES methodologies, with particular reference to what they have to contribute to the present analysis; to describe the main elements of the methodology used in the study, including the rationale behind adaptations from the source methods; and, finally, to outline changes and refinements which should be considered in future applications.

A.1 The CTFT and RES Methodologies

CTFT Methodology

Background

The CTFT methodology was developed in studies of forest products marketing in the West African nations of Mali, Niger and Burkina Faso, in work carried out primarily by Alain Bertrand and Jean Clement of CTFT between 1982 and the present.

The physical conditions in the Sahel (the West African semi-desert zone in which Mali, Niger and Burkina Faso are located) are very different from Nepal, and these conditions influenced CTFT's approach. They therefore merit a brief description:

The terrain is largely flat, with limited scrub vegetation. Population density in rural areas is very low compared to Nepal (densities of 3-7 persons per square kilometer are not uncommon). The principal urban areas are accessible from a variety of roads coming in from all sides. Off road traffic (primarily animal drawn) is not as difficult as in the areas around Kathmandu. The capital cities themselves (Bamako, Niamey and Ouagadougou) are quite spread out, with poorer populations on the urban periphery living in "semi-rural" conditions in many areas.

The institutional circumstances are also different in one very important respect: forest products flows are not controlled to any significant extent by public enterprises. Wood collection and marketing is largely a private activity, and there are few official statistics on these flows. In all three countries, as in Nepal, villagers are allowed to harvest wood for their own needs from surrounding forests. Wood collected for sale requires a permit, obtained from the Forestry Department. However, such wood is not collected from designated forest

zones, but from a variety of locations along the major road axes leading in to urban markets. As a result, it is even more difficult to detect or control illegal wood cutting.

Specific Approach

The CTFT study of forest products marketing chains for Bamako, Mali, will be used as an example to describe the specific approach.

Because there is no 'benchmark' against which to compare a given set of data, the study used three independent sources to compile information, comparing results as a means of arriving at working estimate. The objective of the working estimate was to have a figure of sufficient reliability to allow policy decisions. The three sources of information were demand estimates, surveys of rural collection points and roadside monitoring along the principal road axes (three main roads and two secondary roads).

Demand. Household surveys (stratified by income group) provided a first basis for estimating total flows of fuelwood and timber. The emphasis in the study was on fuelwood, since it plays the dominant role in the forest products market in Mali. Results of the survey were compared with those of other studies both in Mali and in similar locations elsewhere in the Sahel.

Roadside Monitoring. As with the Nepal Forest Products Marketing Study, roadside monitoring was conducted for several periods of one week each along the major road axes entering the city of Bamako. While off road traffic may be considerable, the largest volume of wood comes in along the roads in dedicated trucks and other all purpose vehicles. The results for each monitoring period were then extrapolated to generate annual estimates. The monitoring periods were geared to capture seasonal variations (which are themselves not as great as the seasonal variations in Nepal).

Surveys of Rural Collection Points. Wood collection for resale to urban areas takes place throughout the forests of rural areas surrounding Bamako. The potential supply zone is essentially circular (unlike Nepal), but it is more financially attractive to collect from forests adjoining the road than to transport long distances to the main road. Therefore, the supply zone may be viewed as a circle with spokes (the major roads) extending beyond its circumference. A major difference from the Nepal case is that these rural surveys in Mali were more 'spot checks' which provided insights on how the process worked, but did not allow independent quantification of the total flow. In effect, the study could not survey a sufficient number of collection points to estimate the whole, nor could a random sampling approach be used because points surveyed were not necessarily representative and the total number of collection points remained unknown.

The Bamako study therefore derived a working estimate of total supply and demand from the household surveys and roadside monitoring, and obtained detailed information on the workings of each step in the marketing chain from collection permit surveys. One of the most useful aspects of the study was to identify the costs and markups at every stage. From a policy standpoint, this information was important for developing government policies with respect to permit fees, transport taxes, sales taxes and forest management strategies.

The Reference Energy System

The Reference Energy System was developed at Brookhaven National Laboratory (National Center for the Analysis of Energy Systems) in the late 1970s, and used extensively in the analysis of national energy systems in the early and mid-1980s. This study draws from the RES only the framework for diagramming flows. The RES framework allows a systematic accounting of energy flows at each stage from energy source to end-use. Its primary advantage is that it allows each subflow to be tracked separately, while showing interrelationships between subflows on the same diagram.

For example, in Figure 4.1 (Fuelwood Flows, Chapter 4), it is important to track wood collected by permit holders, NFC and others in a desegregated manner. Each of these subflows corresponds to a different set of institutional relationships and financial incentives. Consequently, each holds different potential for diversion as well. Finally, each subflow is known with a different degree of certainty (figures on NFC collections

are fairly accurate; permit holders are thought to take out more than their permits allow; the illegal flows are more conjectural, etc.).

The Reference Energy System is susceptible to being linked to sectoral computer models. For example, household fuelwood demand can change through adoption of improved cookstoves or conversion to LPG, kerosene or electricity. The impact of such a change could be tested by running the model "backwards": that is, changing demand and then calculating the amount of wood needed to satisfy that demand. In such a scenario, it can be assumed that NFC subflows remain constant, but that reductions in supply would take place in the private sector.¹ Similarly, by building a "price elasticity of demand" into the calculations, the impacts of different price scenarios can be tested. In a complex modeling exercise, both fuelwood and timber markets could be linked with markets for other sources of energy and construction materials (including imports) to test relationships across complementary and substitute products.

A.2 The Study Methodology

Objectives

The main objectives of the methodology used were:

- o To use available **independent sources of information** to establish as reliable a set of data as possible on the total fuelwood and timber flows, and on the major subflows within each market. The attempt has been to "box in" the uncertainty in a given data set with other evidence, until it is reduced to acceptable levels.
- o To track each subflow in sufficient detail to identify (through supplemental institutional analysis) the key decision-points at which market or other incentives play an important role. In particular, the financial analyses of Chapter 6 shed light on supplier and intermediary incentives at various points in the marketing chain, and provide a basis for policy initiatives.

Data Sources

Five independent sources of information were used:

- o Reported statistics on public enterprises and permit holders
- o Thankot Checkpoint Statistics
- o Roadside Monitoring (Thankot and Valley Feeder Roads)
- o Demand Estimates
- o Surveys and Interviews (non-quantified)

Data collected came from a combination of secondary and primary sources. Primary data collection was undertaken only after all available secondary data had been collected and analyzed, and when three criteria were met: it added new information with which to cross-check available data; secondary data had sufficient uncertainty that policy conclusions could not be drawn from it; it substantially improved the information base for future analysis.

In several instances, project resources did not permit primary data collection which would have been useful. An example is household consumption surveys. In this instance, the study adopted a two-fold approach: first, detailed interviews were conducted with analysts who carried out previous household surveys, and the results

¹ This is just one example. One could also assume that reductions would take place proportionally, that they would all occur in NFC supply, or some user-specified combination.

were adjusted to reflect best guesses for the needs of the focus of this study², second, study results have been presented in such a way (especially with regard to disaggregation) that the findings of future surveys can simply be integrated into the same analytical framework to further refine the results.

The principal primary data collected during the study falls into two categories:

- o **Data on overall flows**, consisting primarily of roadside monitoring at Thankot and along feeder roads. In some senses, the compilation of the Thankot checkpoint records falls halfway between primary and secondary data collection, since this rich source of data has not previously been exploited.
- o **Specific data** on prices, incentives, institutional mechanisms, etc. A tremendous amount of such data was collected through interviews and site observations. Without it, it would have been impossible to understand and reconcile the secondary data available, or to analyze the incentive structure of the various actors in the marketing system.

Most other data collected was secondary. The contribution of the study was in uncovering data which, while it existed, was not easily accessible³, and in bringing together the relevant data from various sources to form a picture of the whole.

Differences in Study Methodology and CTFT and RES

The primary differences between the Study's methodology and that used by CTFT relate to the specific physical and institutional conditions in Nepal. They are outlined below:

- o The role of public enterprises in Nepal provides a base set of current and historical data not available in the West Africa case. Between 20 and 50% of flows can be accounted for by public enterprises and permit holders.
- o The Thankot checkpoint provides a **single point** through which virtually all wood flows into the Kathmandu Valley. No single road axis provided equivalent coverage in the CTFT studies. Roadside monitoring at Thankot was therefore of great value in this study.
- o The Thankot checkpoint records, while not always fully accurate, provide a very strong point of reference (both current and historical) for the analysis.
- o Finally, the forest areas exploited for supplying urban areas (both legally and illegally) are less dispersed in Nepal than in West Africa, making interviews and informal surveys somewhat more representative of the whole.

These differences, when added to the information available through the Forestry Master Plan and the Forestry Private Sector Study, have allowed a better estimate of total flows.

² For example, the Master Plan's numbers on average per capita timber consumption for Nepal were adapted to better reflect per capita demand in the urban areas of Kathmandu Valley -- a number which the Master Plan did not estimate, but for which its data provided a reasonable starting point.

³ This was particularly true for information from public enterprises which goes beyond the normally published statistics.

This study makes limited use of the RES methodology. In particular, RES can be a fully-computerized system which allows user-defined scenarios to be constructed and tested⁴. The Nepal analysis is not computerized in any meaningful sense. However, it is important to note that the results of this study are presented in a way which is easily susceptible to being entered in a computer model and this is one of the advantages of the approach used. This would allow some potentially valuable analysis which, in particular, integrates the findings of this study with other sectoral studies.

A.3 Changes and Refinements for Future Applications

The following points should be considered in future applications of the methodology:

1. The study would have benefitted from a third one-week period of roadside monitoring. It would improve seasonal coverage (there was no monitoring during the rainy season) and would improve the reliability of annual extrapolations.
2. It is essential that roadside monitoring be around-the-clock for a minimum of seven days at a time. Study Team members must be prepared to conduct spot checks and surprise visits on a regular basis to assure that monitors remain at their posts. Extra effort on supervisory staff proved a sound investment both for this study and in the West Africa CTFT applications.
3. Industry/commerce demand estimates are typically the weak link in such a study, as they were in this one. While household demand is susceptible to sampling and per capita estimation, industry and commerce (where there are great differences in the size and use-intensity of end-users) demand is not.
4. Independent household surveys are valuable as part of the primary data base, but contribute relatively little (at great cost) if the information from previous surveys is reasonably reliable. It is more important to assure that questions relevant to such a study are included in a wider household survey than to conduct an independent one.⁵
5. It would be relatively straightforward to develop (or adapt) a computer model which allows flows to be tracked through the stages of the marketing process (by subflow). Such a model would be valuable as an updatable repository of data, and should allow linkages between fuelwood and timber flows, as well as with markets for substitutes (kerosene, LPG, etc.) or complementary products.
6. On a more advanced level, the recent development of geographic information systems (GIS) offers new prospects for storing and manipulating data on a geographic basis. For example, several impacts of deforestation (such as soil erosion, income generation, etc.) are geographically specific to the areas being exploited. Non-geographic quantitative (tabular) analysis does not adequately reflect the differential effects of supply from The Terai vs. from the Kathmandu Valley. As the Forestry Master Plan's analysis implies, the sustainability of forest management will depend as much on the zones under exploitation as on the overall quantities involved.

⁴ See for example, the RES-Gen model, developed by Energy/Development International, as applied in Morocco, Indonesia, Sudan and Pakistan.

⁵ There is a caveat to this point: prior surveys often fail to capture information in categories which are useful for the analysis of household demand. For example, a number of surveys have obtained information on average household expenditures on fuelwood, without inquiring about quantities and prices. Influencing survey design (and/or obtaining access to the survey forms which may contain more information than is reported in the results) can be of particular value.

7. Finally, the study would have benefited from a more detailed treatment of potential substitutes for fuelwood and timber, including through imports. Such analysis is possible based on the findings of this study, however. Throughout the developing world, there is a direct link between natural resources degradation, rural productivity and food security, and the balance of payments. Short term choices are most often in favor of reducing the balance of payments deficit⁶ but the long term costs of resource degradation are becoming increasingly apparent. The warrant detailed analysis because such analysis may affect the choice of public sector policy options.

⁶ Resource degradation does not show up in national income accounts, so that planners are often slower to detect the impact of the degrading natural resource capital stock on future income. It is interesting to note efforts currently underway -- most notably at the World Bank -- to include the state of the resource base in GNP accounts.

Appendix B

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