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Ex-post cost-benefit analysis of village woodlots of Gujarat, India.

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EX-POST COST-BENEFIT ANALYSIS OF VILLAGE WOODLOTS OF GUJARAT, INDIA

A thesis submitted in the University of Wales

for the degree of Philosophie Doctor

by

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Summary

This study is an attempt towards a comprehensive ex-post evaluation of the village woodlot scheme being implemented in Gujarat state of India since 1974. The scheme is meant for raising trees on village common lands to meet the fuelwood needs of the local people. The technique of cost-benefit analysis has been applied as the analysing tool for this evaluation.

The study relies on the actual knowledge of the people gathered through a questionnaire survey involving 467 respondents belonging to 32 villages. In addition, the field level information on costs and benefits (along with the distribution among various groups) of 124 harvested village woodlots, located in 15 districts of Gujarat provide the supporting database for the financial, economic and social cost-benefit analysis.

The results of the questionnaire survey indicate the high level of awareness and concern among the people about the tree planting programme in Gujarat. But it clearly identifies the low involvement of the village poor in the activities of the scheme and the high aspirations of the village panchayats to realise more income from the sale of the products.

While the financial analysis of the village woodlots presents a little dismal picture, the findings of the economic and social CBA explain the socio-economic importance of the scheme in the rural economy. The shadow pricing has a remarkable impact on the overall results of CBA. The study has attempted to test the sensitivity at different levels of shadow prices, both in the economic CBA and social CBA.

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List of Abbreviations

ARI	Accounting rate of interest
ARTEP	Asian Rural Training and Employment Programme
BCR	Benefit-cost ratio
BF	Big farmers
CBA	Cost-benefit analysis
CENDIT	Centre for Development and Instructional Technology
CFP	Community Forestry Project
CIDA	Canadian International Development Agency
CRI	Consumption rate of interest
CSE	Centre for Science and Environment
DANIDA	Danish International Development Agency
EARI	Economic accounting rate of interest
ECBA	Economic cost-benefit analysis
EDR	Economic discount rate
EEC	European Economic Community
EIRR	Economic internal rate of return
FAO	Food and Agriculture Organisation of the United Nations
FCBA	Financial cost-benefit analysis
FFRP	Forest farming for rural poor
FIRR	Financial internal rate of return
FLCS	Forest Labourers' Cooperative Society
FRI	Forest Research Institute
FSI	Forest Survey of India
GDP	Gross Domestic Product
GFD	Gujarat Forest Department
GLASOD	Global Assessment of Soil Degradation
GNP	Gross National Product
GOG	Government of Gujarat
GOI	Government of India
Ha	Hectare
IBRD	International Bank for Reconstruction and Development
ICAI	Institute of Chartered Accountants of India
ICAR	Indian Council of Agricultural Research
ICP	International Comparison Programme
IFS	Indian Forest Service
IIM	Indian Institute of Management
IIPO	Indian Institute of Public Opinion
ILO	International Labour Organisation
IOCR	Incremental Capital-Output Ratio
IRMED	Institute for Resource Management and Economic Development
IRR	Internal rate of return
IUCN	International Union for Conservation of Nature and Natural Resources
LL	Landless
LPG	Liquefied Petroleum Gas
MF	Marginal farmer
MFP	Minor Forest Produce
Mha	Million hectares

MOA	Ministry of Agriculture
N	Total number
NCA	National Commission on Agriculture
NCAER	National Council of Applied and Economic Research
NFP	National Forest Policy
NISWASS	National Institute of Social Work and Social Sciences
NPV	Net present value
NREP	National Rural Employment Programme
NRSA	National Remote Sensing Agency
NSFP	National Social Forestry Project
NSSO	National Sample Survey Organisation
NWDB	National Wastelands Development Board
ODA	Overseas Development Administration
ODI	Overseas Development Institute
OECD	Overseas Economic Cooperation and Development
OECF	Overseas Economic Cooperation Fund
OED	Operations Evaluations Department
PEO	Programme Evaluation Organisation
PVC	Present value of costs
Qtl	Quintal (equal to 100 kilograms)
RAPA	Regional Office for Asia and the Pacific
RLEGP	Rural Landless Employment Guarantee Programme
Rs	Rupees (Indian currency)
SCBA	Social cost-benefit analysis
SDP	State Domestic Product
SDR	Social discount rate
SF	Small farmer
SIDA	Swedish International Development Agency
SPWD	Society for Promotion of Wasteland Development
Sq km	Square kilometres
SSP	Saradr Sarovar Project
SWR	Shadow wage rate
TFAP	Tropical Forestry Action Plan
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNIDO	United Nations Industrial Development Organisation
USAID	United States Agency of International Development
VPR	Village panchayat representative
WRI	World Resources Institute

Glossary

District:	an administrative unit of a state
Division:	an administrative unit of forest department at the district level
Gaucher:	village common grazing land
Gram sabha:	a general body meeting of the villagers
Panchayat:	village council (an elected body)
Range:	an administrative unit of a forest division
Rann:	desert
Taluka:	an administrative unit of a district
Village woodlot:	refers to the tree planting on village common lands (gaucher land owned by the village panchayat).

The Introduction

1. A background to the problem

In India, the rural people are largely dependent on the use of forest biomass for their daily survival needs, especially for fuelwood, fodder, small timber and grazing purposes. As a result, the country has been facing severe land degradation problems, particularly after independence. Both the forest and non-forest areas have been constantly subjected to over-use. In effect, the recuperative capacity of the natural growth of plants has failed to keep pace with the increasing level of demands. The situation has aggravated manifold in the recent years because of innumerable socio-economic reasons. Needless to say, the main causes are deforestation and unscientific land-use practices.

By and large, the departmentally harvested forest areas (as per the working plan prescriptions) are reforested on a regular basis. But the large-scale depletion on account of the social demands, coupled with illicit and irregular removals are left unattended, rendering many forest areas almost barren. The situation of the non-forest common lands (including village commons) is not very encouraging either. The unscientific farming practices have brought farm lands (private lands) to a critical stage of degradation too. Much of these lands are now quite unsuited for agriculture purposes.

In nutshell, rapid expansion of wastelands has irreversibly damaged the productive resource base of the country, endangering the vital life support systems in the rural areas. The estimates indicate that almost half of the land is degraded in one form or the other. Here, it may be mentioned that India has nearly 12 million hectares of common pasture lands which need special attention to sustain the increasing demands of rural people.

Throughout the country, afforestation and reforestation have been going on in a planned manner. Up to the fifth five-year plan, the activities were mostly confined to the government forest lands only. But the recommendations of the National Commission of Agriculture in 1976 diverted

the attention of the government towards the regeneration of non-forest areas through a massive social forestry programme by involving the local community, particularly the rural poor. So, the overall efforts were increased manifold during the sixth and seventh plans, respectively. Several new schemes of social forestry were initiated to deal with different kinds of situations, concerning the land ownership, type of produce, etc. In addition, large-scale social forestry projects have been implemented in many states during the eighties with foreign assistance from various donor agencies. Between 1980 and 1990, more than Rs 30 billion (about US $ 2.3 billion) has been spent on social forestry programmes of India.

The prime objective of social forestry is to augment the production of fuelwood, fodder and small timber for meeting the needs of the rural population. In order to achieve this objective, the main components of social forestry include village woodlots (rainfed and irrigated), strip plantations (road, rail, canal), farm forestry (distribution of seedlings) and rehabilitation of degraded forest and non-forest areas. All-out efforts have been made to involve the local communities, governmental and non-governmental agencies in raising of trees on the degraded lands of the country.

In terms of the physical and financial achievements, the reported progress of social forestry in India has been quite encouraging. Its overall progress has also attracted a world-wide recognition, criticism and appreciation. Apart from the silvicultural requirements in raising of trees, many other important issues have emerged during the implementation of the social forestry programme. Some of these relate to the socio-economic role of the tree planting programme for the rural people.

The schemes of social forestry supported by the Central and State governments are taken on an annual basis without any appraisals. But in the case of foreign aided projects, decisions are taken after considering different criteria, the most important being the economic appraisals. However, there are certain factors which are not considered in the appraisals of these projects. Moreover, it is now observed that these appraisals are based on very high estimates of yield (particularly firewood, poles and timber) from tree planting. In many cases, the role of intermediate

products has not been addressed in a realistic way. In general, they have also ignored the distributional aspects which relate to the different groups in the society.

A detailed review of past evaluations suggests that very little efforts have been made to assess the actual impacts of the social forestry schemes in terms of the costs and benefits (financial, economic and social). In fact, many States of India have entered the second phase and third phase of social forestry without knowing the overall economic and social impacts of the programme. Moreover, the programme has been questioned by many individuals, national and international organisations.

2. The topic

In view of the above-mentioned facts, it was felt necessary to undertake an *ex-post* evaluation of social forestry in India. Needless to add, it was impossible to pursue the study on a country-wide basis. Therefore, it was decided to confine this research work to the state of Gujarat which is a leading and well recognised state in the field of social forestry. In Gujarat, the social forestry schemes were started as early as 1969-70 and since then thousands of hectares of forest and non-forest areas have been taken up for afforestation work. So far, Gujarat has implemented two large-scale World Bank aided social forestry projects. The total expenditure on social forestry in Gujarat has been about Rs 2,900 million (nearly US $ 100 million) at 1990-91 prices.

Of particular interest is the scheme of village woodlots, which concerns raising of trees on common grazing lands to meeting the local demands of firewood, small timber, fruits, etc. This is the main scheme which proposes to transfer the benefits to the rural poor by offering them a substantial share of intermediate and main produce. As much as one-fifth of the total funds of social forestry has been involved for raising of village woodlots.

From the viewpoint of the rural community, the scheme has two basic aspects: economic and social, and both are equally important. These factors are reflected in the selection of area and designing of woodlots, choice of species, maintenance and protection, benefit-sharing, etc. The

success of village woodlots depends on the co-operation of the local villagers. To ensure their involvement, the scheme permits them to collect intermediate produce free of charge and also gives a share in the main benefits. So the distributional aspects are quite crucial in the sustainability of the scheme. Even if the financial and economic benefits and costs seem promising, the woodlots may not be benefiting the villagers, particularly the rural poor.

This idea has enthused me to take up the social CBA of village woodlots. Therefore, a befitting title for this study seems to be the "*Ex-post* cost-benefit analysis of village woodlots of Gujarat, India".

3. The objectives

(I) to find out the extent of villagers' awareness and their participation in raising and management of the village woodlots through a questionnaire survey;

(II) to undertake a detailed *ex-post* cost-benefit analysis (financial, economic and social) by using the actual data from the harvested village woodlots; and

(III) to identify the effect of different parameters on the overall profitability of village woodlots, especially the economic and social ones.

4. The thesis

To illustrate the different aspects of this study, the thesis has been suitably designed and divided into eleven chapters. Chapter 1 provides a detailed background to the study area (Gujarat) in the Indian context. Chapter 2 describes the social forestry programme in India with special reference to Gujarat, while chapter 3 goes into the details of the past evaluations of social forestry. An attempt has been made in chapter four to present an outline of the technique of cost-benefit analysis and its application to the appraisal of the forestry and social forestry projects of India. Then comes the chapter 5 which narrates the details of methodology used in the field survey and

data collection. Chapter 6 presents a description of the secondary data, especially the harvested village woodlots, which form the basic database for the cost-benefit analysis.

After having dealt with the above, the details of the data analyses and presentation of results have been covered in the subsequent chapters. The analysis and findings of the questionnaire survey have been detailed in the chapter 7. The chapter 8 deals with the financial cost-benefit analysis of village woodlots. The next two chapters (9 and 10) have been designed to cover the economic and social cost-benefit analyses of village woodlots, respectively. Finally, chapter 11 analyses and discusses the findings of the study, mentioning the important parameters which affect the profitability of village woodlots. The conclusions and suggestions are also covered in this chapter.

Chapter One

India in General and Gujarat in particular

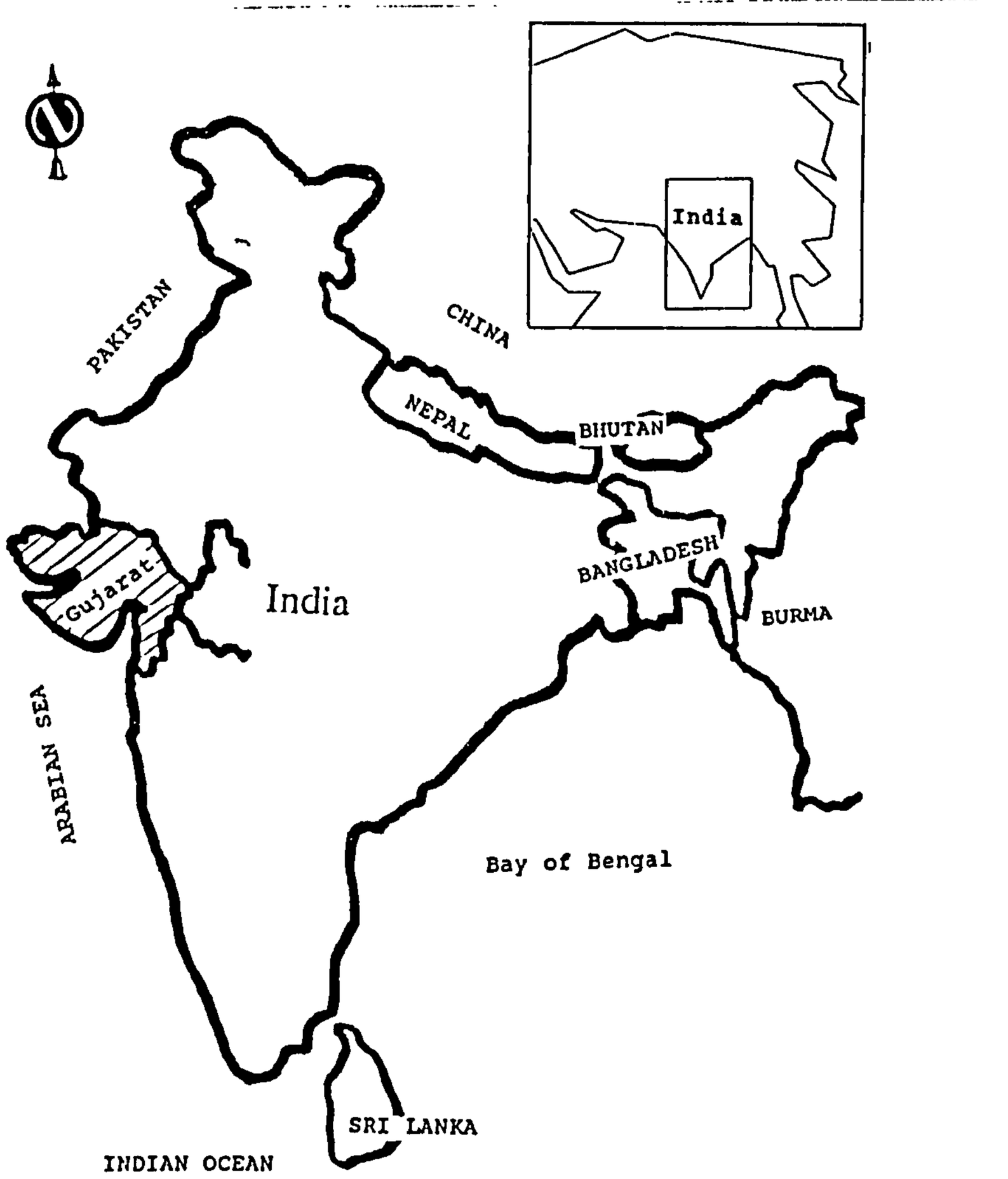
This chapter presents the overall picture of India and the study area of Gujarat, mentioning a few important global aspects. The description is grouped into eleven different sections to highlight the specific issues.

1.1. Locational details

India is situated in south Asia between $8^0$4'N to $37^0$6'N latitude and $68^0$7'E to $97^0$25'E longitude, occupying 328.8 million hectares of land. There are 25 states and 7 union territories which include 413 districts and over half a million villages. Map 1.1 exhibits the location of India and Gujarat.

Gujarat state, which separated from the erstwhile Bombay state in 1960, occupies 196,024 sq km (5.97% of India) on the western coast and is the seventh largest state. The Tropic of Cancer passes through the middle of the state. Area-wise, Gujarat is bigger than Bangladesh, Cuba, Denmark, Sri Lanka, etc. Its boundaries are formed by the Arabian sea coast (1,500 km) on the west and south-west; the state of Rajasthan in north; the international border of Pakistan in north-west; Madhya Pradesh, the largest state of India, in the east; and the state of Maharashtra in the south and south-east. The state comprises 19 districts, 184 talukas (sub-districts) and 18,550 villages (GOG, 1989). Topographically, there are two regions; Mainland Gujarat in the east and Saurashtra & Kachchh peninsula in the west. The first one is further divided into South, Central and North region. Appendix 1.1 provides the details of environmental regions of Gujarat (FAO-UNESCO, 1977) and appendix 1.2 describes the agro-climatological data of Gujarat (FAO, 1987a).

Map 1.1: Location of India and Gujarat



1.2. Demographic features

1.2.1. The population details

According to the census of 1991, India accommodates 844 million people and Gujarat is the tenth most populous state, supporting 4.87% of Indians (GOI, 1991). In fact, Gujarat's

population (41.17 million) is higher than the population of many large countries e.g. Argentina, Australia, Canada, Malaysia, Poland, Spain, Sweden, etc. It is estimated that by the year 2000 India's population will cross one billion (World Bank, 1992). The projections for Gujarat are 46.53 million by the year 2001 (GOG, 1989).

Between 1901 and 1991, Gujarat's population rose from 9.1 to 41.2 million (4.5 times) while the Indian population grew by 3.5 times (2,383 to 8,439 million). However, the figures of 1991 census indicate that compared to the national averages (annexure 1.1), now Gujarat state has got lower annual growth rate of population and lower density per sq km; but a higher literacy rate. For the nation as a whole, the life expectancy at birth is 59 years (World Bank, 1992) whereas in Gujarat it was reported as 59.8 years for males and 60.2 years for females during 1986-90.

Nearly three-fourths of Indians still live in villages and three-fourths of villages have a population less than one thousand (annexure 1.2). Gujarat is the third most urbanised state in the country with 31.1% people residing in the urban areas. A classification of villages and towns of Gujarat according to the population size (annexure 1.3) indicates that more than half of the villages have less than one thousand people. On the other hand, the eleven cities alone accommodate 15.60% people of Gujarat. In rural areas of Gujarat, only 36% people are literate as compared to 60% in the urban areas (GOG, 1989).

Spatial distribution of population within the state is highly uneven. Saurashtra & Kachchh region support only 31% of the total population. Relative densities (per sq km) at regional level are 240, 363, 196, 149 and 23 for south, central, north, Saurashtra and Kachchh regions, respectively. A classification of districts on the basis of population density is given in table 1.1 (page 9). Ahmedabad district has the highest population (11.36% of the state) while Dangs district has the least population. Annual growth of population is highest in Gandhinagar (4.41%) and lowest in Bharuch (1.68%).

The working age group in India is 15 to 59 years. Nearly 40% of the Indians are below 15 years. At the country level, there are 222.5 million (33.4%) main workers, 23.0 million (3.3%)

marginal workers, while in Gujarat, 10.98 million (32.2%) are main workers and 1.72 million (5.1%) marginal workers, suggesting high dependence of non-working population.

Table 1.1: Classification of districts of Gujarat according to the population density

(per sq km)

Population density	Name of the Districts
<100	Dangs, Jamnagar, Kachchh, Surendranagar.
100-200	Amreli, Bharuch, Bhavnagar, Banaskantha, Junagadh, Rajkot.
200-300	Mahesana, Panchmahal, Sabarkantha.
300-400	Surat, Vadodara, Valsad.
>400	Ahmedabad, Gandhinagar, Kheda.

1.2.2. Ethnic & socio-cultural attributes

Gujarat's name is derived from Prakrit word 'Gurjarratta' which means land of Gurjaras (graziers). The state has played a prominent role in the history of Indian culture and civilisation. There are quite well demarcated cultural zones with diverse ethnic, linguistic, and religious groups (Annexure 1.4). Each of them hold a definite position in the society. Ellis (1990) writes,

> "Gujarat is a colourful mixture of modern and old-age cultures...Rural Gujarat appears barely touched by the twentieth century...villagers still wear traditional dress and practice skilled crafts, particularly weaving and wood carving".

Socially and economically deprived caste groups in the country are known as the scheduled caste and scheduled tribe communities. India has 15.75% scheduled castes and 7.76% scheduled tribes, whereas in Gujarat, nearly 7.15% and 14.23% people belong to scheduled castes and scheduled tribes, respectively. Over two-third of the scheduled castes of Gujarat reside in rural areas and only 39.8% are literate. On the other hand, only 7.3% of the scheduled tribes live in urban areas and nearly 80% are illiterate (GOG, 1989).

Women's position varies among various religions, regions and social groups. Their place in society depends on the varied nature of caste taboos, religious and cultural ethos. In general,

the role of women in rural areas has not changed much, whereas in urban areas it is changing rapidly. Economically women depend on male members of the family. Often, they are deliberately kept out of the labour force (Shukla and Dalvi, 1986). The working population includes 26.9% female workers (GOG, 1989).

1.2.3. Rural scenario

According to Agarwal and Narain (1989),

"Indian villages are highly integrated agrosylvopastoral systems...each Indian village has its own croplands, grazing lands, and tree or forest lands, and each of these land-use components interact with each other...the entire village ecosystem is often held in fine ecological balance".

The rural settlements consist of houses and the surrounding farm land which belong to different families. Usually, the houses are of clustered or semi-clustered nature. In tribal areas, the settlements are mostly of dispersed type. The rural houses are generally made of soil, mud, thatch, bamboos, stones, wood or unburnt brick. Most of these materials are locally available. There are single room huts made of mud with thatched, sometimes tiled roofs or houses with several rooms and elaborate courtyard and homesteads. Nowadays, the rich people of the villages prefer concrete houses. But the majority can not afford costly building materials and there is no option for them.

1.3. Livestock

India's 416 million livestock (1982 census) which is about 13% of the global livestock survive on only 0.5% of the pastures of the world. According to census of 1988, Gujarat has 17.35 million livestock (4.4% of Indian total in 1982). This includes 4.48 millions buffaloes, 6.25 million cattle and 5.17 million sheep and goats (GOG, 1991a). The growth rates (five yearly census) of livestock in Gujarat were +25.44% in 1977, -21.85% in 1982 and +20.40% in 1988 (annexure 1.5).

The density of livestock varies in different regions as well as the districts. In rural areas, cattle rearing is the second most important occupation after agriculture. It provides supplementary income and gainful employment particularly to small and marginal farmers and agricultural labourers including the rural poor. The dairy industry in Gujarat is well-established and well-organised.

1.4. Land resources

1.4.1. Agro-climatic zones

The Planning Commission, Government of India has divided the country into fifteen agro-climatic zones (Alagh, 1991). Gujarat state is covered in zone number thirteen, called the Gujarat Plains and Hill Region. Further, on the basis of rainfall pattern, topography, cropping pattern and the climate, Indian Council of Agricultural Research (ICAR) has classified the country into 127 agro-climatic zones for the purpose of evolving appropriate packages of agricultural practices (MOA, 1991). The Research Review Committee of Gujarat Agriculture University constituted by the ICAR has identified eight different agro-climatic zones in Gujarat (GFD, 1990). The zone-wise details of coverage and soils are tabulated in annexure 1.6. The drier areas cover as much as 62.91% of the area of the state and soils within the same zone show a great variation. Even many of the districts have a different agro-climate with specific soil types.

1.4.2. Land use pattern

Annexure 1.7 furnishes the land-use pattern for the country and Gujarat. Nearly 55% of the land is privately owned and 28% belongs to the government. Panchayats control 4% of the land. The remaining 13% land includes rocky areas, glaciers and the unsettled lands (Agarwal and Narain, 1989).

A century ago, India had nearly two-third of its land under common control (Arnold and Stewart, 1991). Over the years, there has been a fast decline in extent of common lands. For instance, during 1960 to 1976, the village grazing lands in Gujarat have reduced from 1.0 million hectares to 0.85 million hectares (CSE, 1985). According to Jodha (1990), there has been 31 to 55 percent decline in common lands in 82 villages of different states (Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu). Following land reforms in 1950, the common lands in many states have declined by about 50 percent in the past 30 years (Kala, 1992). There has been an extension of agriculture to the inferior lands too (MOA, 1991).

Between 1977-78 to 1985-86 (annexure 1.8), striking changes are noticed in the land use pattern of Gujarat. There are decreases in net area sown, forest area, culturable waste, permanent pastures and other fallows, while the barren and unculturable land, current fallow and area under non-agricultural uses have increased. The scope for any increase in gross cropped area is limited except through reclamation of desert, saline and ravine lands of the state (Mehta, S.S., 1991).

1.4.3. Dependence on land resources

Per capita availability of cultivable land is only 0.2 hectare in India and 0.25 hectare in Gujarat. Net cropped area per agricultural worker in Gujarat (1.42 ha) is higher than the national average (GOG, 1991b). The national demography shows that there are 13.89% cultivators, 8.41% agricultural labourers and 11.14% other workers reflecting a high dependence on land resources. Similarly, Gujarat's population comprise 12.06% cultivators and 7.30% agricultural labourers who depend on land resources in rural parts of the state. Appendix 1.3 describes the situation of agriculture, including landholdings in Gujarat state.

In India, at least one-third of the population living below poverty line have little or no land of their own. They derive their subsistence needs from the common lands (forest land, non-forest government land and village community land). In a study (Jodha, 1986), it was found that 84 to 100 percent rural households were solely dependent on common lands for meeting their fuel, fodder

and food demands. The dependence of the rural poor on common lands is comparatively higher than that of the rural rich. Yet another study (quoted in WRI, 1992) showed that the common lands of India provide 14 to 23 percent of the poor's incomes and 84 percent of their livestock fodder. Particularly, the village community grazing lands provide access to the poor for grazing animals; and for collecting twigs, leaves, herbal medicines, and the raw material for rural crafts.

1.4.4. Land degradation

Throughout India, faulty and unscientific land use practices have resulted in heavy land degradation (Das, D.C., 1985). Despite the valuable contribution to the rural economy, common lands, in general are the most neglected area, resulting in depletion in terms both of area and of productivity (Jodha, 1990). In fact, under common ownership, over exploitation continues, as each person perceives only the benefits obtained from individual exploitation (Price, 1989). A substantial percentage of the common lands have been encroached upon for agriculture and other purposes. Because of heavy biotic pressure, the common lands are subjected to serious water and wind erosion leading to soil degradation problems. According to GLASOD (Global Assessment of Soil Degradation),

"soil degradation is a process that describes the human-induced phenomena which lower the current and/or future capacity of the soil to support human life" (WRI, 1992).

Deforestation and over-exploitation of common resources (generally over-use, excessive grazing and unscientific cultivation practices) are considered as the main causes of land degradation in India. The common lands are usually treated as no man's property, ensuing into improper management and protection problems. In many parts, the common pastures and woodlands are virtually barren with a complete loss of diverse forest produce to which poor people have access (Chambers, Saxena and Shah, 1989). As a result, often the productive capacity of the common lands is very low. In the past, there has been a very limited attempt to regenerate these

lands through artificial means. Even today, the efforts to rehabilitate the common lands have remained a governmental activity without much cooperation of the affected people (Kala, 1992).

The degraded lands are identified as wastelands. NWDB (1987b) has defined wastelands

"...degraded land which can be brought under vegetative cover, with reasonable effort, and which is currently under-utilised and land which is deteriorating for lack of appropriate water and soil management or on account of natural causes".

But the precise extent of wastelands in the country is not known. However, it is believed that at least half of the total land area of the country is degraded in one form or the other (NWDB, 1989b). There are several estimates of wastelands which vary considerably (annexure 1.9).

Gujarat has 4.39 million hectares of wastelands which include 42.60% of private, 15.49% of forest and 41.91% of revenue lands (FAO, 1989b). Road and railway networks in Gujarat include 65,565 kilometres and 5,696 kilometres by 1989-90 and 1988-89, respectively (GOG, 1991a). The strip lands on both sides of roads, railways and canals provide substantial area for tree planting activities in the state.

1.5. Forest resources

1.5.1. The condition of forests

Physiographically India comprises many different landscapes presenting a wide range of ecological situations. The climate varies from tropical in the south to arctic in the Himalayas. Major parts experience a tropical and sub-tropical climate. This has resulted in a diverse flora (13,000 species of flowering plants) and fauna (65,000 species of animals) found from one end to the other end of the country. Champion and Seth (1968) have identified 16 major forest types (annexure 1.10) which include 221 minor types. About 95% of the forests are non-coniferous and more than two-third of the forests belong to tropical moist deciduous and tropical dry deciduous types. Gujarat's forest types include tropical semi-evergreen forest (494 sq km), tropical moist deciduous

forest (2,980 sq km), tropical dry deciduous forest (5,727 sq km), tropical thorn forest (3,492 sq km) and littoral & swamp forest (427 sq km).

The national forest policies have aimed at maintaining one-third of the country's total land under forest (60% in hills and 20% in plains). However, only 23.4% of land (77.01 million hectares) is officially demarcated as forest land, the closed forest (crown density >40%) being confined to 11.71% of land mass (38.50 million hectares) (FSI, 1989).

Gujarat is among the forest poor states of India (FSI, 1987). According to latest reports (GFD, 1992b), the forest area in Gujarat is 19,388 sq km which is 9.89% of the state's geographical area. The actual forest cover is confined to 11,907 sq km (6.1% of Gujarat's area), leaving 38.6% of forest area in refractory, barren and degraded condition.

Per capita forest area in the country is less than 0.09 hectares which compares poorly with many other countries and the world average of 0.89 hectares (annexure 1.11). As many as ten states including Gujarat have lower per capita forest than the national average (FSI, 1989). Per capita forest area for Gujarat is only 0.047 hectares which is half of the national average.

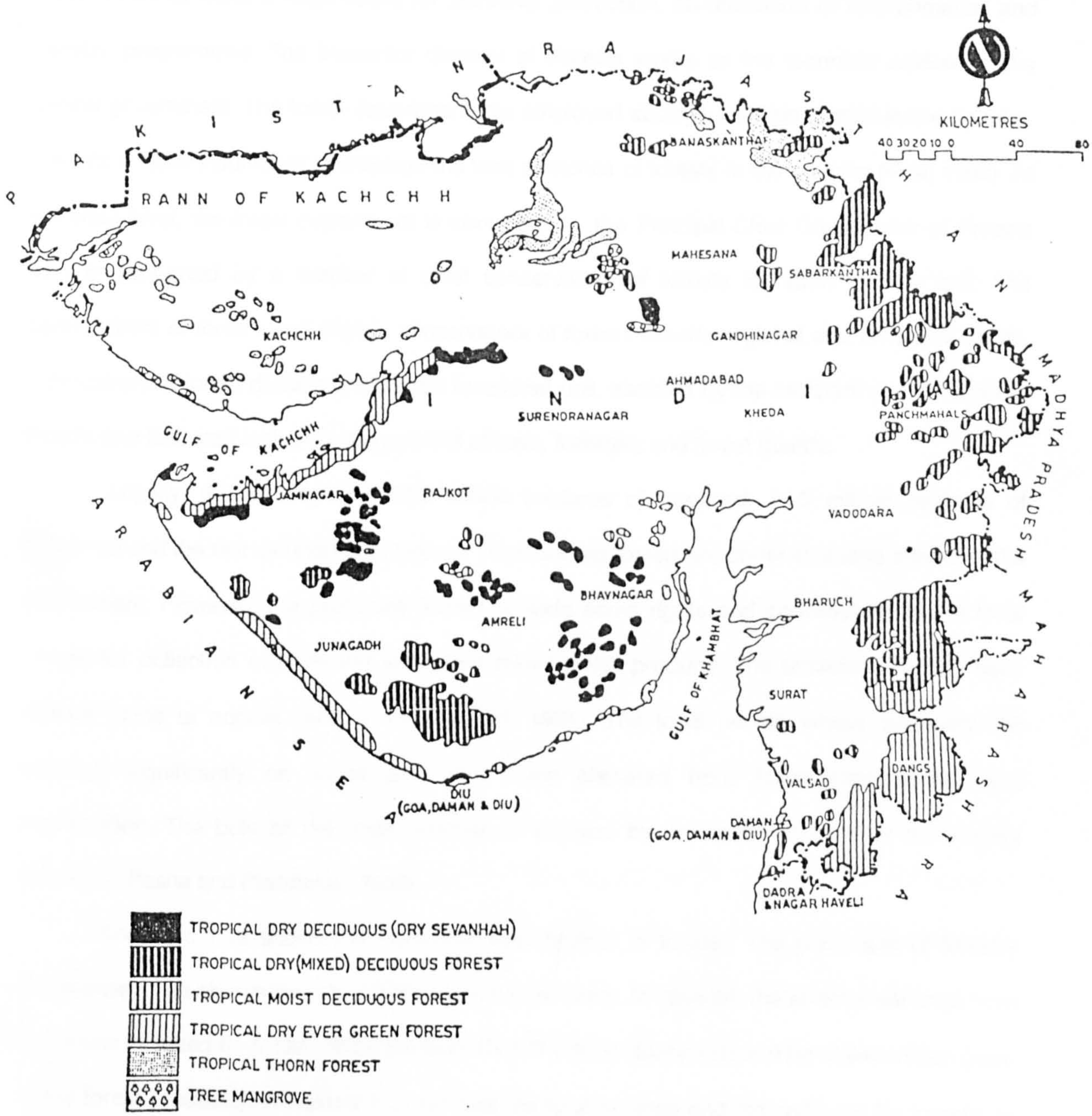
In India, about two-thirds of the forest cover occur below 600 metres altitude. Spatial distribution of forests is highly uneven among the states and districts. The state-wise recorded forest area and forest cover (along with dense forest) and per capita forest are given in the annexure 1.12. Madhya Pradesh has got the maximum forest area (15.54 million hectares); but the per capita forest area is highest in Arunanchal Pradesh (6.0 hectares).

Within Gujarat too, the distribution of forests is very uneven among the regions and districts (map 1.2). South Gujarat alone has half of the forests. Dangs has 85.8% area under forest cover. As many as thirteen districts have below 10% of their area under forest cover (FSI, 1991). More than two-third of the villages in the state have no forest at all (GFD, 1992).

Potentially exploitable forest area in the country is 49.2 million hectares and the total estimated growing stock is 4,192 million cubic metres (65 m^3/ha of actual forest cover). Silviculturally permissible average annual production is 52 million cubic metres (0.7 m^3/ha/year) which includes an unrecorded production of 22 million cubic metres in the form of dead and dried

wood removed on headloads for domestic fuel. The productivity of Indian forests (0.7 m^3/ha/year) is much lower than many countries and the world average of 2.1 m^3/ha/year (FSI, 1987).

Map 1.2: Distribution of forests in Gujarat



In Gujarat, there are 9,765 sq km (50.4%) of productive forests, 8,298 sq km of protective forests and 1,325 sq km of grasslands. The estimated standing volume is only 35 million cubic metres with a mean annual increment of 0.5 m^3/ha (GFD, 1992b).

Almost all the forests belong to the government and are governed jointly by the central government and the concerned state governments. The Ministry of Environment & Forests, Government of India is responsible for planning, promotion, co-ordination of environmental and forestry programmes. The Inspector General of Forests works as the technical adviser to the central government. The forest department has employed about 0.1 million people in the country. But this is quite insufficient to manage the vast stretches of forests in the country (Kala, 1992). At the state level, the forest department is controlled by the Principal Chief Conservator of Forests who is supported by a number of chief conservators of forests for each forestry unit. The conservators of forests and deputy conservators of forests are the regional and divisional heads, respectively. A forest division is the main functional unit, assisted by the assistant conservators of forests and field staff including range forest officers, foresters and forest guards.

Legally, the country has 40.6 million hectares of reserved, 21.5 million hectares of protected and the rest as unclassed forests. The reserved forests are under exclusive control of the government. However, the protected forests provide some rights and concessions to the local people for collection of fuelwood and other minor forest produce. The unclassed forests have various forms of access (Arnold and Stewart, 1991). The local people whose economy still depends significantly on forest use have been alienated from forest management and regeneration. The bulk of the main produce is enjoyed by the richest groups of the society (Nadkarni, Pasha and Prabhakar, 1989).

Annexure 1.13 shows the functional classification of forests. The prime aim of forestry management has always been to realise maximum revenue. In 1985-86, the revenue earnings from the forests included Rs 5,422 million (timber), Rs 571 million (fuelwood) and Rs 2,940 million (non-timber forest products). Annexure 1.14 exhibits the total revenue and expenditures for forestry in India (GOI, 1987). On the other hand, despite the consistent efforts made by the scientific

management, the average yields of timber and fuelwood in Gujarat (annexure 1.15) have decreased over the past 30 years.

1.5.2. Nature of demands on forests

1.5.2.1. Demand and supply of forest produce

On the global level, every year, more than a billion cubic metres of wood is consumed as fuelwood, especially by about 80% of the households in developing countries. Even today, the United States of America obtains more energy from woody material than from nuclear power; and in Finland and Sweden, the share of wood is about 15% and 8% respectively in the total energy use (Oldfield, 1989). The estimates show that by the year 2000, more than half the population of the developing countries will face fuelwood scarcity (FAO, 1987b). Acute shortages of fuelwood are already visible in 18 countries of Africa, 3 Asian countries and 6 Latin American countries (de Montalembert and Clement, 1983 quoted in FAO, 1985b).

In India, demands for forest products are quite large and continuously increasing because of the phenomenal growth in population. The country's forests are able to meet only 17% of fuelwood, 43% of industrial wood and 49% of fodder demands, while the remaining quantities are met through illegal extraction of wood from forests and the sale of private trees (FSI, 1987). This shows large-scale gaps in the supply and demand position of main forest produce. In fact, the fuelwood demands far exceed the supply. The estimated requirements of timber and fuelwood by the year 2000 are about 64.45 and 225.00 million cubic metres, respectively (NCA, 1976). According to Collins, Sayer and Whitmore (1991), if plantation forestry is extended and natural forests managed more effectively, India can meet these demands from its own land resources.

As compared to the national figures, the demand and supply position in Gujarat is more hopeless. The existing forest resources of the state are incapable of meeting the required demands of forest produce. For instance, in 1984-85, the total requirements were about 7.37 million tonnes

of fuelwood, 36.06 million poles, 1.07 million cubic metres of timber and 36.58 million tonnes of fodder. The supplies from the forests were able to meet only 0.15 million tonnes of fuelwood, 0.2 million poles, 0.14 million cubic metres of timber and one-fifth of fodder (GFD, 1985).

India produces 13 times as much fuelwood as sawlogs (FAO, 1990a) and about 80% population of India uses nearly 90% of the wood produced in the country as fuelwood (Shah, S.A., 1988). A large proportion of fuelwood (in the form of twigs, leaves, bark and dead wood) is extracted from the forests on headloads by the local people. Over and above this, the number of cattle grazing in forest areas is more than three times the estimated carrying capacity. Further, the uneven distribution of forests has created local and regional imbalances in the demand and supply of forest products. Needless to say, the excessive grazing and over-dependence on fuelwood are responsible for rapid depletion of forests, leading to serious ecological consequences throughout the country (FSI, 1987). Many a time, the human demands on forest resources reduce the ability of the forest to regenerate (Hallsworth, 1982).

1.5.2.2. Diversion of forest land for non-forestry purposes

At the country level, in the past thirty seven year period (1951-87), 4.328 million hectares of forests were diverted for non-forestry purposes (annexure 1.16). In addition, 4.35 million hectares of forests are affected by shifting cultivation; 0.7 million hectares are under encroachments; and 0.68 million hectares are used for mining purposes (FSI, 1987).

In Gujarat, 140,679 hectares of forest land was diverted for non-forestry purposes between 1960 and 1990 (Annexure 1.17). The forests which are found closer to habitations are faced with heavy biotic pressure due to human and cattle both. The encroachment of forests for agriculture is a major socio-economic problem in Gujarat. Periodic regularisation of such encroachments has encouraged the local people to encroach new forest lands.

1.5.2.3. Deforestation scene

According to an analysis by FAO, at the global level, the temperate forest have increased by about 2% during 1950-80, while the closed broadleaved tropical forest have shown a declining trend by about 0.6 percent per year (Lanley, 1982; Spears, 1983).

As per the estimates of the National Remote Sensing Agency (1983), the forest area in India shrunk by 16.4% between 1972-75 and 1980-82 (1.3 million hectares every year). But the situation seems to have improved, as the latest assessment shows an annual increase of 28,000 hectares (FSI, 1991). Annual rate of deforestation in India and Gujarat are shown in annexure 1.18. Between 1987 and 1989, there was a loss of 700 hectares of forests in Gujarat. Based on 1981-85 estimates (table 1.2), the annual rates of deforestation in Brazil, Indonesia, Malaysia and United States of America are higher than India.

Table 1.2: Annual rate of deforestation (1981-85 estimate)

Country	Geographical area (sq km)	Annual rate of deforestation (sq km)	Deforestation rate in percentage
India	3,288	0.50	0.015
Pakistan	796	0.10	0.013
Indonesia	1,905	10.00	0.525
Malaysia	330	2.70	0.818
Brazil	8,512	13.80	0.162
U.S.A.	9,373	1.60	0.017

Source: World Bank (1992).

1.5.3. Forest management and regeneration practices

Several authors have presented the detailed history of Indian forestry management in the early days, the British period, and the post-independence period (Guha, 1983; Nadkarni, Pasha and Prabhakar, 1989; Srivastava, 1992; Das, B.L., 1992; Sharma, A., 1992). There seem to have been very few efforts at forest conservation prior to the British period.

Scientific forestry in India is now over 125 years old. Preliminary forestry operations were started in the early nineteenth century for organising timber supplies. A proper scientific and systematic management of forests commenced after 1864 with the strengthening of forestry organisation at the national level. Later, many forest areas throughout the country were declared as reserved forests including the forests of Panchmahal, Surat and Dangs in Gujarat. In the first quarter of this century, the scientific aspects of forest management began to receive greater attention. Many silvicultural systems for different types of forests were decided upon for sustained supply of timber. Area-specific working plans were prepared to regulate the extraction of timber.

In Saurashtra and Kachchh regions of Gujarat, most of the forests belonged to the princely states who gave very little attention to proper forest management (Pathan, Arul and Poffenberger, 1990). Indiscriminate felling and shifting cultivation were very common. Regular efforts were made to control forest destruction by the provisions of the Indian Forest Act, 1927 (GFD, 1984).

For quite a long period, the forests remained a source of revenue. There was insufficient cash allocation for proper management. Large scale timber extraction continued for commercial purposes, i.e. ship building, railway sleepers, paper industry, etc. Main species included *Tectona grandis, Shorea robusta, Cedrus deodara, Pinus roxburghii, Abies pindrow, Picea smithiana*, etc. Hundreds of other indigenous species were completely neglected and there was no effort to study their silvicultural aspects. Because of faulty silvicultural practices, many virgin forest areas failed to achieve satisfactory regeneration levels and became degraded and barren.

After independence, the scientific management was further extended. Laws relating to forests were extended and standardised. Simultaneously, under the five year plans, forest development and rehabilitation works were started through artificial regeneration, in order to increase the productivity of forests.

Gujarat's forests were controlled by the Bombay forest rules. In ex-Saurashtra state, "The Saurashtra Felling of Trees and Infliction of Punishment Act, 1951" was introduced to control the felling of valuable tree species on private lands. Its provisions were extended to other parts immediately after the formation of Gujarat state. Further, "Private Forest Acquisition Act (1973)"

came into force for acquiring the private forests in the interest of better forest conservation and management purposes.

It is observed that excessive grazing, frequent fires and heavy biotic pressures have seriously affected the natural regeneration of tree species. Despite the fact that over three-fourths of the forest area is covered by the working plans for proper management purposes, adequate natural regeneration is limited to only 15% of areas and more than half of the forests have inadequate regeneration. As a result, India's forest resources are rapidly declining and are now unable to meet the multiple demands of individuals in general and the nation in particular (FSI, 1987). In spite of the well-laid out policies, India's forests have continuously suffered serious depletion due to relentless pressure arising from ever-increasing demand for fuelwood, fodder and timber. Inadequate protective measures, diversion of forest land for non-forest purposes, encroachment and the tendency to realise more and more revenue have caused heavy destruction of forests throughout the country (GOI, 1988).

1.5.4. Government's policies and needs of the people

From time to time, several commissions, committees, policies and acts have defined the nature of forests with special reference to meeting the needs of the people. In general, prior to British rule, the regulation of the people's use of forest was mainly through local customs.

The concept of "village forests" was recognised by the Forest Acts of 1875. They were meant for meeting the fuelwood needs of the local community (Singh, S., 1991). A report on "Improvement of Indian Agriculture" by Dr Volecker in 1893 mentioned the creation of fuelwood reserves (Shah, S.A., 1988). The first forest policy (1894) tried to streamline the rights and privileges of people living in and around forests. It stated that the needs of the local population should override all considerations of revenue. The creation of fuel and fodder reserves were also supported (Tiwari, 1983). The Forest Act of 1927 gave recognition to the rights of individuals (Arnold and Stewart, 1991). The Royal Commission on Agriculture (1928) recommended fuelwood

and extension forestry in India by handing over the management of village forests to the village panchayats. It also suggested raising plantations along canal banks, margins of rivers and streams (World Bank, 1990b).

The policy of 1952 had recommended establishment of tree lands, wherever possible for the general well-being of the people by ensuring the supplies of forest produce, particularly fuelwood, fodder and small timber. However, the national needs were given precedence over the privileges of the local inhabitants. The policy favoured the realisation of maximum annual revenue in perpetuity without sacrificing the national interests and without subordinating the rights and interests of future generations. It advocated awakening the interest of the people in the development, extension and establishment of tree lands on all possible lands.

The recent policy of 1988 mentions meeting requirements of fuelwood, fodder, minor forest produce and small timber of the people, particularly the rural and tribal population as the first charge on the country's forests. It recommends the promotion of social forestry including farm forestry in a massive way through a time bound programme.

1.6. Growth and Structure of Economy

According to the World Bank (1992), India's per capita GNP is only 350 US dollars and the ICP (International Comparison Programme) estimate of GDP per capita is only 5.4 percent of U.S.A., suggesting a very low economy as compared to many other countries (annexure 1.19). Table 1.3 (page 24) indicates that the agriculture sector still contributes nearly one-third in the country's economy because the number of people who depend on farming is quite large.

In spite of reasonable growth rates and a gross domestic product (GDP) of 254,540 million dollars, India remains among the poor countries.

Gujarat's per capita income is relatively higher than many other states of India (GOI, 1991). It was Rs 1,970 as compared to the national average of Rs 1,630 at constant prices of 1980-81 (1 US $ = Rs 7.91). The annual growth rate of Gujarat's economy has been recorded as only 4% per

annum. The contribution of the agriculture sector has gradually decreased from 48.9% in 1970-71 to 39.3% in 1980-81 and to only 26.7% in 1989-90 (annexure 1.20).

Table 1.3: Growth and structure of production in India

Growth of production		Structure of production	
GDP		**GDP (million dollars)**	
(1965-80)	3.6%	1965	50,530
(1980-90)	5.3%	1990	254,540
Agriculture		**Share of agriculture**	
(1965-80)	2.5%	1965	44%
(1980-90)	3.1%	1990	31%

Source: World Bank (1992).

Historically Gujarat has been well known for its textiles mills. Now it is a major producer of petrochemicals, fertilisers, dyes, common salt, milk & baby food, pharmaceuticals, drugs, etc. Even then the agriculture sector contributes more than a quarter in the state's economy.

In monetary terms, the contribution of the forestry sector in the country's gross domestic product is about one percent. Annexure 1.21 provides the year-wise figures for 1977 to 1983 (GOI, 1987). Similarly in Gujarat, the contribution of forestry in the state's gross domestic product is limited to only 0.4 percent (GFD, 1984). Throughout the country, the income from gathering and selling forest produce, and large-scale employment in forestry operations is an important part of the rural economy (FAO, 1978). But this remains unreflected in the total income.

1.7. Rural unemployment and poverty

Agriculture plays a very crucial role from the point of view of income and employment in all parts of India. According to the 38th round of National Sample Survey of 1983, there were 17.44 million unemployed people in India (GOI, 1985a) and only eighteen percent of the total labour force in Gujarat had regular wage/salaried employment. Self-employed and casual wage labourers

(80% of total labour) do not have a full-time job and they have to face intermittent spells of unemployment every year (GOG, 1989).

More than 300 million Indians are poor (Puttaswamaiah, 1990) and about 200 million of them live below the poverty line (Chambers, Saxena and Shah, 1989). Nearly 1.145 million families (24.3% of the population) in Gujarat are below the poverty line. The poverty is higher in rural areas than urban areas, and especially more serious among agricultural labourers (GOG, 1989). The eastern hilly areas and southern plains of Gujarat have more poor people.

1.8. Energy consumption

Fuelwood is a major source of non-commercial energy in India, especially the rural areas. It contributes 36.5% of the total energy requirement in Gujarat. Other sources include agricultural waste (14.2%), dung cake (10.7%), kerosene (16.2%), LPG (14.1%) and coke (7.4%). More than seven million tonnes of firewood are consumed annually for cooking and heating needs. The estimates show that the fuelwood will remain the major source for meeting rural energy needs in the near future too (GFD, 1985).

1.9. The panchayat system

The panchayat system is a three tier democratic system of local self-government of villagers, set up at district, taluka and village levels. India has around 0.2 million village panchayats with an average population of 2,306 (Agarwal and Narain, 1989). Gujarat has 13,029 village panchayats, 144 nagar panchayats, 182 taluka panchayats and 19 district panchayats (GOG, 1991a). Village panchayats form the lowest rank and represent a single or group of villages. A panchayat samiti is formed of the representatives of the village panchayats of a taluka. Similarly, town areas have got nagar panchayats. The district panchayat is the apex of panchayat organisation at district level (Agarwal, 1990).

Panchayats take an active part in the rural development activities. They have wide powers and look after the social, cultural and economic life of the villagers (Kumar, et al., 1963). Their functions cover almost all aspects of rural life, particularly water supply, health, building of roads, street lighting, education, agriculture, animal husbandry, minor irrigation, rural housing, collection of revenue, etc. They control the village common grazing lands. Panchayats have powers to levy taxes on persons, property and business. Government also gives grants for carrying out certain works. Their work is looked after by the field staff of the state government. In general, the annual income of village panchayats is very small, averaging to Rs 8,000 only. About 80% of the village panchayats have below this average. They use their income for high priority works related to agriculture, drinking water and roads. Forestry is not a priority item for them (Shukla and Dalvi, 1986).

1.10. Special problems of Gujarat

1.10.1. Drought

In Gujarat, three-fourths of agriculture is rainfed. About 35% of the area located in twelve districts and 43 talukas is drought-prone. There were 23 years of drought in this century alone (Mehta, S., 1991). During the droughts of 1985, 1986 and 1987 (which affected 13,390, 11,612 and 15,369 villages, respectively), the state had to mobilise Rs 15,000 million on drought relief works. In addition, agricultural crops worth Rs 50,000 million were destroyed (Patel, V.M., 1991). The effect of drought is enormous on income and employment of the rural population, particularly those living below the poverty line (Agarwal, et al., 1987; Karanjia, 1991). Social forestry is considered as an important activity for relief works because of high employment potential.

1.10.2. Salinity and desertification problems

Gujarat's 1,500 km long coastline is a great threat of increasing salinity ingress. In the recent past, it has advanced up to 6 km from the coastline in many parts (Bhatt, 1990). As a result, the ground water has become saline and unfit for drinking and plant growth. Over-exploitation of ground water for irrigation has further aggravated the salinity ingress problems (Patel, V.M., 1991).

Parts of Mahesana and Banaskantha districts are facing desertification problems due to the advancing Thar desert of the Indian sub-continent. Similarly, parts of Surendranagar district are under threat of the Little Rann of Kachchh (Bhatt, 1990; Karanjia, 1991).

1.10.3. Migration

Even in good rainy years, in many parts, millions of villagers cannot sustain themselves on the meagre cultivation of marginal lands. Due to limited work opportunities in rural areas, poor people are forced to migrate to other areas in search of economically gainful work (Dalal, 1991). Usually, the agricultural labourers migrate out temporarily in search of labour after the harvest of the kharif crop, particularly in the summer months.

Maldharis and Rabaris (professional and skilled communities) who live in the Saurashtra and Kachchh region rear cattle, sheep and goats. They move from one place to another in search of better grazing grounds. Every year, at least 25% of the livestock migrates. In drought years, the situation is uncontrollable. They cause large-scale damage to the juvenile plantations (Shukla and Dalvi, 1986).

1.10.4. Regional disparities in Gujarat

A great amount of regional disparity is seen in Gujarat in terms of distribution of natural resources, human population and livestock (Fig 1.1, 1.2, 1.3 and 1.4).

Having only 16% of area (46% forests and 13% common grazing lands), south Gujarat supports 31% of the people and 28% of the livestock. On the other hand, Kachchh shares 23% of the area (15% forest and 8% of common grazing land) for sustaining only 3% of the people and 7% of the livestock. The population density is highest in central Gujarat which has only 13% area (8% forests and 16% common grazing land) to support 26% of the population and 17% of the livestock. The regional distribution of annual rainfall is quite pronounced, affecting the quality and growth of vegetation in Saurashtra and Kachchh region which support 36% of the total livestock of the state.

This shows that each region has a distinct problem and is constrained by the occurrence of natural resources to support its human and livestock population. This causes a hindrance in the progress of the state.

Fig 1.1: Distribution of area

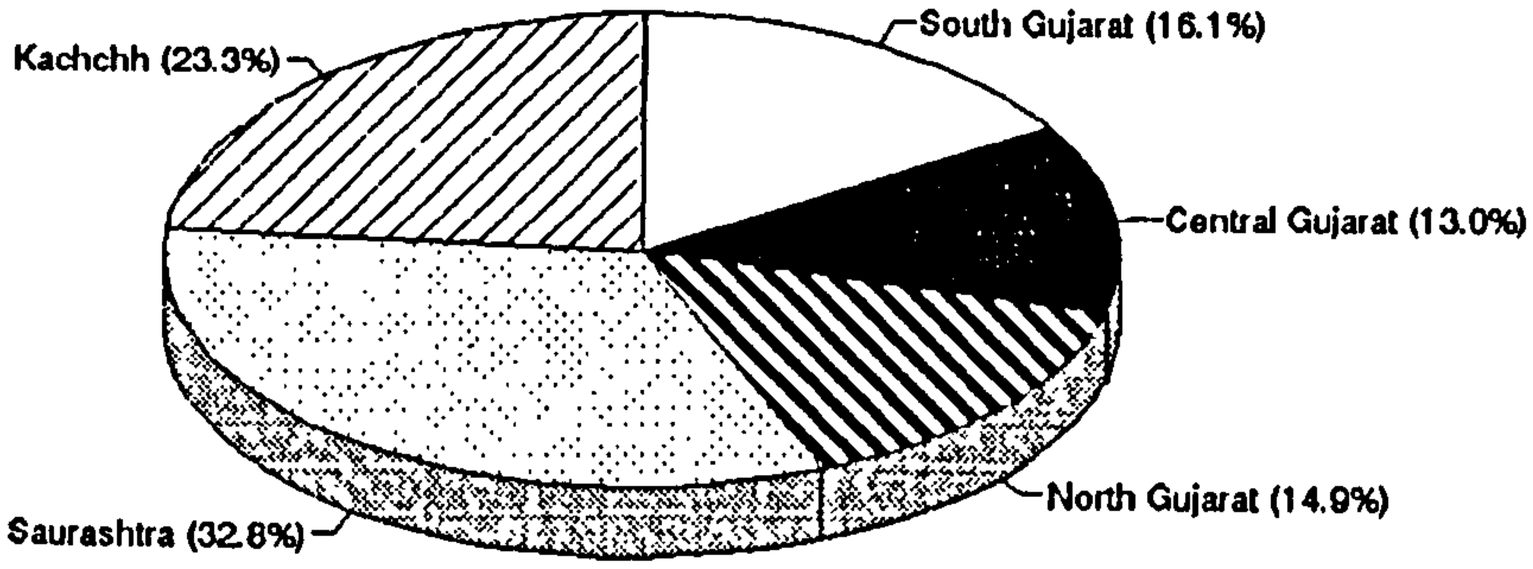


Fig 1.2: Distribution of population

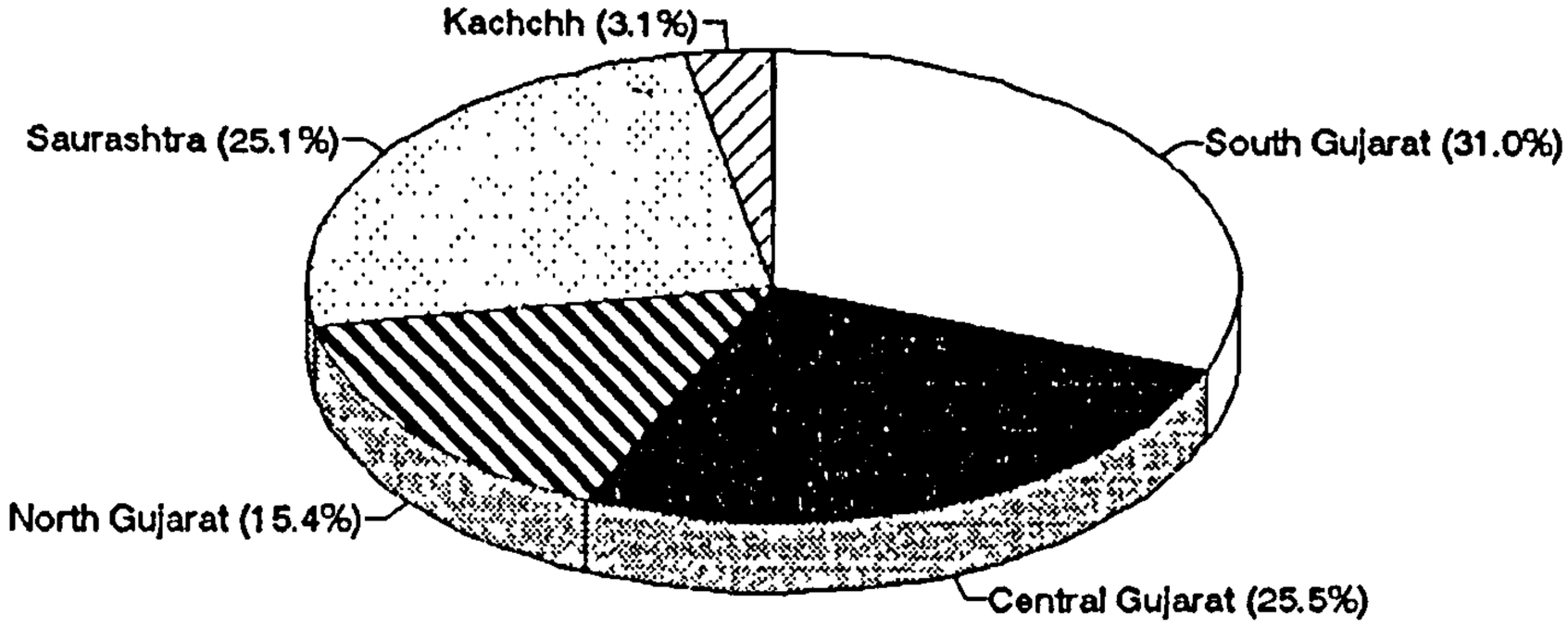


Fig 1.3: Distribution of livestock

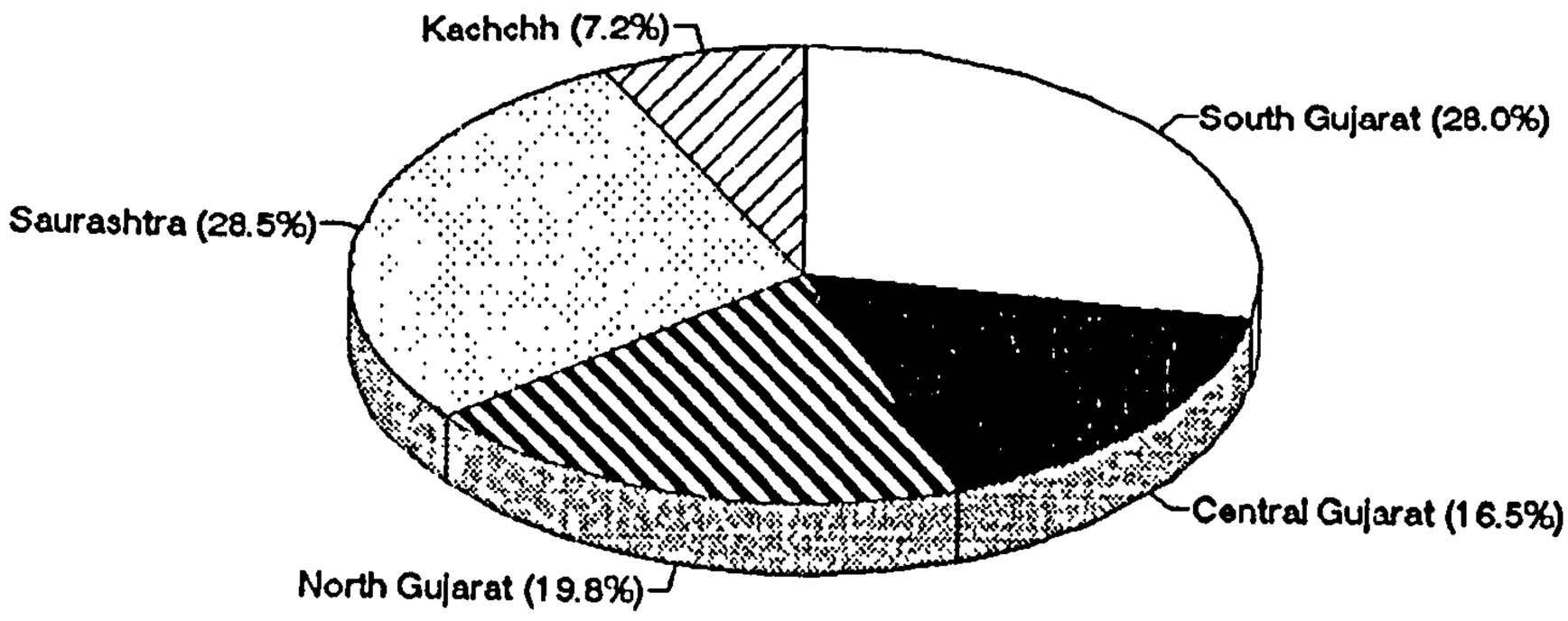
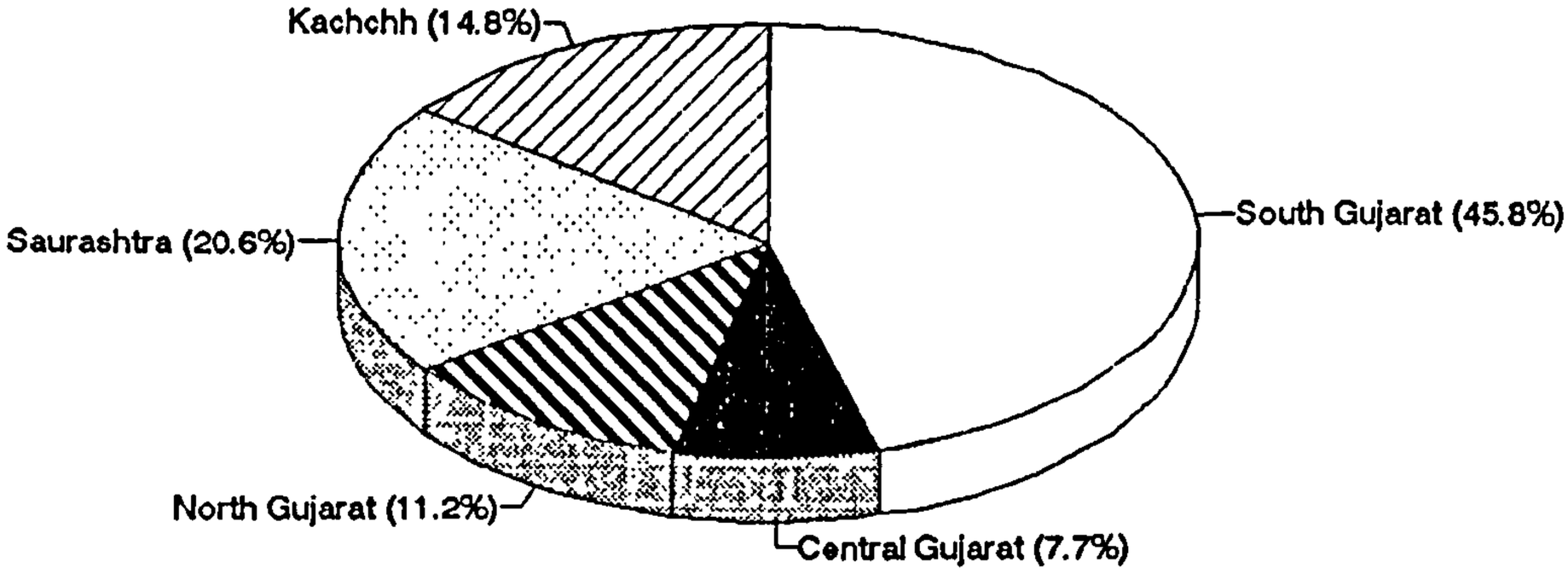


Fig 1.4: Distribution of forests



1.11. Summary

Most people in India live in close contact with the natural world. They derive all kinds of daily subsistence needs directly from the countryside (either private or common land). A reasonably good vegetation cover is, therefore, quite important in the rural economy of India.

Gujarat's agro-climatic details, population and land-use clearly exhibit an uneven distribution of resources. Nearly two-thirds of villages have no forest areas and millions of people have no land of their own. In addition millions of farmers, especially small and marginal farmers, have very little landholding. In short, the rural poor have limited resources to meet their daily requirements of fuelwood and fodder. They have no other alternative but to depend on the common lands for their daily needs.

Over the years, the village common lands have partially or wholly degraded and are incapable of meeting the needs of the people. Therefore, regeneration of common lands has become an imperative for India including Gujarat state.

Chapter Two

Social forestry in India with special reference to Gujarat

This chapter is designed to elucidate the social forestry programme in India with special reference to Gujarat. Particularly the implementational and distributional aspects of social forestry have been detailed with special reference to Gujarat.

2.1. Conceptual background of social forestry

Before the advent of the term social forestry, many instances in different countries indicate the public-initiated tree growing in the past. Examples include China, Sri Lanka, Ethiopia, India, Indonesia, Korea, Peruvian Andes, Senegal, Mali, Malawi, etc. (FAO, 1985b).

The term social forestry was used for the first time in the ninth Commonwealth forestry conference held in India (1968) when Jack Westoby proposed a distinction between "production forestry and social forestry", as under:-

Production forestry	Social forestry
forestry which aims at producing wood for industrial and household use.	forestry which aims at producing a flow of protection and recreation benefits for the community.

Official recognition was given to social forestry for the first time by the National Commission on Agriculture in 1973 to denote the tree growing programme for supplying the fuelwood, fodder, small timber and minor forest produce to rural communities. The commission identified farm forestry, extension forestry (on public lands and village common lands),

rehabilitation of degraded forest lands, and recreation forestry (Shah, S.A., 1988). The Government of India accepted the recommendations of the commission in 1976 (NCA, 1976).

So far, there is no approved definition of social forestry (Slade and Campbell, 1986; Shah, S.A., 1989; World Bank, 1990b; FAO, 1992). FAO (1985b) described social forestry as,

"a term used for any type of industrial, conservation or community forestry project which tries to maximise benefits for residents".

Slade and Campbell (1986) described social forestry as tree growing for rural development which is heavily dependent on the active participation of people. Another expert (Shah, S.A., 1988) has described social forestry as,

"any programme of tree planting by any organisation on any land, including farm forestry...to the extent it meets the needs of the rural poor".

According to the World Bank (1990b),

"social forestry is a programme designed to create the necessary conditions for tree planting outside the traditional domain of the forest lands...includes the tree planting in farmers' fields; in village common lands; along roads, railways, and canals; and in degraded wastelands...are multi-dimensional and complex...involve much more than just planting tree".

The synonyms for social forestry are "community forestry" or "village forestry" (Arnold, 1983) or "forestry for local community development" or "participatory forestry" (Slade and Campbell, 1986). Community forestry which falls under the umbrella of social forestry was defined by FAO (1978) as

"...any situation which immediately involves local people in a forestry activity...embraces...woodlots...for local needs, through the growing of trees at the farm level to provide cash crops and the processing of forest products at the household, artisan or small industry level to generate income, to the activities of forest dwelling communities...excludes large-scale industrial forestry... which contributes to community development solely through employment and wages...does include...services which encourage and assist forestry activities at the community level...does embrace most of the ways in which forestry and the goods and services of forestry directly affect the lives of rural people".

However, Tiwari (1983) opined that the present social forestry programme is not at all different from conventional forestry. Roche (1992) argues that social forestry as defined by Westoby is sustainable only when donors provide the resources out of their public funds. He does not agree with the dichotomy between social forestry and production forestry. But Shah, S.A. (1988) differentiates social forestry and conventional forestry as under:-

Conventional forestry	Social forestry
1. mainly based on long rotations,	1. managed on short rotations,
2. no involvement of the community	2. with involvement and participation of local community
3. based on single-use (timber) trees, etc.	3. diffused in small bits and with multiple uses (fruits, fuelwood and small timber),
4. social functions are subordinated to the commercial ones.	4. it is just the opposite in social forestry.

2.2. Evolution of social forestry in India

Attempts to encourage village communities in tree planting date back to 1940s, although the efforts were slow and limited (FAO, 1985b). Much before the proposal of Westoby, the Government of India had started a programme called 'van mahotsava', the annual festival of trees from 1950 (Tewari, 1992). The idea was to promote tree planting by the people and other institutions. A few states (Gujarat, Tamilnadu, etc.) were already implementing programmes for regeneration of non-forest lands (Shukla and Dalvi, 1986; FAO, 1985b). The farm forestry symposium held in Dehradun (1958) had recommended tree raising by farmers to meet the increasing demands of forest produce (Shah, 1988).

However, the Commonwealth conference of 1968 activated the idea of tree growing for the community. Few state forest departments took immediate initiatives to launch social forestry

schemes to plant the non-forest lands. Gujarat was the first state to set up a separate unit for social forestry.

Due to the unrestricted rural demand for various forest produce, the pressure on reserved forests had increased considerably, leading to shrinkage of tree cover from the areas lying in the vicinity of villages. Therefore, a befitting programme for regeneration of degraded areas was thought necessary for reducing the burden on production forests. With this idea, the National Commission on Agriculture mooted the idea of launching of a massive social forestry programme with involvement of the local communities. The idea received recognition by national (NCA, 1973) and international organisations, especially the FAO (1978) and the World Bank (1978). The theme of the Eighth World Forestry Congress held in Djakarta (1978) was 'Forests for People'. As a result, the national and state-level policies and programmes were reoriented to support social forestry for the people (Singh, S., 1991). The Government of India took a few years to standardise the social forestry programme for the country as a whole.

During the sixth five year plan, the Government of India introduced a massive programme of social forestry throughout the country to create additional fuelwood and fodder reserves to meet the growing demands of rural population. A social forestry unit was created in the Ministry of Environment and Forest (which separated from the Ministry of Agriculture). Afforestation and tree planting were listed in the India's twenty point programme (GOI, 1983). Higher cash allocations were made for social forestry to achieve increased targets of planting.

The national level objectives of social forestry were outlined as follows:-

(i) to meet the requirement of the rural communities in respect of fuelwood, small timber, fodder, fibre and a variety of other minor forest produce;

(ii) to meet the raw material requirement of cottage and small scale industries in particular;

(iii) to provide gainful employment to the rural poor;

(iv) to bring about the eco-restoration, conservation and development of degraded forest areas; and

(v) to bring one-third of the area of the country under forest or tree cover.

External assistance was sought to supplement the funds for social forestry projects. Several million seedlings were raised and distributed to the people. Block plantations, strip plantations and farm forestry activities were carried out on a much bigger scale. An attempt was made to popularise the programme in rural areas and particularly amongst the poorer sections of the society by free distribution of seedlings.

By the end of sixth plan, an assessment of social forestry indicated many deficiencies in implementation. The overall efforts were found inadequate. As a result, on 5th January, 1985, the Prime Minister of India announced

"Continuous deforestation has brought us face to face with a major ecological and socio-economic crisis. The trend must be halted...We shall develop a people's movement for afforestation" (NWDB, 1985a).

A National Wastelands Development Board (NWDB) was set up with a mandate to create 5 million hectares of fuelwood and fodder plantations every year with an active involvement of non-governmental organisations, voluntary agencies and the public at large, including the landless (NWDB, 1985b).

In view of the above facts, the seventh plan gave an added emphasis to increasing the vegetal cover by a massive afforestation programme through a people's movement. Several innovative schemes were initiated to increase the level of people's participation in creating a mass movement in the country (GOI, 1985a). The allocations under various sectoral programmes of the central and state governments were further increased for mobilising more resources. As a result, the total achievement in the seventh plan (1985-90) included the afforestation of 8.88 million hectares which was substantially higher as compared to the previous plans, as shown below:-

Period	Area afforested (million hectares)
1950-80 (up to fifth plan)	3.56
1980-85 (sixth plan)	4.65
1985-90 (seventh plan)	8.88

Towards the end of seventh plan, the role and functions of the NWDB were again restructured into adopting a mission approach in order to promote integrated wasteland development through systematic planning and implementation. Restoration of the forest cover in the country through natural regeneration or appropriate intervention for ecological security is one of the aims. Now, with the active assistance of voluntary agencies, non-governmental organisations, panchayats, and individuals, the board is promoting participatory and sustainable management of the common lands. The overall management prescriptions are oriented not only towards maintaining the ecological balance but also towards satisfying the basic needs of the Indian society, particularly the rural and tribal people (NWDB, 1990a).

2.3. Implementation of the social forestry programme in India

The social forestry programme in India has been implemented under various schemes of the central and state governments. Funds have been mobilised through the central schemes (NWDB, Department of Rural Development; Department of Agriculture); state schemes; private industries and individuals; and the foreign-aided social forestry projects with assistance from many bi-lateral and multi-lateral donor agencies. Main funding agencies include the World Bank, United States Agency for International Development (USAID), Swedish International Development Agency (SIDA), Canadian International Development Agency (CIDA), Danish International Development Agency (DANIDA) and Overseas Development Administration (ODA). The World Bank is the biggest funding agency involving projects in 9 States viz. Uttar Pradesh, Gujarat, Rajasthan, Himachal Pradesh, Haryana, Jammu & Kashmir, Karnataka, Kerala and West Bengal. The first four states had a composite project, called the National Social Forestry Project (NSFP). Recently the Overseas Economic Cooperation Fund (OECF) and European Economic Commission (EEC) have also provided funds for afforestation projects in Rajasthan and Haryana state, respectively (NWDB, 1989a). Some states (Gujarat, Orissa, Tamilnadu and Uttar Pradesh) have entered into the second

phases of the projects. Overall, Gujarat's share has been 17.01% in terms of cost and 23.49% in terms of the area coverage under these projects.

The total involvement of funds in the social forestry programme of India has been about Rs 30 billion (nearly US $ 2.3 billion). Annexure 2.1 summarises the physical and financial details of the foreign aided social forestry projects in India. Plan-wise details of afforestation in India is shown in annexure 2.2.

The main objectives of the social forestry projects are to promote social forestry for augmenting the production of fuelwood, small timber, pulpwood, fodder and minor forest products to meet the needs of the rural communities. The projects also aim to increase rural employment, farmers' incomes and opportunities for participation of the rural poor.

To fulfil the general objectives of social forestry development, several types of plantation models have been designed to suit the region-specific requirements of each state. The emphasis is on people's participation in nursery raising, planting and protection of trees. The projects create awareness among the people about environmental and economic benefits of the tree planting programme. In order to develop technical and managerial skill (of the government departments, non-governmental organisations and individual tree growers), strengthening of the forestry institutions through education, training, research, and extension activities are also an important part of these projects.

The basic approach to implementation of social forestry in India is more or less similar in all states. The programme provides for raising of tree plantations on the following lands:-

(i) degraded village common lands;

(ii) strip lands (roads, canals and rail sides);

(iii) degraded forest areas;

(iv) revenue wastelands; and

(v) private lands.

The physical achievements of tree planting under these projects have progressed satisfactorily. The proportion of farm forestry is nearly 50-60% of the total planting effort in the country. Millions of farmers in Punjab, Haryana, Uttar Pradesh, Gujarat, Tamilnadu, Karnataka, West Bengal, etc. have taken up farm forestry in a big way mainly as a cash crop (Spears, 1983).

Between 1985-86 and 1991-92, more than 400 voluntary agencies and non-governmental organisations have initiated 619 projects involving Rs 359.4 million for wasteland development programme in the country (NWDB, 1992).

2.4. Implementation of the social forestry programme in Gujarat

The first scheme to be started in the name of social forestry in Gujarat was the strip plantation over 125 hectares in 1969-70. The farm forestry scheme (distribution of free seedlings for private lands) began in 1970. The schemes for village woodlots and reforestation of degraded forest lands commenced from 1974-75 and 1976-77, respectively. The initial success of the plantations on non-forest lands created a public awareness, particularly in rural areas (Shukla and Dalvi, 1986).

Due to paucity of funds, all the social forestry schemes were implemented on an annual basis without any long-term project approach. The implementation was confined to a limited scale till the emergence of the World Bank aided community forestry project in 1979-80. During the eighties, Gujarat has seen two subsequent phases of foreign aided social forestry projects (World Bank, 1979 and 1985a). In addition, during sixth and seventh five year plans, several schemes of the central government (forestry sector and rural development department) have also provided substantial funds for social forestry activities in Gujarat. About 20 non-governmental organisations have taken advantage of the schemes started by the NWDB for increasing the people's involvement in the tree plantation programme of Gujarat. The state is now nationally and internationally recognised, well appreciated and criticised for large-scale implementation of social forestry programme.

The implementation of the social forestry programme in Gujarat can be divided in three distinct phases, as under:

- 1969-80 (mainly state sector schemes on an annual basis);

- 1980-85 (Community forestry project with the World Bank's assistance) and

- 1985 onwards (National social forestry project with joint funds from the World Bank and United States Agency for International Development).

2.4.1. Objectives of social forestry in Gujarat

The main objective of the annual schemes before 1980 was to provide fuelwood in rural areas. The additional produce were mentioned as poles, bamboos, fodder, small timber, fruits, oil seed, gum, etc. This objective was repeated in the first phase of the World Bank aided "Community Forestry Project" of Gujarat. In addition, the project was designed to promote fuel conservation measures (improved crematoria and cooking stoves); to provide employment to the poorest section of the society; and to help soil conservation (World Bank, 1979).

The second phase of social forestry in Gujarat pursued the following four objectives:-

(i) to increase production of fuelwood, small timber, poles and fodder;

(ii) to increase rural employment, farmers' incomes and opportunities for participation of landless persons;

(iii) to afforest degraded areas and wasteland and reduce soil erosion; and

(iv) to strengthen forestry institutions (World Bank, 1985a).

Thus with the projectised approach the objectives became more specific and distinct in nature, intending to increase people's involvement, especially the rural poor.

2.4.2. Main components of social forestry

Brief descriptions of the main components of social forestry in Gujarat are given in the following paragraphs.

2.4.2.1. Strip plantations

These plantations are raised in a linear fashion along the roads, canals and railway lines. The number of rows on both sides depends on the width of strips available for plantation. In the roadside plantations, the first row is planted with shade and avenue trees for aesthetic values. Subsequent rows include many fast growing species for fuelwood and timber production. Since the beginning, 71,584 hectares of strip plantations (80.31% roads, 10.63% canals and 9.03% railway sides) have been carried out in Gujarat up to 1990. More than half of these plantations were raised during the first phase of the social forestry.

2.4.2.2. Village woodlots

The village woodlots are raised on village common land, called "gaucher" (grazing land) which is owned by panchayats. The plantations may be rainfed or irrigated. The departmental woodlots are raised by the staff of the social forestry department after obtaining permission (resolution) from the village panchayat who sign an agreement for future management and benefit sharing. As per the policy, the departmental plantations are required to be transferred to the village panchayat in the fourth year for protection and further management purposes. Past experiences show that the panchayats are by and large reluctant to undertake this responsibility. However, a few enthusiastic and progressive village panchayats have raised self-help village woodlots by involving the villagers. The government staff provides the technical guidance and seedlings for such woodlots.

On the whole, between 1974-75 and 1989-90, over thirteen thousand village woodlots covering 76,319 hectares were raised in Gujarat under this scheme. This includes 87% of departmental and 13% of the self-help village woodlots. About 89% of the village woodlots are of rainfed type. About half of the total village woodlots were raised during the first phase of social forestry in Gujarat.

2.4.2.3. Farm forestry (distribution of seedlings)

This is the most popular and important scheme of the social forestry programme. The social forestry officials have established thousands of nurseries throughout the state and raise seedlings of many suitable species in large number for distribution to the farmers and others who establish plantations on their own lands. The seedlings were given free of charge till 1985. A token charge was introduced in 1986 for those who ask more than thousand seedlings to avoid any unnecessary wastage of planting stock. Altogether, 1983.6 million seedlings were distributed to farmers up to 1990.

2.4.2.4. Reforestation of degraded forest lands

The state has nearly 0.64 million hectares of degraded forest land. With an idea to regenerate these areas, two types of schemes are being implemented. The first one is purely departmental. The second one, called 'social security scheme' involves the tribal landless families (in a group of 10-15) who are temporarily engaged to carry out the planting and after-care operations on the degraded forest land. They are paid their wages and are settled in the nearby area with permission to keep cattle, poultry and grow some vegetable crops for their own use. At the time of harvesting, the families get 20% share in the net profit of the forest produce. A total of 82,792 hectares of degraded forests have been reforested by 1990. About 8.66% of these plantations were raised through the settled labourers.

2.4.2.5. Malki (Private tribal land) plantations

In the tribal areas, many tribal families have their private lands which are lying unused and barren. This scheme helps them to regenerate their lands by raising tree species of commercial timber value. The government forestry staff carries out the operation for them. The people themselves protect such plantations for 100% benefit. By 1990, a total of 1,992 hectares of malki land has been afforested.

2.4.2.6. Rehabilitation of degraded farm lands

Throughout the state, thousands of hectares of farm lands are badly degraded. This scheme helps the small and marginal farmers to reclaim their farm lands by growing trees. Under the scheme, the government pays for the advance works and provides free seedlings to the farmers, who undertake the planting and aftercare operations themselves. The staff gives technical guidance. Depending upon reasonable survival rates, the farmers are given subsidy at the end of the year. So far, 29,444 hectares of degraded farm lands in Gujarat have been covered under this scheme.

2.4.2.7. Other schemes

A scheme for fodder development was initiated in the first phase to reduce pressure on the newly regenerated panchayat lands which were meant for grazing purposes. Similarly a scheme called 'urban firewood plantations' was initiated in the second phase to meet the demands of fuelwood in the urban areas which usually have vast degraded areas in their neighbourhood. With an idea of improving the environment, particularly near industries, a separate scheme called 'Environmental plantation' was also introduced in the second phase. The scheme for improved

crematoria and cooking stoves began in the first phase in order to make an efficient use of fuelwood for energy conservation purposes.

2.4.3. Scheme-wise physical achievements of social forestry

Table 2.1 shows the overall physical achievements of social forestry schemes in Gujarat from 1969-70 to 1979-80, 1980-81 to 1984-85 and 1985-85 to 1989-90. The figures clearly establish the increasing level of emphasis on the social forestry programme.

Table 2.1: Scheme-wise physical achievements of social forestry in Gujarat

Name of the schemes	Area coverage (hectares)		
	1969-70 to 1979-80	1980-81 to 1984-85	1985-86 to 1989-90
(a) Strip plantation	19,325	37,590	12,138
- roadside	16,411	31,888	9,189
- canal bank	2,922	2,035	2,654
- railway side	-	3,667	2,798
(b) Village woodlots	17,576	38,208	20,535
- departmental			
- rainfed	17,576	28,393	13,326
- irrigated	-	3,836	3,174
- self-help			
- rainfed	-	5,979	2,876
- irrigated	-	-	1,159
(c) Reforestation of degraded forest			
- departmental	15,655	27,680	32,286
- social security	45	2,570	4,556
(d) Village firewood plantation	-	-	835
(e) Malki plantation	164	1,000	828
(f) Reforestation of degraded farm lands	-	1,521	27,923
(g) Fodder development	-	461	684
(h) Farm forestry*	151.1	701.7	1130.8
(i) Improved			
- crematoria	-	1,106	308
- cooking stoves	-	10,937	-

* Figures indicate seedling distribution in millions

Source: Gujarat Forest Department.

Particularly the scheme of farm forestry shows manifold increase (from 151 million seedlings during 1969-80 to 1131 million seedlings during 1985-90). This also indicates that the social forestry schemes in Gujarat were at a peak during 1980-81 to 1985-86.

2.4.4. Expenditure on social forestry in Gujarat

Table 2.2 provides the overall expenditure on production forestry and social forestry in Gujarat. The figures clearly indicate the increasing level of emphasis on social forestry since its inception in 1969. The expenditure on social forestry has become nearly three times that of the production forestry.

Table 2.2: Expenditure on social forestry in Gujarat
(in Rs million)

Period	Total	Production forestry	Social forestry
1951-56	1.97	1.97	0.00
1956-61	10.22	10.22	0.00
1961-66	22.36	22.36	0.00
1966-69	22.08	22.08	0.00
1969-74	39.20	33.60	5.61
1974-78	126.80	66.20	60.56
1978-80	138.29	64.22	74.07
1980-85	1,038.46	351.60	676.35
1985-90	1,489.33	394.00	1,095.37

It needs to be highlighted here that the share of village woodlot scheme has been up to 20% in the total expenditure of social forestry in Gujarat.

2.5. Employment generation through social forestry

The immediate benefits from the implementation of social forestry projects have been the generation of employment throughout the country, especially in the rural areas. According to Pant

(1979), one hectare of planting activity creates 150 to 500 man-days of employment in the first three years. Including the harvesting works, the direct employment through social forestry schemes may be 600 to 700 man-days (ILO/ARTEP, 1988).

In Gujarat, the total employment generation through the social forestry programme includes 63.51 million man-days during 1980-90 (34.95 million man-days in the first phase and 28.56 million man-days in the second phase). In terms of employment generation, the contribution of social forestry programme is presented in table 2.3.

Table 2.3: Employment generation through social forestry
(million man-days)

Year	Forestry	Social forestry	Percentage
1983-84	21.38	9.83	46
1984-85	21.08	5.95	28
1985-86	18.74	5.62	31
1986-87	17.08	5.02	29
1987-88	20.05	5.73	29
Total	98.33	32.15	33

Source: Gujarat Forest Department.

This indicates that about one-third of the total man-days generated in forestry works came from the implementation of social forestry schemes.

2.6. Benefit-sharing mechanism in social forestry

The accrual of direct benefits from tree planting is related to the type of land, its ownership and the provisions of the schemes. The village woodlots, beside helping to tackle problem of degradation of common lands, are expected to provide a means by which the landless poor can take part in tree growing and thereby obtain benefits which are otherwise enjoyed by the landowners only. Unfortunately, in many cases, there is no clear and agreed upon method for sharing the produce, either intermediate or final. Usually, the people are unaware of the existing

sharing arrangement (FAO, 1985b). In fact, many authors have criticised the implementation of social forestry as,

> "...the CPRs are virtually converted into commercial fields by the social forestry projects...without making available the larger part of the benefit to the village communities" (Kala, 1992).

Apart from the employment opportunities, the primary aim of the project has been to provide the fuelwood requirements in the rural areas. With the projectised approach of social forestry, the benefit-sharing mechanisms for various forest products seem to have evolved systematically. Appendix 4.1 furnishes the existing norms for sharing the benefits under various schemes of communal woodlots (village woodlots, strip plantations and rehabilitation of degraded forests) of Gujarat.

2.7. Summary

Throughout India, the social forestry programme has become very popular among the government, non-government, donor agencies, institutions, communities, farmers, etc. The overall progress has been quite substantial. Billions of rupees have been spent for the purpose of tree planting with a prime objective of providing the daily requirements of fuelwood to the people, particularly the rural poor. So the education, motivation, awareness, and participation of villagers is vital for the success of the social forestry programme in India. Specifically, the scheme of village woodlots depends on the real participation of the local villagers. Its sustainability is linked up with the distribution of benefits in a proper way. But several questions relating to the involvement of poor classes, clear benefit-sharing mechanisms favouring the poor, sustainability of the programme, and participatory management are considered quite complex and critical for future progress of social forestry programme.

Chapter Three

A review of past evaluations on social forestry

With the idea of highlighting the actual impact of the programme in meeting the desired objectives, a detailed review of the literature concerning evaluations of social forestry is presented here. This chapter includes eight different sections to analyse the important aspects of the past evaluations concerning the social forestry programme in India.

3.1. Rationale behind the evaluations

According to FAO (1985a), evaluation is

"...a systematic process which attempts to assess as objectively as possible the relevance, effectiveness, and impact of a project in the context of the project objectives".

The evaluation essentially helps

(i) In analysing the rationale and logic of the project (objectives and design);

(ii) In reviewing the implementation process (inputs, activities, outputs, implementation and management) and the emerging results (output, effects and impacts); and

(iii) In assessing the validity and relevance of project in achieving the intended results.

The evaluations may be taken up before or after the project or during the implementation of the projects, as shown below:-

- *ex-ante* evaluation (appraisal before the project),

- concurrent evaluation (during the implementation of the project),

- terminal evaluation (on completion of project), and

- *ex-post* evaluation (some years after the completion of the project).

The social forestry programme is comparatively a new development in the field of forestry activities, particularly in the developing countries. There has been great enthusiasm in implementing the programme during the eighties. In more than 50 countries, in recent years, hundreds of projects have been implemented to promote tree planting in rural areas (Foley and Barnard, 1984). Despite the large- scale success in terms of physical and financial achievements, very little is known about the flow of actual benefits from the projects (FAO, 1985b).

3.2. Nature of evaluations

From time to time, many international institutions, the government of India, the state governments, donor agencies, independent organisations, and individual researchers have carried out numerous reviews, pilot studies, full-fledged evaluations, terminal evaluations, as shown below:

- **reviews** (FAO, 1978; Arnold, 1983; Spears, 1983; Stewart, 1983; FAO, 1985b; ODA, 1986; USAID, 1988; World Bank, 1990b; FAO, 1992),

- **case studies** (Srivastava and Pant, 1979; CENDIT, 1985; Chatterjee, 1985; FAO, 1985b; Verma, 1988; Singh and Ballabh, 1989; FAO, 1989b),

- pilot studies (IRMED, 1988; IRMED, 1989),

- **full-fledged evaluations** (CIDA, 1985; FAO, 1985b; FAO, 1985c; USAID, 1985; NISWASS, 1986; Shukla and Dalvi, 1986; Arnold, Bergman and Djurfeldt, 1987/8; NCAER, 1987; SIDA, 1987; PEO, 1989; IIPO, 1991; Search India, 1991; Desmond et al., 1992), and

- **project completion reports** (GFD, 1989; World Bank, 1991a).

On the basis of world-wide case studies, country reports, and studies/evaluations, the FAO's forestry papers (FAO, 1978; FAO, 1985a; FAO, 1992) have attempted detailed reviews of the existing practices of social forestry, community forestry and village forestry. Elsewhere too, several authors have reviewed the social forestry programme in different countries (Arnold, 1983; Spears, 1983; Stewart, 1984; Bartlet, 1992). As such there is no dearth of articles concerning the general aspects of social forestry programme.

In India too, several evaluations have been carried out in several states by a number of independent agencies and funding organisations. In the case of the foreign aided projects, the in-built nature of on-going evaluation (mid-term reviews) has often provided important information for the management to make many timely adjustments to the objectives, activities, operation, and performance of the projects. However, there are very few *ex-post* evaluations because the projects have been quite new. A detailed review of the relevant evaluations with special reference to India is presented below.

3.3. Objectives of evaluations

In general, the evaluations on social forestry are designed to assess the relevance, effectiveness and impact of the projects in the context of appraised objectives and expected benefits. Many of them have tried to analyse the rationale and logic of the programme; and to review the implementation process and the emerging results; to find out the level of people's participation and flow of benefits to the rural population.

The Programme Evaluation Organisation of the Planning Commission, Government of India (1989) carried out a country-level study during 1984-85 in sixteen states including Gujarat. The objectives were to study the programme implementation, extension efforts, infrastructural and technical aspects, distribution of produce to the rural poor, and economic impact of the

programme (PEO, 1989). Similarly the Ministry of Agriculture, Government of India had organised studies in ten states (during 1985, 1986 and 1987) through the experts of Agro-Economic Research Centres located in different universities. The main objectives included the review of the social forestry programme, evaluation of its effectiveness at the grass root level, people's participation, accrual of benefits, etc.

The National Council of Applied Economic Research (NCAER), New Delhi undertook a detailed study of social forestry projects and programmes in five selected states of India during 1987. The main objective was to assess the potential of social forestry for employment, income and asset generation in the rural areas (NCAER, 1987).

Aiyaswamy (1984) has carried out a series of studies to assess the economic and social benefits of social forestry plantations in Tamilnadu. Another study undertaken by Arnold, Bergman and Djurfeldt (1987/8) in Tamilnadu was directed to analyse the project objectives and targets, effects in broad socio-economic terms, impact on target groups, profitability and broad cost-benefit analysis. A detailed evaluation of the social forestry programme in Gujarat was carried out by the Sardar Patel Institute of Economic and Social Research, Ahmedabad (FAO, 1985c). The main objectives were to review the performance of the programme; to analyse the reasons for success and shortfalls; to evaluate the impact of programme on rural people; and to identify necessary changes.

The two pilot studies carried out by the Institute for Resource Management and Economic Development, New Delhi in Uttar Pradesh (IRMED, 1988) and Haryana (IRMED, 1989) were designed for

(i) developing a suitable methodology for evaluation of social forestry and

(ii) examining the status and potential of social forestry, particularly in poverty alleviation and benefit to rural population.

Another study in Orissa (Search India, 1991) was designed to explore the people's participation, their awareness, role of motivation and training, benefit-sharing mechanism, and physical assessment of the schemes. On the other hand, the main objectives of the studies in

Tamilnadu and Orissa states by Desmond et al. (1992) were to assess the relevance of the projects, the degree of fulfilment of project objectives, cost-efficiency of the projects, and the degree of sustainability and replicability.

3.4. Methodologies of evaluations

The above-mentioned studies have used a number of methods to gather the relevant information concerning their listed objectives. A summary of the methodologies in some major evaluations undertaken in different states of India indicates that the sample size, sampling method, and the level and number of beneficiaries have been quite varying in nature (table 3.1).

Table 3.1: A summary of methodologies of sampling in the past evaluations

Reference	State	Sampling methodology
PEO (1989)	16 states	32 divisions, 64 ranges, 256 villages, 907 farm forestry beneficiaries and 440 land-less households.
Parthsarthy (1984)	Andhra Pradesh	2 divisions, 2 ranges, and 40 beneficiaries.
Goswami (1984)	Assam	1 division, 15 villages, and 28 beneficiaries.
Singh, M.N. (1984)	Bihar	2 divisions and 69 beneficiaries.
Chand and Swarup (1984)	Himachal Pradesh	2 divisions, 2 ranges, 3-4 villages, 84 beneficiaries, 84 non-beneficiaries and 7 institutions.
Brahmbhatt (1985)	Rajasthan	2 divisions, 2 ranges, 40 villages, 20 strip plantations, 50 beneficiaries and 50 non-beneficiaries.
Bhattacharya (1985)	Haryana	2 divisions and 6 ranges.

Reference	State	Sampling methodology
Shyam and Gupta (1985)	Uttar Pradesh	2 divisions, 2 blocks, 4 panchayats, 50 beneficiaries, 10 non-beneficiaries, 3 gram sabhas and 3 institutions.
Sharma, K.G. (1986)	Madhya Pradesh	2 divisions, 4 blocks, 4 panchayats, 80 beneficiaries and 20 non-beneficiaries.
Muranjan (1987)	Maharashtra	2 divisions, 2 talukas, 24 villages, 50 beneficiaries, 50 non-beneficiaries and 50 landless households.
Aiyaswamy (1984)	Tamilnadu	2,110 respondents (including 900 farmers, 418 agricultural labourers, 217 rural artisans, 339 service personnel, and 236 village level workers.
Shukla and Dalvi (1986)	Gujarat	65 plantations for technical aspects, 79 villages (4 in each district) for forestry field survey, 33 villages (including 5 non-beneficiary villages).
Arnold, Bergman and Djurfeldt, (1987/88)	Tamil Nadu	3 circles, 5 divisions, 17 panchayats, and 100 plantations in 12 divisions and 4 circles.
IRMED (1988)	Uttar Pradesh	1 district, 1 block, 2 villages and 105 beneficiaries.
IRMED (1989)	Haryana	1 division, 1 range, 3 villages and 153 beneficiaries (including 36 farmers practising farm forestry).
Search India (1991)	Orissa	15 divisions, 160 villages, 1,408 general beneficiaries, 158 FFRP beneficiaries, 20 group discussions, 10 depth interviews with village opinion leaders, 3 in-depth interviews with FFRP beneficiaries, 20 in-depth interviews with project officials and 25 case-studies.
Desmond et al. (1992)	Tamilnadu Orissa	5 districts, 4 social forestry divisions and 3 interface

Reference	State	Sampling methodology
SIDA (1987)	Orissa	forestry divisions in Tamilnadu and 12 social forestry divisions in Orissa state. 3 districts, 16 ranges and 19 villages.

Note: FFRP = Forest farming for rural poor.

A multi-stage random sampling procedure has been adapted to give a proper representation of samples. Invariably, the divisions or the districts have been the first stage, followed by ranges or sub-divisions, villages or panchayats and individuals (beneficiaries and non-beneficiaries including farmers and landless households). Sometimes, the key respondents (village leaders, institutions, village panchayats, etc.) have been contacted for in-depth interviews about the social forestry programme in the rural areas.

However, the review studies undertaken by the foreign donor agencies are mostly carried out by a group of experts through field visits, consultants' notes and on-the-spot interviews of beneficiaries. The projects have the provision of mid-term reviews to maintain a satisfactory level of progress in physical and financial achievements.

Sometimes, the specific things are purposely chosen for preparation of comprehensive case studies. For example, the case-studies undertaken by Saxena (FAO, 1989b) covered 4 villages in different ecological zones (Himachal Pradesh, Uttar Pradesh, Madhya Pradesh, and Tamilnadu). The villages were selected purposely to cover different regions. The interviews were non-structured covering various aspects of wastelands development activities.

Further review of these evaluations shows that in most cases, the investigating individuals or the institutions have made use of the primary data (procured through direct interviews or through the schedule-cum-questionnaire surveys) and the secondary data (obtained from the implementing agencies). The field observations were made to substantiate the overall information on various aspects of project activities in different regions.

3.5. Findings of the evaluations

Since the social forestry programme encompasses a number of activities, an attempt has been made to present a suitable classification of the findings of evaluations in the following paragraphs. In particular, the underlying issues raised by these evaluations have been highlighted.

3.5.1. Community woodlots

The community woodlots with active participation of local people are considered as an important component of the social forestry programme in many countries (FAO, 1978). A recent report of the FAO recognises the early communal efforts in the village woodlots of Korea, panchayat woodlots of India, village afforestation programme of Tanzania, etc. (FAO, 1992). However, according to Spears (1983), most attempts to transplant 'community' based Chinese and Korean woodlot models into other parts of developing world have failed.

The component of community woodlots (strip plantations and village woodlots) in the Indian social forestry programme is basically designed to meet the demands of the rural poor. But the community woodlots have received inadequate attention (NWDB, 1989c). Throughout the country the community plantations are facing a direct conflict with the existing grazing demands and other uses of common lands.

3.5.2. Farm forestry

Farm forestry has been the most popular scheme in many countries, including India. An elaborate analysis of reforestation activities of 20 developing countries by Spears (1983) identifies the various underlying points for the success of farm forestry programme in China, Korea, India (Gujarat, Uttar Pradesh and West Bengal), Philippines, Nepal, Pakistan, Haiti, Nigeria, Malawi, etc. Although the basic aim of social forestry has been to produce forest produce for local villagers, the

scarcity of wood resulting in the increase in prices has spontaneously lured the farmers or the local communities to undertake tree planting on a massive scale.

At the time of formulation of social forestry projects of India, the interests of farmers were greatly underestimated. Although the farm forestry is inappropriate to address social inequities (FAO, 1978), it has dominated the social forestry programme of India (NWDB, 1989c). Time and again, the farm forestry has been criticised by many as the primary objective of social forestry was to produce fuelwood for local use, not poles for sale (FAO, 1985b). Only 21% of the farmers intend to meet fuelwood needs from their plantations (GFD, 1989). A review of the forestry sub-sector in India by the World Bank (1990a), mentions

"farmers have shown a massive interest in private planting; more for its income generating potential as small timber than for fuelwood production".

So the farmers are not concerned for meeting their own subsistence needs (Arnold, Bergman and Djurfeldt, 1987/88). The people are raising trees on their own initiative (Desmond, et al., 1992). However, a considerable amount of fuelwood is being produced as a by-product from 'lops and tops' and non-marketed poles (FAO, 1985b).

In Gujarat, a broad spectrum of farmers have taken up tree planting (FAO, 1985c) and the farmers' demand for seedlings far exceeded the projected targets (FAO, 1985b). In the project completion report of Gujarat, the World Bank (1990b) commends the extraordinary success of the farm forestry scheme (which distributed 800 million seedlings against a target of 30 million only). Between 1980 and 1987, about 0.86 million farmers (57% marginal, 28% small and 16% large farmers) were given 873 million seedlings in Gujarat (Verma, 1990).

Under the World Bank aided national social forestry project, half of the beneficiaries in farm forestry are medium and large farmers (USAID, 1988). In general, the big farmers have received maximum benefits in all states (PEO, 1989). In Uttar Pradesh and Haryana too, the large farmers have got maximum benefits (IRMED, 1988; IRMED, 1989).

In Bihar, the small and marginal farmers were incapable of absorbing the long gestation lag of tree planting (Singh, 1984). In Tamilnadu, even the cash subsidies to the farmers did not attract many small and marginal farmers, and big farmers took more advantage (Vardan, 1987). A report by Colin (1985) for social forestry in Karnataka also highlights the poor response of small farmers. Under the scheme of group farm forestry in West Bengal, it was observed that the produce was mostly bought by the rich people of the village resulting in very low income to the poor farmers (Shah, T., 1987). In the recent years, the participation of small farmers has increased (USAID, 1988).

By and large, uncertain tenurial situations, improper marketing facilities, poor quality of planting material, wrong choice of species, etc. have been the main problems faced by the farmers. In fact, the Indian farmers have themselves experimented and evolved many viable combinations of trees and agricultural crops. They have also taken personal interest in selling their tree products at competitive prices.

3.5.3. People's participation

People's participation is a key factor in the overall success of social forestry schemes. Various levels of people's participation have been achieved in different countries including India. For instance, China has been able to implement 'four sides' tree planting programme by involving individuals, families, communes, etc. in a very effective manner. In 1981-82 alone, 8.52 million hectares of area was planted with 9.5 billion trees (FAO, 1978).

Despite large-scale implementation of social forestry projects in India, community participation in village forestry has not, in general, been successful (FAO, 1978). Villagers do not feel involved in making choice of species, and the protection and management of plantations (NWDB, 1989c). Many reasons have been put forward for this failure. Lack of extension, land tenurial security and marketing support are the main reasons for low participation of the poor

families in Gujarat, Himachal Pradesh, Uttar Pradesh, Madhya Pradesh and Tamil Nadu (FAO, 1985c; FAO, 1989a).

In Assam (Goswami, 1984), the enlightened section of the rural community takes more interest in tree planting activities and in Madhya Pradesh (Sharma, K.G., 1986), the programme is appreciated for its usefulness. Among the rural people of Maharashtra, an increased level of interest was noticed (USAID, 1985). But in Uttar Pradesh, the people were found to be indifferent towards tree planting programmes (Shyam and Gupta, 1985). In Tamilnadu, the villagers, especially the poor ones, showed limited interest in the project because of a imperfect benefit-sharing mechanism (SIDA, 1987), while in Andhra Pradesh, the people's participation is largely absent except in farm forestry (CIDA, 1985). On the other hand, the people's participation in community woodlots of Gujarat is still inadequate (World Bank, 1991a). In general, the under-privileged have little voice in the decisions taken by the panchayat (Verma, 1988).

However, in Orissa, NISWASS (1986) found a good response of the people towards the scheme of forest farming for rural poor (FFRP) and Search India (1991) observed that there was wide-spread awareness concerning the joint ownership of communal plantations. The villagers feel that social forestry plantations are meant for them. But it is feared that at the time of distribution of final benefits, the conflicts might appear (Desmond, et al., 1992).

The efforts to popularise community forestry have been insufficient (Seetharaman and Shingi, 1990). Particularly the establishment of village woodlots is adversely affected due to lack of interest on the part of the local people (World Bank, 1991a). The poor involvement of village panchayats is also clearly visible in the case of village woodlots (FAO, 1985c) as most panchayats have preferred departmental plantations and very few of them have come forward to play a more active role (World Bank, 1991a).

Considering the tree planting on common lands only a government exercise, the villagers do not participate in establishing, maintaining, protecting, or harvesting activities of the village woodlots because they think the individual cost is greater than the benefit (World Bank, 1991a).

But the departmental approach is unfavourable to any large-scale people's participation in the programme (Verma, 1988).

3.5.4. Programme implementation, protection and management

The social forestry schemes are supposed to be operated and managed by the people with necessary technical guidance from the experts in various fields. Unfortunately, this has not been the case. In almost all states of India, the government forest departments have been responsible for management of the social forestry plantations except the farm forestry (NWDB, 1989c; PEO, 1989; FAO, 1989b).

A recent report of the Operations Evaluation Department of the World Bank (1991a) mentions that it is quite difficult to formulate and implement social forestry projects. Many a time, the forest department is interested in physical and financial progress of the programme only.

Under the national social forestry project too, there is no visible participation of panchayats in managing the plantations (USAID, 1988). In Himachal Pradesh, Uttar Pradesh, Madhya Pradesh and Tamil Nadu, there were insufficient efforts to build up the community's ability to manage its own resources (FAO, 1989b). In Tamilnadu, the management of village resources by the panchayats was found to be against the interests of the poor (SIDA, 1987). Studies undertaken by CENDIT (1985) and USAID (1985) have observed in Madhya Pradesh that the caste and political factions were main determinants which impede any self-sustaining programme of social forestry in the villages. As a result, the panchayats were reluctant to take over the management and protection of village woodlots. Similarly in Maharashtra (USAID, 1985), the panchayats were hesitant because of various socio-political and economic reasons. In Uttar Pradesh, the village panchayats whose annual income is only Rs 3,000 are unable to mobilise funds for tree plantation on community lands (Seetharaman and Shingi, 1990).

The Gujarat social forestry programme has completed its targets for all the models, and in some cases exceeded them (FAO, 1985c). However, the efforts in giving technical guidance to the

farmers and the distribution and marketing aspects were not addressed properly (USAID, 1988). On the whole, the project performance in Gujarat is considered satisfactory by the World Bank (1990a). The Bank appreciates the unprecedented effectiveness and flexible administration accomplished by the forest department while implementing the social forestry programme.

In Gujarat, the panchayats have avoided the responsibility of management due to many socio-economic and political reasons (World Bank, 1990b). This is reflected in the failure of self-help woodlots. Only in few selected villages, the village panchayats have opted to protect and manage the village woodlots. As such a proper kind of leadership is lacking at the community level. In fact, at the village level, an effective organisation is yet to be created, particularly one that can nurture the community participation in the long run (World Bank, 1991a). Due to this reason, the World Bank is not inclined to support any village-managed forestry in Gujarat (World Bank, 1990a).

As the village panchayats do not have the managerial capability to harvest and market the produce, the role of the forest department in protection and management of community woodlots is considered irreplaceable in the present circumstances (Verma, 1988). It is believed that any short-term measure to solve these problems is not helpful in bringing the desired level of protection and survival in the communal plantations. In fact, it is vital to consider the long-term interests of the people (FAO, 1989b).

3.5.5. Choice of species

Choice of species has been quite critical in promotion of social forestry in India. In order to get an early returns, several types of fast growing and high yielding multi-purpose tree species have been introduced. But the choice of species has not been acceptable to all, because the socio-economic attributes of each species are not the same for different group of people in the society (Raintree, 1991).

Fuelwood species are rarely the farmers' first priority. They have adopted large-scale eucalyptus planting for higher returns. Eucalyptus shared about 70-100% in 16 different states of

India (PEO, 1989). In Gujarat, during 1980 to 1984, 84% seedlings in farm forestry were of eucalyptus (GFD, 1989) as about 90% of the farmers prefer to grow eucalyptus trees (Verma, 1990). Nowadays, in some states (Himachal Pradesh, Uttar Pradesh, Madhya Pradesh and Tamil Nadu), the high value timber trees are being planted in private lands for higher returns (FAO, 1989b).

However, in Gujarat, the share of eucalyptus was reduced from 67% to 17% during 1985 to 1989 in the irrigated village woodlots (GFD, 1989) while in the rainfed village woodlots, it has declined from 21% to 9% during 1980 to 1987 (GFD, 1992a). In the case of strip plantations, the proportions of *Acacia* spp and *Eucaluptus* spp have been 36% and 21% respectively (GFD, 1989).

3.5.6. Survival rate of trees

In an independent study undertaken in five states (Gujarat, Karnataka, Uttar Pradesh, Tamil Nadu and West Bengal), the survival percent of trees was found between 40 and 80 percent. The survival of all types of plantations in Gujarat (annexure 3.1) was reported as 66.87%, while village woodlots had the highest survival rate (79.93 percent), followed by 70.55% for strip plantations (IIPO, 1991). The farm forestry had a survival percent of 40.67 percent.

According to the monitoring and evaluation wing of the social forestry in Gujarat, the survival rate was 43% in strip plantations, 36% in farm forestry (GFD, 1989), about 60% in irrigated village woodlots (GFD, 1991) and 44% in rainfed village woodlots (GFD, 1992). By and large, the condition of the village woodlots in Gujarat is not good, basically due to improper protection and maintenance (World Bank, 1990a).

3.5.7. Employment generation

Without any doubt, the social forestry projects have proved their high potential in raising the employment level in rural areas, particularly for the weaker sections (scheduled castes and

scheduled tribes) and women (USAID, 1988). The rural work force was able to get additional employment, especially in the slack season (NCAER, 1987). The social forestry programme has contributed 27-32% of the total income of the labourers (PEO, 1989).

In Tamilnadu, the programme generated 68 million man- days for the rural poor (Desmond, et al., 1992). Another study in Orissa (SIDA, 1987) noticed a substantial amount of employment creation for the rural poor including women. In Orissa, out of 34 million man-days, over two-thirds went to the scheduled castes and scheduled tribes (Desmond, et al., 1992). In Uttar Pradesh, the community woodlots provided substantial employment to the people in close proximity of villages (IRMED, 1988). However, the study in Haryana found that the employment generation through social forestry was transitory in nature (IRMED, 1989). Parthsarthy (1984) noticed that employment potential of farm forestry was highly unfavourable while Brahmbhatt (1985) concluded that the farm forestry provided maximum employment to the people.

In Gujarat too, millions of man-days were created through social forestry, especially for the poor and disadvantaged classes. The effect of farm forestry on local employment opportunities is still uncertain. In the case of bund planting, the net effect on employment is positive (FAO, 1985c).

There is no clear evidence of large-scale diversion of labour from other economic activities to social forestry which are generally in the slack season of crop cultivation. At the same time, the payment rates were found to be better in social forestry schemes with up to 200 days of employment in a year (NCAER, 1987).

3.5.8. Disposal of produce

Throughout India, the strong commercial demand for wood products has attracted the panchayats and farmers to sell their produce at the higher prices (FAO, 1978). As a result, social forestry plantations are producing more of timber and industrial material without bothering about the local needs. The wide-spread tree planting activity has ensured substantial supply of forest products in India (FAO, 1985b). In some cases, the good species selection, particularly in

community woodlots is expected to produce a substantial amount of intermediate produce for the people (FAO, 1989b).

However, there has been an unsatisfactory attention to the subsistence fuel needs of the people (USAID, 1988). In Gujarat too, the majority of trees grown under the programme are intended for sale. The primary objective of providing subsistence material to the local people has been thwarted because most farmers and also the panchayats opt to sell their trees at market rates (World Bank, 1990b). But there are a few exceptional cases. For example, in Dhanori village, 99% of fuelwood was distributed among the local people (Verma, 1988).

Despite the large-scale harvest of community woodlots, the fuelwood shortages still persist, especially among the weaker sections. In Tamil Nadu, the main produce from communal plantations was sold at market price to urban areas (SIDA, 1987). In many cases, the contractors had sold even the lops and tops which were supposed to be given free of cost to the villagers (Arnold, Bergman and Djurfeldt, 1987/8). Therefore, a large proportion of the returns from community plantations went to the urban traders, retailers and industries (Desmond, et al., 1992). In Gujarat too, the main produce is mainly auctioned and the proceeds are given to the panchayat after deducting the costs (World Bank, 1990b).

3.5.8.1. Benefit-sharing mechanism

The existing methods of distributing the produce from social forestry plantations vary to a great extent and an acceptable benefit-sharing mechanism is yet to be developed in India. The adverse implications of defective mechanisms are very high. For instance, in Madhya Pradesh the auction of intermediate produce, especially fodder grass, affected the involvement of the rural poor (CENDIT, 1985). The mid-term review in Karnataka (ODA, 1986) has also noted the failure of the project in developing a proper benefit-sharing mechanism.

In Gujarat, the rich people do not want to share the benefits of development with the poor (FAO, 1989a). On the other hand, in Orissa, there was uncertainty with regard to actual

arrangements for distribution. The people believed that the produce will be equally (not equitably) distributed among the households (Search India, 1991). They actually favour equal distribution of benefits, not the equitable one (Desmond, et al., 1992). On the other hand, the distribution of benefits in Dhanori village was determined by the village panchayat; but the arrangements for ensuring the flow of benefits to the poor were found to be inadequate and unsatisfactory (Verma, 1988).

3.5.8.2. Benefits to the poor

In India, millions of poor people are unable to buy fuelwood and other forest produce at any price. So, they use whatever traditional fuel they find (FAO, 1978). Specifically, the farm forestry is of not much help to the rural poor (FAO, 1989b). However, the World Bank's report (1991a) recognises that the social forestry projects have benefited a large number of people, including women and children. The report further mentions that the tree growing has helped the rural poor to raise their income level.

The findings of many evaluations have mentioned the failure of social forestry in helping the landless and poorer sections of society (CIDA, 1985; ODA, 1986). However, the poor people were able to get some intermediate produce before the final harvest of community woodlots (Shukla and Dalvi, 1986; Verma, 1988; Singh and Ballabh, 1989; Desmond, et al., 1992).

In Uttar Pradesh and Haryana, the programme has helped in raising the income level of weaker sections of the rural society and many of them have crossed the poverty line (IRMED, 1988; IRMED, 1989). In Gujarat, the intermediate products (grass, fruits and other minor forest products) from the community woodlots were enjoyed by the local villagers. In Aslali village of Gujarat, the villagers were able to receive the fuelwood, fodder and minor forest produce either free or at subsidised rates (Singh and Ballabh, 1989). In yet another village (Dhanori), the rural poor had received the bulk of the benefits, especially the fuelwood and employment (Verma, 1988).

But the extent of intermediate and free benefits accruing to the poorer section has been quite difficult to ascertain (World Bank, 1990b).

The improper distribution of produce has resulted in limited participation of poor villagers, causing adverse implications for the sustainability of community woodlots. Moreover, it is feared that after the harvest of woodlots, the poor families do not get any benefit at all (FAO, 1985b).

3.5.8.3. Utilisation of income from community woodlots

The net income from community woodlots is handed over to the concerned village panchayats. Any reinvestment of income is, therefore, decided exclusively by the panchayats (World Bank, 1990b). Many of them do not prefer to spend for tree planting. In Tamilnadu, the panchayats have used only a little portion of income for the village development works (SIDA, 1987). Particularly, they do not have any specific plans to spend any money for the welfare of the poor (Desmond, et al., 1992). In Gujarat, the current provisions of the Panchayat Act do not allow tree planting through the use of the panchayat's share of revenue from woodlots (USAID, 1988).

From the harvest of the village woodlot, the Aslali village panchayat received a sum of Rs 78,000 which was partly spent to augment the supply of drinking water in the village and partly for re-planting the area (Singh and Ballabh, 1989). On the other hand, in Dhanori village, the panchayat which gained Rs 22,935 from the harvest of a village woodlot utilised the income for a village road and school building (Verma, 1988).

3.5.9. Economics of tree planting

In India, the foreign aided social forestry projects have been appraised beforehand. According to the World Bank (1991a), the estimations of costs and benefits were quite optimistic at the time of appraisals. As a result, under the national social forestry project, most of the models are expected to provide less than the appraised level of benefits (USAID, 1988). The harvest of 30

village woodlots in Gujarat suggested that final wood harvests were 25% less than the anticipated yield in the project. But the grass harvests were slightly higher than anticipated yields in the semi-arid conditions (USAID, 1988).

To give an idea of the cost-benefit analyses of social forestry plantations, a summary of results is presented in table 3.2. These results indicate that in general the performance of tree planting appears promising.

Table 3.2: A summary of findings of appraisals/evaluations

Reference	Scheme	State	Results
Srivastava & Pant (1979)	Roadside Plantation	Gujarat Haryana	FIRR (13-18%) FIRR (14-32%)
--do--	Village woodlot	Gujarat Haryana	FIRR (7-20%) FIRR (23-29%)
Aiyaswamy (1984)	Mixed	Tamilnadu	FIRR (5-20%)
USAID (1985)	Miscellaneous	Maharashtra	FIRR (12%)
Arputhraj (1985)	Farm forestry	Tamilnadu	NPV >0 @15%
World Bank (1985)	Non-farm forestry	Gujarat	FIRR (11.2%) BCR (1.14)
Shukla & Dalvi (1986)	village woodlot Farme forestry	" "	FIRR (26%) FIRR (27-40%)
World Bank (1988)	Non-farm forestry	"	EIRR (15.6%) BCR (1.77)
Verma (1988)	Village woodlot	"	FIRR (35%)
Singh & Ballabh (1989)	Village woodlot	"	FIRR (39-43%) BCR (2.2-2.7)
Desmond et al. (1992)	Community woodlots	Tamilnadu	Positive NPV at some of the assumptions.
Desmond et al. (1992)	Community woodlots	Orissa	FIRR (11-21%) EIRR (7-21%)

The terms FIRR, EIRR, BCR and NPV represent the financial internal rate of return, economic internal rate of return, benefit-cost ratio and net present value, respectively.

In general, the economic rates of return have been found higher in social forestry plantations than the traditional forest plantations (Spears, 1983). In Tamilnadu, Arputhraj (1985) found that in tree planting activity, the per acre returns were higher than the agricultural crops. A case study of farm forestry in three districts of Gujarat (FAO, 1989a) found that tree growing is mainly based on the rationale of profit-calculations. According to Chatterjee (1985), the scheme of strip plantation is comparatively a costly proposition from the economic angle but from the social viewpoint the scheme is highly desirable.

The economic performance of the block plantations in Tamilnadu was found unsatisfactory (Arnold, Bergman and Djurfeldt, 1987/8). However, a recent evaluation by Desmond, et al. (1992) has mentioned that the community planting is technically successful, environmentally beneficial and financially and economically profitable for the panchayats in Tamilnadu and Orissa. So, they are capable of meeting the social objectives. As a result, the auction of harvested materials has generated an income of Rs 265 million from the community woodlots. The panchayats were given 50-60% share.

In the case of village woodlots of Gujarat, the overall rate of return has been found reasonable but the actual return to the government is quite low because of its policies (Chatterjee, 1985). A comprehensive case study of Aslali village in Ahmedabad district of Gujarat (Singh and Ballabh, 1989) indicated that the village woodlot scheme was financially viable. Yet another case study by Verma (1988) arrived at a financial IRR which is quite high as compared to the anticipated level.

3.5.10. Sustainability of social forestry projects

The key question in the implementation of social forestry projects is their sustainability (i.e. the self-supporting capacity to withstand in future without giving way). In general, the sustainability

of social forestry projects is quite doubtful because of intrinsic socio-political and institutional weaknesses. But the sustainability of village woodlots depends mainly on the forest departments to progressively transfer the management and protection responsibilities to the participating beneficiaries (World Bank, 1991a). The small size of woodlots is a major constraint in ensuring a sustainable supply of produce. The area in each village needs to be expanded to accommodate different age gradations of trees, shrubs and bushes (USAID, 1988). The sustainability depends on a proper benefit-sharing mechanism (Desmond, et al., 1992).

In many states, the farm forestry is found to be sustainable and has contributed to the income of farmers. The chances of attaining sustainability of social forestry projects in India (Gujarat and Uttar Pradesh) are quite good (World Bank, 1991a).

3.5.11. Impacts of the programme

In many countries, including India, the overall progress of the social forestry programme has been quite encouraging in terms of physical and financial progress. The creation of woodlots has helped to provide substantial amounts of forest products for the community as a whole.

An early observation by the FAO (1978) had indicated that social forestry projects of India might have very little positive impact on increasing the availability of tree products for people in the lowest economic levels. It was also feared that there might be some negative social impact by displacing rural labourers, restricting access to communal plantations, and reduced economic opportunities of the poor in rural areas. Perhaps, this fear was not totally incorrect because the National Wastelands Development Board has observed that the social forestry programme has been implemented without much concern for fuelwood and fodder production (NWDB, 1989a). Moreover, the big farmers in many states have opted for tree planting just to avoid the persistent labour problems of practising agriculture on an annual basis.

Due to this, the programme failed to elicit meaningful involvement of the local people, especially the rural poor. It has failed in meeting their genuine needs. Except for the employment,

no marked impact was noticed on weaker sections (Goswami, 1984; Arnold, Bergman and Djurfeldt, 1987/8). There has been little improvement in the availability of fuelwood and fodder supplies in Haryana and Uttar Pradesh (IRMED, 1988; IRMED, 1989). However, according to the mid-term review of national social forestry project (Gujarat, Himachal Pradesh, Rajasthan and Uttar Pradesh), farm forestry alone is expected to contribute nearly 10% of India's current commercial and industrial needs, providing considerable potential relief to existing forests. No doubt, the project is helpful in augmenting the farmers' incomes (USAID, 1988). But this trade-off has raised several questions for developing proper strategies for tree planting on the public lands (World Bank, 1990b).

In Gujarat, the effects of the programme have been complex (FAO, 1985c). In general, the programme has been unable to meet the overall ecological needs of the area as well as the survival needs of the rural poor and has adversely affected the labour use in the region (FAO, 1989b). However, the World Bank's review appreciates the positive changes in landscape of Gujarat and says that the demonstration effects have been quite substantial in the expansion of the social forestry programme (World Bank, 1990b).

The overall economic impacts in farmers' fields, village commons and in the degraded forests have also been found quite significant. In fact, the intervention by the government can be helpful in averting the tragedy of the commons (Singh and Ballabh, 1989).

In order to assess the impact of social forestry programmes on future demand and supply of fuelwood and small timber, the wood balance studies have been undertaken in some states (NWDB, 1989a). The findings of these studies suggest that a significant increase is expected in the production of timber, fuelwood and pulpwood, mainly on account of the large-scale farm forestry plantations. The adverse effects on the market prices of forest products are also visible in some states.

3.6. Main drawbacks of the social forestry programme

In general, the review of social forestry at the country level has shown many shortcomings of the programme, as follows:

- the afforestation activity was inadequate because of poor linkages between funding and implementing agencies,
- the regeneration and restoration of existing forests has been neglected because of diversion of funds for social forestry works,
- the indigenous and locally useful species of trees, shrubs, legumes and grasses have been neglected,
- the problems of land degradation and deforestation were not addressed properly, and
- no proper mechanism was worked out for the flow of benefits and distribution of intermediate and final produce to the local and needy people (NWDB, 1990a).

Furthermore, the diversion of most benefits to the well-to-do farmers has affected the involvement of rural poor. It is realised that the promotion of social forestry technology is unhelpful in meeting the needs of farm or industrial forestry either. A few major gaps are still visible in the social forestry strategy (World Bank, 1991a).

Some management and administrative failures have also been observed. In some cases the follow-up action was lacking (CENDIT, 1985; PEO, 1989). Chand and Swarup (1984) noticed that in Himachal Pradesh, seedlings of desired species were not available in sufficient numbers. In Orissa, due to the absence of tenurial security, the interest of people was limited to the immediate benefits only (NISWASS, 1986). A defective method of seedling distribution led to the wastage of seedlings in Maharashtra (Muranjan, 1987), while in West Bengal, small farmers could not get proper marketing facilities to sell their produce (Shah, T., 1987).

Arnold, Bergman and Djurfeldt (1987/8) observed that social forestry has made little headways with some of the social and institutional aims. Many kinds of conflicts (social, ethnic,

class, caste differences) in the rural society have not been properly addressed. The project has failed to equip the panchayats for an independent management of community plantations (Desmond, et al., 1992). In most states, the community asset formation has been below expectation because of poor involvement of village-level organisations (NCAER, 1987; PEO, 1989). There has been negligible involvement of non-governmental organisations too (USAID, 1988).

3.7. Future prospects of social forestry

According to the World Bank (1990a), multi-product technologies have been developed and tested in India during the implementation of social forestry projects. But the community plantation strategies and models need considerable restructuring. Other evaluations and reviews have also made many important and realistic suggestions for future projects of social forestry. Particularly, there is a need for legal modifications to help farmers to enjoy full rights on their trees (FAO, 1989a). In future, the question of community participation in the afforestation of public lands need much more attention (World Bank, 1991a).

Despite the numerous deficiencies in the social forestry programme, the hidden potential of tree planting can hardly be overlooked. The Tropical Forestry Action Plan (FAO, 1987; FAO, 1989c) has proposed promoting community or social forestry to meet fuelwood needs. The tenth World Forestry Congress (1991) held in Paris has also recommended that the needs of all people concerned, particularly those who depend on forests for their livelihood, should be carefully taken into consideration at the planning stage; the agro-forestry systems, afforestation and reforestation be developed more actively with involvement of all people.

It is now believed that an environmentally and socially acceptable mixture of species can add to the overall benefits from the social forestry schemes (USAID, 1988). Having seen the encouraging results in sal (*Shorea robusta*) forests of West Bengal, the World Bank has shown interest to support participatory forestry in many states of India to regenerate and protect the degraded forests with active involvement of the local villagers (World Bank, 1990a). The

Government of India has already issued guide-lines for such activities (NWDB, 1990a). Many states have started the implementation, too (Singh, S., 1991).

3.8. Summary

Thus the social forestry evaluations have made many useful observations and findings for further improvements in the implementation, maintenance, harvesting, marketing and distribution of produce. Most of the evaluations have concluded that there is a lack of people's participation and the rural people, especially the weaker sections, are not getting the usufruct of the programme. The village panchayats are hesitant to take over the protection and management responsibilities. On the other hand the farmers as well as the panchayats are interested in obtaining maximum returns through sale of their produce.

It is, however, noted that most of the evaluators have confined themselves to the programme implementation or at the most confined themselves to the financial analysis only. There were very few attempts to undertake economic analysis. No attempts have been made to look into the social aspects of the programme. No one has used the full-fledged technique of social cost-benefit analysis to evaluate the social forestry programme in India.

Chapter Four

Cost-benefit analysis and its application to social forestry projects

This chapter presents a detailed background of cost-benefit analysis and its application to social forestry projects with special reference to India. The types of CBA and the methodologies are explained and analysed. It is divided into eight parts to describe the important aspects.

4.1. Project appraisal: an introduction

Projects are considered as the basic building blocks of development, representing the smallest investment unit which can be separately evaluated at all levels and analysed at all depths independently (Little and Mirrlees, 1974). Usually, the success of a project rests on the economic environment in which it is undertaken, the institutional arrangements for its implementation and its financial viability (ODA, 1988).

The appraisal involves the examination of a project before it is undertaken and is concerned with optimisation of the capital budget. In the past two decades, project appraisal has received much attention. Formerly, its main objective was to achieve an efficient allocation of capital. Now it also looks at income distribution and environmental quality, particularly in the developing countries where the governments spend huge amounts of public sector funds. The largest number of project appraisals is carried out by the World Bank (Brent, 1990).

The type of appraisal depends on the point of view from where it is undertaken, i.e. from a private, economic, social, or environmental point of view. This difference in point of view makes the appraisal a highly specialised task.

The outcome of appraisal helps in explicit or implicit decision-making on policies, programmes and projects. A comparative ranking of a large number of projects (having costs and benefits of different magnitudes and at different timings) helps the decision-makers in selecting the

best project design and the best set of projects for investment. But the decision-making is not always based on financial and economic criteria alone because the decision-makers are also concerned with the overall effects of projects which are related to other objectives, namely the social and environmental. For income re-distribution effects, social cost-benefit analysis is undertaken to appropriately weigh the costs and benefits from the rich and poor point of views. Similarly, the environmental effects need a specialised appraisal technique (FAO, 1979).

4.2. Cost-benefit analysis (CBA)

Cost-benefit analysis (also known as benefit-cost analysis) is defined as "an economic appraisal of the costs and benefits of alternative courses of action, whether those costs and benefits are marketed or not, to whomsoever they accrue, both in present and future time, the costs and benefits being measured as far as possible in a common unit of value" (Price, 1989). Basically, it is an attempt to assess the desirability of a project by comparing the benefits and costs. In fact, CBA provides a valuable framework for analysis of projects. Depending on the range of agencies involved and type of effects, the nature of CBA varies to a great extent. Use of CBA for project appraisal in developing countries has been advocated by many authors and institutions (Little and Mirrlees, 1974; Irvin, 1978; UNIDO, 1978; FAO, 1979; ODA, 1988).

Customarily, the investing and financing agencies are interested to know the return on the capital invested. CBA estimates the net beneficial effect. The relevant project costs and benefits (of many kinds, to all people, in every generation) are identified and evaluated in terms of a common value-base, e.g. market prices, efficiency prices or social prices. The project is accepted if the overall benefits exceed the costs. Usually the CBA is undertaken by or for a government agency.

A common unit of value, called 'numeraire' is used in CBA. It can be expressed in units of the local or some foreign currency. The numeraire suggested by Little and Mirrlees (1974) is uncommitted public income measured in terms of foreign exchange of constant purchasing power. On the other hand, the UNIDO (1978) advocates the use of domestic currency available for an

average individual as the numeraire. However, it is convenient if the numeraire is taken as the "value at present-day prices of domestic currency used for consumption by citizens having the mean income level for the country" (Price, 1989).

Broadly speaking, the CBA is of two types:-

- environmental CBA (or extended CBA), and
- developmental CBA.

The first one is mainly concerned with the evaluation of non-market costs and benefits (environmental effects of land use). The second one deals with distortions of market prices and distributional issues and has much relevance to the Third World. It includes Financial CBA (FCBA), Economic CBA (ECBA), and Social CBA (SCBA).

Financial CBA is concerned with the assessment of profitability from the private point of view. On the other hand, the economic analysis provides information on whether or not the project would provide an economically efficient use of the resources available to society. Generally, both analyses are carried out together and as a matter of convenience, the financial analysis precedes the economic analysis. In fact, for public or mixed projects for which the support comes from public money, the project appraisal should include both. The economic appraisal is mostly applied to public sector projects in the developing countries which have distinctly special features (ODA, 1988).

Social CBA explicitly evaluates the distributional objectives and is the most comprehensive form of CBA which measures all types of effects (ODA, 1988). However, it requires details of distribution of costs and benefits among the different groups of the society.

The evaluating agencies often face the methodological difficulties, i.e. the selection and indexing of appropriate sets of 'real' market prices, computation of shadow prices, suitable decision criteria and authentic identification of costs and benefits (Johnson and Whitlam, 1988). In fact, CBA represents a general philosophy of evaluation. There are a number of differences in opinion among its users. By and large, those differences do not affect the ranking among a given

set of projects (Price, 1987). According to Price (1989), "the complexities of CBA reflect complexities of the real world."

4.3. Criterion of profitability in CBA

A suitable criterion to measure the profitability (of an investment and/or relative profitability of each of several incompatible or competing investments) is critical for computing the true value of revenues and costs accruing at different times (Gittinger, 1982; Price, 1989). The criteria are grouped into discounting and non-discounting types.

4.3.1. Non-discounting criteria

Some of the non-discounting criteria are listed below:

(a) ranking by inspection (Gittinger, 1982)

(b) payback period (Gittinger, 1982; Price, 1989)

(c) proceeds per unit of outlay (Gittinger, 1982)

(d) average annual proceeds per unit of outlay (Gittinger, 1982)

(e) average income on book value of the investment (Gittinger, 1982)

(f) capital output ratio (Trivedi, 1987)

(g) maximum forest rent (Price, 1989)

(h) rates of return (Price, 1989)

(i) profit after interest (Price, 1989)

Appendix 4.1 provides a brief description of these criteria. The undiscounted measures of project worth share a common defect as they do not account adequately for the timing of the benefit stream. Therefore, "...some common undiscounted measures of project worth can be

misleading..." (Gittinger, 1982). According to Squire and van der Tak (1975), these are inaccurate indicators of economic profitability.

4.3.2. Discounting criteria

The discounting criteria fully account for the time value of money. The cash flows accruing at different times can be compared by discounting. However, it is fundamental to derive the equivalent value of each cost or revenue at the chosen point in time. The discounting methods are described below:

4.3.2.1. Present value of costs (PVC) or Least cost analysis

Present value of costs is measured as follows,

$$PVC = C_n (1+r)^{-n}$$

where C_n = annual investment and/or operation/maintenance cost in year n,

and r = discount rate.

Mutually exclusive technologies having the same benefits but differently shaped cost curves can be compared by this criterion.

4.3.2.2. Net present value (NPV)

Its synonyms are net present worth (NPW) or net discounted revenue (NDR) or net discounted cash flow. The NPV indicates the increase or decrease in return which is obtained by

computing the sum of all revenues, suitably discounted, minus the sum of all costs, suitably discounted. The formula is as follows,

$$NPV = \sum_{t=0}^{t=T} \frac{R_t}{(1+r)^t} - \sum_{t=0}^{t=T} \frac{C_t}{(1+r)^t}$$

where R_t = revenue at any time t
C_t = cost at any time t
r = discount rate.
T = length of complete production cycle or rotation.

NPV may be expressed as per unit of any production factor, e.g. land, labour, etc. or for the whole project. Being a present equivalent of future values (usually at year zero), it provides a conclusive ranking of projects. It accepts projects with positive NPV only. It is used to compare mutually exclusive technologies with different flows of costs and benefits. Because of its absolute nature, it cannot be used to rank alternatives which are not mutually exclusive (independent), e.g. the NPV of a small-scale highly attractive project may be lower than a large-scale, marginally acceptable project. This criterion is widely used by forestry and business enterprises, by government institutions, financial institutions and international development agencies (Price, 1989).

4.3.2.3. Benefit-cost ratio (BCR)

Benefit-cost ratio (BCR) is computed by dividing the present value of revenues by the present value of costs.

$$BCR = \frac{B_t / (1+r)^t}{C_t / (1+r)^t}$$

Projects having a ratio of more than one are generally acceptable. BCR also needs a suitable rate of discount to calculate the ratio between the discounted benefits and discounted costs. According to Mishan (1975), it is a variant of NPV. However, it is not a common criterion for

project appraisal in developing countries (Gittinger, 1982). In the case of mutually exclusive projects, the investment choice may be erroneous .

4.3.2.4. Net benefit-investment ratio (N/K ratio)

Net benefit-investment ratio (N/K ratio) denotes the present worth of the net benefits divided by the present worth of the investment. The formal selection criterion is to accept all projects with a ratio of 1 or more. According to (Gittinger, 1982), it is the most suitable and very reliable criterion for ranking of the independent projects except in the most extreme cases.

4.3.2.5. Internal rate of return (IRR)

The rate of discount which makes the discounted cash inflows and discounted cash outflows equal (or NPV = 0) is known as the internal rate of return (IRR). It refers exclusively to the investment's internal ability to generate a rate of return. In other words, it represents the upper limit for the cost of capital to be invested on the project. The computation of IRR is largely by trial and error. The decision rule for selection is R > r, i.e. IRR greater than the interest rate. As a selection criterion among projects it does not need a discount rate.

IRR is considered a useful measure of project worth, particularly in business circles for promoting the fastest return from limited funds. It can be used to summarise the economic result of a project (Squire and van der Tak, 1975). Among compatible investments, it selects investments in descending order while among incompatible investments, the investment with highest IRR is selected (Price, 1989).

The World Bank uses IRR for practically all its financial and economic analyses of projects. Most of the other international financing agencies also use this criterion (Gittinger, 1982). But IRR can not be used to measure the relative merits of mutually exclusive projects in a correct manner.

It is not useful for comparing the economic merits of alternative projects in economic analysis either.

4.3.2.6. Sum of discounted consumption flows

This criterion was evolved by Kula (1981) and subsequently applied to forestry decisions (Kula, 1986). However, it has not attracted widespread support.

4.3.3. A comparison of discounting criteria

The indicators of discounting type are better because they take into account the time dimension (a crucial aspect of project management). In general, the NPV, BCR and IRR criteria are well recognised and most commonly used measures of profitability. For the truly independent projects (with no operative constraints), these three criteria may give similar results. But the ranking of projects may differ.

Usually, the IRR accepts and rejects the same set of investments as NPV or BCR. But the IRR and BCR do not favour large size projects or projects involving long occupation of a site. The ranking of projects by NPV and BCR may also differ (Price, 1989). In the case of independent projects, the rankings are not important. When the projects are not independent (i.e. mutually exclusive), the ranking becomes quite crucial. For such projects, the NPV criterion is preferable and always reliable. It provides the appropriate decision rule for both independent and non-independent projects.

There are many experts including Gansner and Larsen (1969), Gittinger (1982), Price and Nair (1984), Price (1989) and Brent (1990) who are critical of IRR. On the other hand, some experts prefer the IRR criterion (Foster and Brooks, 1983; Schallau and Wirth, 1980). Criticisms of IRR include its sensitivity to the time phasing of benefits, the size of capital outlay and the problem

arising out of multiple roots (Feldstein and Flemming, 1964; Dasgupta and Pearce, 1972; Price and Nair, 1984; Price, 1989).

According to Price (1989), "IRR is only the solution of an equation, and leaving mere equations to determine the weight to place on future events is a grave abrogation of human responsibilities". Moreover it does not give correct advice mainly because it ranks the projects irrespective of the market rate of interest. The BCR criterion is also misleading and suffers from many ambiguities (Gittinger, 1982). It is unable to indicate the true quantum of net benefit.

Thus, the NPV is the most useful criterion to assess the desirability of all kinds of project. However, the IRR can provide some additional information. Sometimes, the IRR is used as an alternative to the NPV criterion. BCR is an important criterion under the situation of budget constraints (Price and Nair, 1984; Brent, 1990). Like the ODA (1988), many others also have recommended the use of NPV as the decision criterion in economic appraisal. According to Price and Nair (1984) and Price (1989), NPV per unit area is the best criterion for the appraisal of forestry plantations.

4.4. Discount rate

It is now well known that the value of a given sum of money at two different points in time is not equal. In other words, the value of a rupee received today is not the same as the value of a rupee received one year later. Therefore, a suitable allowance for the time value of money is essential. The process of discounting which is the reciprocal of compounding allows future costs and benefits to be expressed in terms of present values. In mathematical terms, it reverses compounding.

In discounting, a present equivalent of future value is computed by dividing the future value by $(1+r)^t$. The rate r is called the discount rate. However, it does not reflect any decline in the purchasing power of money (Price, 1989).

There are several reasons why benefits accruing in future are given a lower value than present day benefits. It is mainly because the early benefits can be reinvested for further profit earning. The delay in accrual of benefits causes a loss of interest. On the other hand, an early benefit becomes more valuable for any project.

Usually in any long-term project, the bulk of investments are made in the early years of the programme, while benefits normally start in later years. Assessing the project's true worth is possible only by computing the values of all cash inflows and outflows (occurring at different points in time) at a common point in time, usually the year zero. To make a comparison between the costs and benefits, all costs and benefits are brought back to a common denominator (present values) by applying a discounting procedure to eliminate the differences in the loss of interest.

When NPV is chosen as a decision criterion, the choice of a suitable discount rate becomes vital because the costs and benefits are not usually spread over time symmetrically. The higher discount rate lowers the PV of benefits compared to discounted costs and vice-versa (ODA, 1988). Discounting affects the value of forestry very much and it is crucial to choose a correct rate (Price, 1989).

4.5. Types of cost-benefit analysis

4.5.1. Financial cost-benefit analysis (FCBA)

Financial CBA is used to assess the commercial (or financial) profitability of a project. It is undertaken from the point of view of specific entities involved in a project. Considering the monetary returns expected by such entities from investment of their funds (resources) in a project, it uses market prices to measure the money profit accruing to them. It also provides information on when funds will be required (outflow) and when receipts (inflows) can be expected. It analyses the changes in the financial position of each main type of participating agent.

In the case of financial CBA, the market interest rate is used as the discount rate for computing the NPV. But it is quite difficult to find a single figure for market interest rate, which varies from time to time depending on the types of investments and types of borrowers and lenders (Trivedi, 1987).

4.5.2. Economic cost-benefit analysis (ECBA)

A project which appears profitable for a particular individual or organisation need not necessarily be beneficial for the society as a whole. In the ECBA, the entity from whose point of view the analysis is being carried out becomes society as a whole rather than a specific entity (or entities) within the society. The main concern is with what society gives up and what society gains from a project. It is usually oriented towards the efficient allocation of capital. It is "...a type of policy analysis in which the socio-economic advantages and disadvantages of policy alternatives are quantified in one unit of measurement" (Van Den Doel, 1985).

There are two approaches to ECBA:

(i) shadow pricing and

(ii) effects method.

The first method is the most common and preferable one. The second one (developed in France) is commonly used for French-aided projects (FAO, 1986).

Shadow pricing in ECBA involves adjustment in the financial analysis on several points to indicate the withdrawal and addition of real resources (products, land, labour, capital) to the national economy. Also it disregards the transfer payments (taxes, subsidies, loans and debts) and tries to neutralise the distortions in price due to an imperfect market system. The market prices are suitably adjusted to reflect the true value of products/services for the society. The adjusted prices are called 'accounting prices' or 'shadow prices' or 'efficiency prices'. There are two ways (described in 4.6) to derive the values of inputs and outputs of projects. Some cost items are also added to change a financial analysis into economic analysis, namely cost of extension, education,

administration costs, etc. as far as they are not borne by private entities. The shadow price used for foreign exchange is a means of directly incorporating the balance of payments objective in the economic analysis. The shadow prices for labour reflect the conditions of unemployment, favouring the use of labour in cases where there is substantial unemployment.

In ECBA, a project is accepted if those who gain from a project can compensate those who lose. However, no distinction is made between the losers and gainers. In fact, the marginal utility of income is taken to be equal for different income levels and actual compensation is not considered necessary. Thus the distribution of benefits and costs among the members of society is not considered in the ECBA because the analysis assumes that the existing distribution of income is correct from society's point of view.

4.5.3. Social cost-benefit analysis (SCBA)

In the SCBA, the main idea is to determine the expected changes in terms of social organisation and living standards of people. It focuses on social aspects of the production system which will be created or sustained by implementing any project for the welfare of the people.

According to Little and Mirrlees (1974), the actual receipts and actual expenditures are not an adequate measure of the social benefits and social costs, respectively. So the SCBA tries to measure the social effects of projects (Dasgupta, Sen and Marglin, 1969; and Squire and van der Tak, 1975). Ideally all projects should be appraised on the basis of their social costs and social benefits. In reality, however, it is difficult to achieve because of complexities of data requirements and computations (ICAI, 1983).

SCBA requires substantially greater information in comparison to the financial or economic analyses. It is necessary to distinguish all items according to the contributions they make to the different objectives and according to the need for adjustment of market prices. Therefore, more details are required in the description of benefits and costs of a project. It also demands some additional information at the national level concerning the relative weights given to alternative

objectives and regarding several parameters used in the adjustment of market prices to reflect social opportunity costs.

The financial and economic data provide the basic input to which adjustments are made for determining the social profitability of the project. The efficiency prices undergo further adjustment, resulting in 'social prices' which reflect different values attached to distribution of income between rich and poor groups in the society and between consumption and investment in general (Squire and van der Tak, 1975).

In SCBA, the inter-personal income distribution and inter-temporal income distribution are considered very important. The value of change of income is dependent on the marginal utility that is assigned to the different income levels. Therefore, the concept of diminishing marginal utility is applied in SCBA to derive the shadow prices. SCBA emphasises a more equitable distribution of income and wealth for providing a better standard of living, especially to the weaker sections of society and the use of scarce resources of the nation for the maximum possible benefit to the present and future generations.

The discount rate in SCBA is taken as either the consumption rate of interest (UNIDO, 1978) or the accounting rate of interest (Little and Mirrlees, 1974). It varies from programme to programme and from country to country.

Nowadays, SCBA is of greater significance because governments in many developing countries are making huge investments of public funds for developmental activities which have significant impact on large sections of the society. There is an urgent need for full justification of these projects from the social angle.

SCBA is useful in assessing the desirability and viability of projects from the view point of income re-distribution (ICAI, 1983). But appraisals which explicitly use income distribution weights are seldom implemented. Most of the appraisals neglect the distributional weights. However, this neglect does not mean that the current income distribution is appropriate.

A difficulty in the application of the SCBA concept is the computation of the distributional weights. Moreover the subjective perception of social benefits and costs, involving a large element

of human judgement, may be unrealistic and erroneous. Any selective use of weights in derivation of social prices may help illustrate the high social profitability of the projects (Price and Nair, 1984).

4.6. Methodologies of CBA

The techniques of deriving the economic and social prices, presented and described in the guide-lines of OECD (1968) and UNIDO (1972) are the first steps towards the application of modern CBA in the developing countries. The methodologies were evolved for studying the desirability of projects from the point of view of the requirements of the Third World countries. Subsequently, the guide-lines have been revised and further developed (Little and Mirrlees, 1974; UNIDO, 1978). The application of these two methodologies under various situations have been further elaborated and explained by other authors (Squire and van der Tak, 1975; Bruce, 1976; ODA, 1977; Irvin, 1978; FAO, 1979; Gittinger, 1982; ODA, 1988; Brent, 1990; etc.).

Either of the two methodologies can be adopted for economic and social cost-benefit analyses. They reach the same conclusions about the relative desirability of projects. In other words, the divergence in two methods does not make any substantial difference in the conclusions ultimately reached. In fact, UNIDO method leans on Little and Mirrlees method to sort out the shadow pricing of tradables or tradable contents of non-tradables and has, therefore, been considered as a variant of the Little and Mirrlees method (Irvin, 1978). The fundamental principles of the UNIDO method are similar to Little and Mirrlees method (ODA, 1988). The specific differences between the two methods are narrated below.

In the Little and Mirrlees method, the numeraire is measured in terms of convertible foreign exchange available to the government for investment. The values of various inputs and outputs of a project are expressed in terms of border rupees. The numeraire in the UNIDO method is measured in domestic currency, indicating the aggregate consumption of an average individual. It uses domestic accounting rupees for expressing the values of various inputs and outputs of a project.

The benefits and costs in the Little and Mirrlees method are measured in terms of the opportunity cost of investments. The ultimate goal is the increase in savings because in developing countries, a rupee of benefits saved is considered more valuable than a rupee of benefits going to consumption. But the UNIDO method emphasises consumption as the ultimate goal of investment and measures the benefits and costs deemed to be accruing from a project in terms of consumption. It actually focuses directly on trade efficacy.

In the Little and Mirrlees method, the social costs and benefits of hiring the workers are built into the shadow wage rate. The shadow prices in the UNIDO method reflect only the economic efficiency cost of labour. The impact of employing labourers on savings and consumption and on income distribution are viewed and analysed separately.

The Little and Mirrlees method makes use of accounting ratios (AR) for converting the market prices to border prices. On the other hand, the UNIDO method uses adjustment factors to transform financial values into economic values.

The Little and Mirrlees method tends to treat goods as tradables. So, it deflates the non-tradables to their border prices. On the other hand, the UNIDO method tends to treat goods as basically non-tradables without any foreign exchange impact, recognising maximisation of the benefits within the prevailing trade barriers. It examines closely the willingness of consumers to pay for goods in the domestic market. So, the tradables are raised to average domestic price levels.

The project outputs and inputs are dealt with in the same way by the Little and Mirrlees method which considers every output as a gain and every input as a use of convertible foreign exchange (Scott, MacArthur and Newbery, 1976; Little and Scott, 1976; Lal, 1980). It usually evaluates all outputs at their shadow prices. The exportable output is evaluated just as traded inputs. The value of non-exportable output (used as a capital good) is determined at border prices by applying the conversion factor for capital goods. The value of non-exportable output (used as a consumption good) is determined at border prices by applying the conversion factor for consumption goods. In the UNIDO method, all traded goods are evaluated in terms of their border prices converted to domestic currency at the shadow exchange rate. Non-traded inputs are valued

at the shadow price in terms of their marginal economic cost (cost of producing an additional unit if the project induces additional production). Similarly, non-traded outputs are valued at their marginal values (the amount domestic consumers are willing to pay for an additional unit).

The social discount rate in the UNIDO method is identified with the consumption rate of interest (CRI), whereas in the Little and Mirrlees method, the social discount rate is the accounting rate of interest (ARI) at which the value of savings declines over time.

It is generally assumed in the UNIDO method that the Planning Commissions in developing countries are not in a position to influence the macro-economic policies. However, the Little and Mirrlees method virtually assumes a strong role for the Planning Commissions in minimising the price distortions and in directing the economy towards a second best equilibrium.

4.7. Application of CBA in appraisal of forestry projects

4.7.1. General background

"...planting trees, growing them tall and strong, and felling them at maturity is irrelevant unless these actions promote desired objectives..." (Price, 1989).

By and large, forest economics was always concerned with the harvest of timber and management decisions. The forests were mainly seen as a vital resource for the production of raw materials to meet the increasing demands of modern development without acknowledging the innumerable non-commercial uses. But the awareness of forestry's contribution to the socio-economic development has undergone substantial change over the past 40 years (Westoby, 1962). The old perception begun to receive heavy criticism in the 1970s.

It is quite true that the potential of forestry to meet development objectives is limited by the demands of rural population due to their dependence on forests, particularly for fuelwood (Douglas, 1983; Westoby, 1987). As a result, it has been lately recognised that the real life complexities of forests often include various other goods and services which can be valued too.

It is also realised that the capital intensive projects do not benefit the rural poor. Therefore, an assessment of public-sector forestry projects on a purely commercial profitability basis provides an insufficient evaluation measure (Pant, 1975). If only timber values are considered forest plantations can seldom compete with other investments either industrial or agricultural (Pant, 1975; Hyde and Newman, 1991; Whitby and Adger, 1993). However, Sedjo (1983) found that the majority of plantation forestry undertaken in different parts of the world was feasible on the basis of plantation management cost, stumpage price estimates and biological considerations.

In many projects, the proportion of non-marketed benefits is highly diversified and widely dispersed in nature. But there are no market prices for many of these products to equate with. So, it is quite difficult to account the actual value of these benefits from forests (Chatterjee, 1985). In many cases, overall social benefits may prevail over the more easily quantifiable values of costs and benefits (Romm, 1981).

In general, the objective of the forest appraisal has been to achieve an efficient allocation of capital. The appraisals in forestry are usually based on a number of assumptions about the choice of species, site quality, rotation age, future costs, prices, etc. They also involve a number of objective measurements such as areas, ages, volumes, productivity, management type, uses, marketability of the products, etc. The principal idea has been to estimate the value of the growing stock and to indicate the positive or negative effects on the capital investment.

Gradually, forest management has become more and more public-oriented. The use of appropriate economic tools including CBA has become common to analyse a wide range of forestry projects (FAO, 1979; Nautiyal, 1988; Price, 1989; Hyde and Newman, 1991). Depending on the correctness of methodology in identifying various items, CBA provides a superior tool for appraisal of forestry projects (Price and Nair, 1984). In the past few years, the focus of forest appraisal has gradually shifted towards the economic and social aspects, involving income distribution and environmental effects. In particular, the appraisal of social forestry projects including community forestry, agro-forestry and farm forestry has received much attention in the developing countries.

The application of CBA has received much more attention in many countries including India. During the eighties, a few research studies have refined and used the technique of appraisal to the Indian forestry. For instance, Nair (1980) has used the basic need approach to compare the land-use alternatives in Kerala. Trivedi (1987) has applied a utility-based shadow pricing approach to assess the impact of illicit felling in eucalyptus plantations of Bihar. Similarly, Kumar (1988) undertook a detailed cost-benefit analysis of teak plantations of Karnataka. On the other hand, Sharma, R.A. (1990) has explored appraising the socio-economic aspects of social forestry in Orissa.

4.7.2. Use of CBA in appraisal of social forestry projects of India

The estimation and prediction of volume of trees has been the main aim of traditional forestry management in India. This is based on the concept of the normal forest and the sustained yield criteria. In almost all cases, the selling price, stumpage price, or royalty rate of standing trees is fixed without any reference to the growing costs of the crop or the market price of the produce. The rates are so low that the government can never hope to make a surplus for revenue and expenditures. There is no account for economic implications which are significant all over the country.

Indian development programmes are decided within the framework of a national five year plan. The implementation of various schemes is undertaken on the basis of "top down" directives (Price and Nair, 1984). Moreover, the application of forest economics has remained negligible in the management of India's forests. It was only at the beginning of the 1970s when 'Forest Economics' as a subject was included in the curriculum of forestry training in India (Misra, 1982). Use of CBA in Indian forestry is, therefore, quite new (Pant, 1975). Even today, the use of CBA in Indian forestry is sporadic in nature.

However, in the past few years, particularly with the idea of attracting donor agencies for financial support, the programme of social forestry has received considerable attention from forest

economists to help make rational decisions about the different options, so as to ensure that scarce resources are spent in the best possible way. Now the use of CBA has become a routine practice to assess the potential of all the foreign aided social forestry projects in India.

Unfortunately, the appraisal of social forestry projects is mainly based on financial criteria involving the IRR alone. In the majority of the projects, the contribution of non-market benefits, including social and environmental values of plantations, has been neglected while carrying out the appraisals. Moreover, these projects predominantly give priority to the timber value of trees rather than the minor forest products. Looking at the diversified nature of forest functions (especially the socio-economic role of forests) in India, comprehensive CBA is vital to establish the real values of social forestry projects (Khan, J.A., 1992).

It is held that the implementation of social forestry programmes will create a number of financial, economical, social and environmental effects. Social forestry projects, being long-term activities, aim at production of a variety of goods and services for the benefit of the society in the future years. The supply and demand of forest products, together with the rural economy, have serious impacts on the economic aspects of social forestry (Chatterjee, 1985).

The main characteristics of social forestry projects that affect the CBA are the long gestation period, non-marketability of many products/services, and multiple use of plantations. The nature of benefits and costs of the social forestry plantations depends on the priorities and objectives of the policies/programmes and varies greatly from country to country. More precisely, they are project-specific, varying from place to place. Usually, the marketable products of social forestry plantations are estimated, valued and compared with the costs of achieving them. Non-marketable and intangible benefits (erosion and water control, adequate village subsistence) and costs (requirements of village participation) receive only a supplemental consideration. There are many products that can not be sold on a market, e.g. diminishing of erosion, or providing recreation opportunities, improvement of soil, reclamation of wastelands, shelter-belt effect, shade effect, etc. Many of these products affect the people and society (positively or negatively).

Srivastava and Pant (1979) have reviewed and analysed the use of CBA at length in assessing and comparing the social forestry projects in India. They consider that CBA is inadequate to measure the impacts of social forestry projects which mainly aim to bring a social change by ensuring a more equitable distribution of income along with the decentralisation of decision-making power. Though the techniques of CBA have become quite advanced, it is doubtful whether social and environmental impacts of social forestry projects can be valued in an adequate way (Romm, 1981).

In view of the above-mentioned points, the social forestry programme for the community may seem to be financially unacceptable because of various underlying factors (degraded land, protection problems, technical and managerial deficiencies, etc.). But a realistic approach in SCBA may help to reveal that it is in the public interest to continue the scheme as it would serve the objective of providing forest produce to the rural communities who are heavily dependent on such products.

4.8. Summary

Thus the use of CBA in appraisal of forestry and social forestry is quite recent. Gradually the attention has shifted to find out the economic, social and environmental aspects of forestry. Because of the in-built distributional aspects in the social forestry programme, the application of SCBA seems quite relevant and important.

Chapter Five

Data requirement: coverage and methodology

This chapter presents the type of data required for carrying out the ex-post evaluation of social forestry, particularly the village woodlots in Gujarat. It was felt necessary to collect both primary and secondary data in order to carry out a detailed cost-benefit analysis. Since it was difficult to gather any primary data on the year-wise details of social forestry including the costs and benefits of the village woodlots, it was decided to rely upon the officially reported figures. The primary data were collected through a questionnaire survey and the secondary data were obtained from the official sources.

5.1. Objective

The aim of collecting the secondary data (especially concerning the village woodlots) and the questionnaire survey was to create a detailed database (quantitative and qualitative) for carrying out the financial, economic and social cost-benefit analyses. The survey was designed to find out the extent of villagers' involvement and their awareness/participation in raising and management of the woodlots on village common land.

5.2. Coverage

The implementation of the village woodlot scheme in Gujarat was started in 1974 under a state scheme. Later on, the scheme was enlarged in the World Bank's social forestry projects from 1980-81. The scheme is spread over all parts of Gujarat. The woodlots are raised on the village common lands, known as the 'panchayat land' which are mainly used for grazing and some fuel/fodder collection. The study covers all the village woodlots raised till 1990 under the social

forestry programme in Gujarat, including the two phases of the World Bank aided social forestry projects. The village woodlot scheme was implemented as one of the main components. By 1990, a little over 13,000 village woodlots (out of 18,275 villages in Gujarat) were created under the scheme. The rainfed woodlots were raised every year since 1974 and the irrigated woodlots have been raised from 1980 onwards throughout Gujarat. The woodlots have been providing some intermediate benefits to the villagers since the beginning. In addition, many villages have begun to get the final benefits from their village woodlots after the harvest of first rotation trees. The data collection, therefore, was organised to obtain a realistic representation of village woodlots in Gujarat state.

5.3. Sources for the official/secondary data

In any evaluation, an adequate description of programme with supporting data from various sources is considered very important to ensure the thoroughness and precision of results (King, Morris and Gibbon, 1987).

In Gujarat state, the office of the Chief Conservator of Forests (social forestry) at Vadodara is the main centre for state-level information on the social forestry programme. At regional level, the offices of the Conservator of Forests maintain the records. However, the district-level offices of the extension divisions are the most important sources for obtaining the basic field-level data. They are supported by a number of extension range offices at the taluka level.

The forest department of Gujarat has a well-established system of maintaining a good database on individual village woodlots in the standard 'plantation registers' which are kept at the range level with an abstract of figures at the division level. In the plantation registers, some interesting comments have been written by the experts of the World Bank. For instance, the following two comments highlight the maintenance of the record and works,

"...appears to be very meticulously kept records. The details show the conscientiousness of the officers on their work" (Umra village woodlot of 1989-90), and

"very well maintained woodlot. Impressive staff work..." (Jadeswar village woodlot of 1988-89).

5.4. Instruments of observation:

The formats (see 5.4.1) are considered useful tool for collection of secondary data while questionnaires help in catching the true flavour of the programme and opinion of the people (Oppenheim, 1966; Belson, 1981; and Sudman, 1982). Suitable formats and questionnaire were, therefore, designed for the collection of the secondary data and primary data, respectively.

5.4.1. Formats for the secondary data

The amount of secondary data concerning the village woodlots in Gujarat was enormous. To avoid any superfluity of data, it was, therefore, tried to limit the gathering of secondary data to the most desired types only. The secondary data were obtained at two different levels, namely the state-level and district-level.

In order to obtain representative information, a set of carefully-designed formats was used. The formats were standardised to maintain the uniformity in collection of state-level and district-level data. Effort was made to cover all the relevant aspects of cost and benefit details of the harvested village woodlots along with the actual distribution of costs and benefits among the different groups of the society.

5.4.1.1. State-level data

The state-level data from the office of the chief conservator of forests (social forestry) included the followings:

- year-wise expenditure on social forestry and village woodlots in Gujarat,

- year-wise progress of village woodlots in Gujarat,

- year-wise figures on employment generation in Gujarat through the social forestry programme,

- choice of species in village woodlots,

- year-wise revenue and yield through social forestry in Gujarat,

5.4.1.2. District-level data

District-wise data obtained from the divisional offices included the following:-

- year-wise expenditure on social forestry and village woodlots,

- year-wise progress of village woodlot scheme,

- year-wise figures on employment generation

- year-wise details of revenue and yield through social forestry,

- details of harvested village woodlots (including the figures on costs and benefits),

5.4.2. Description of the questionnaire

The first part of the survey included a village profile (annexure 5.1) showing the basic village-level information on land-use (total land, agricultural land, pasture and village woodlots), population (total population, number of households, big farmers, small farmers, marginal farmers and landless labourers) and livestock (cattle and sheep/goats).

The second part was a suitably designed questionnaire which was meant to capture the relevant information from the sampled respondents. The questionnaire included 50 different questions. The questions were composed very carefully to elicit firstly, the knowledge of the villagers about the implementation of village woodlot scheme, secondly their involvement in the programme, and thirdly to know their attitude about the scheme. The questions were carefully grouped into fourteen separate headings, as listed below:-

a. agency for raising of village woodlots (question 1 & 2);

b. reasons for raising of village woodlots (question 3);

c. panchayat resolution and agreement for village woodlots (question 4 & 5);

d. choice of species for village woodlots (question 6, 7 & 8);

e. protection problems in village woodlots (question 9);

f. condition of village woodlots (question 10);

g. access to villagers for using the produce of the village woodlots (question 11);

h. accrual of benefits from village woodlots (question 12, 13, 14, 15, 16, 17 & 18);

i. income from the village woodlots (question 19 & 20);

j. Involvement of villagers in the activities of village woodlots (question 21 & 22);

k. willingness to manage the village woodlots (question 23, 24, 25 & 26);

l. self-help village woodlots (question 27, 28, 29 & 30);

m. condition and use of panchayat land (question 31, 32, 33, 34, 35, 36 & 37); and

n. attitude and perception of villagers (question 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49 & 50).

All the questions except question number eight were of the closed type having minimum of two and maximum of six different options. While half of the questions had single answers, the question numbers 1, 3, 6, 8, 9, 11, 12, 13, 15, 16,17, 20, 22, 28, 31, 32, 35, 36, 38, 43, 44, 45, 46 and 47 had the possibility of multiple answers. Various options for individual questions are mentioned in the questionnaire (annexure 5.2). Each of the options in the individual questions were pre-coded and given a code number for ease of computing purposes. At the same time, for ease of handling the questionnaires during the interviews and also to collect the data in a more realistic manner, a Gujarati translation was developed and used for the fieldwork.

5.5. Sampling methodology

It is well known that a well-designed and skilfully conducted sample survey is a practical way of collecting information concerning the general population or any special group of population (Atkinson, 1979; de Vaus, 1986).

The questionnaire survey was meant for all villages (covered under the village woodlot scheme). But it was not possible to conduct surveys in all those villages. Therefore, a multi-stage random sampling method was applied to draw representative samples for the questionnaire survey work. The samples were drawn at three different levels, namely districts, villages and respondents level. The procedure followed for selection of samples was as follows:

5.5.1. Selection of districts

The social forestry project is under implementation in all nineteen districts of Gujarat. The districts of Gujarat are located in different regions, as follows:

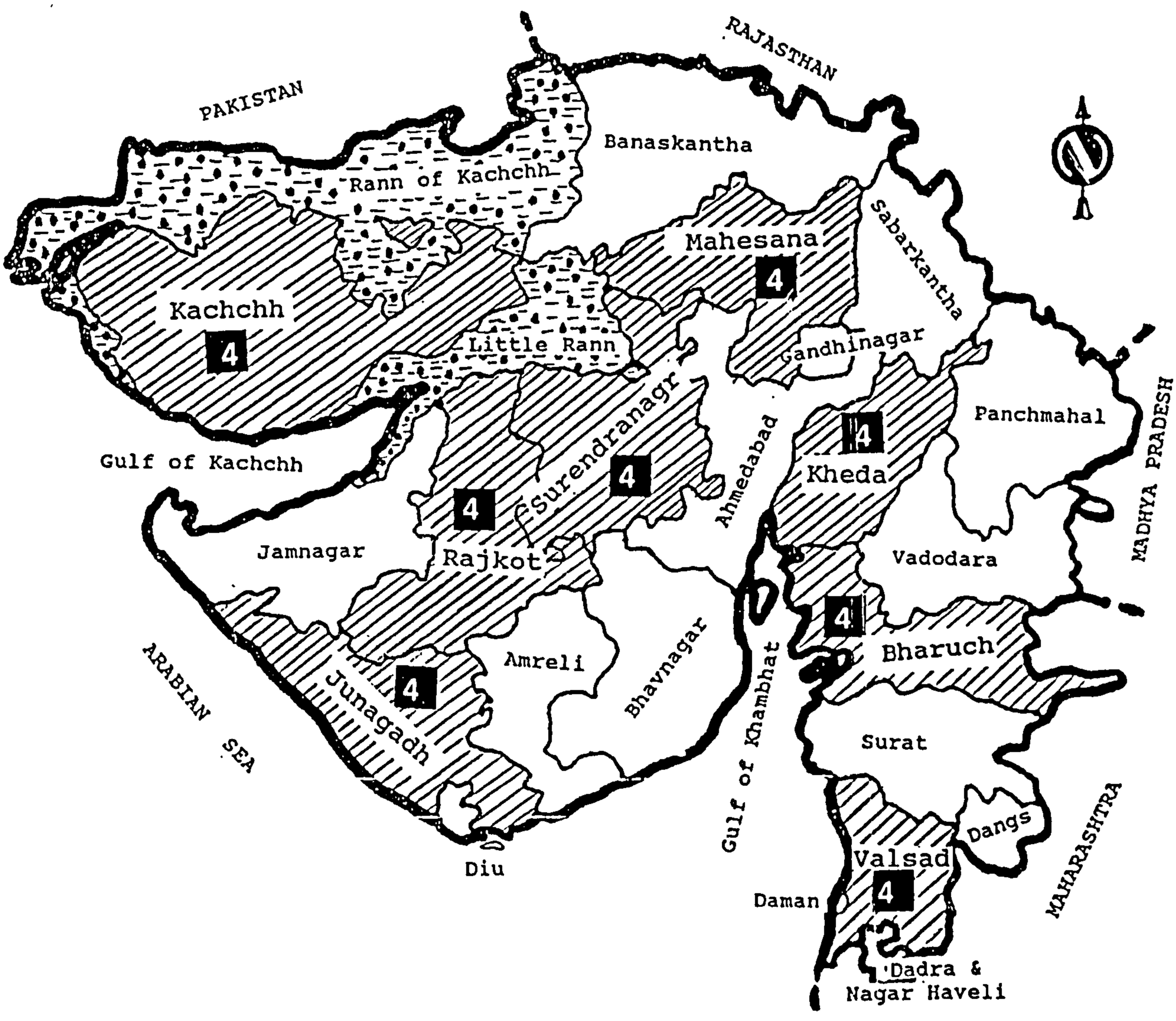
South Gujarat	Central Gujarat	North Gujarat	Saurashtra	Kachchh
Bharuch	Ahmedabad	Banaskantha	Amreli	Kachchh
Dangs	Gandhinagar	Mahesana	Bhavnagar	
Surat	Kheda	Sabarkantha	Jamnagar	
Vadodara	Panchmahal		Junagadh	
Valsad			Rajkot	
			Surendranagar	

First of all, the districts were listed alphabetically and thereafter, eight districts were selected randomly, as follows,

- Bharuch and Valsad district in south Gujarat,
- Kheda district in central Gujarat,
- Mahesana district in north Gujarat,
- Surendranagar, Rajkot and Junagadh districts in Saurashtra region, and
- Kachchh district in Kachchh region.

Thus, all regions of Gujarat were represented in the eight sampled districts (map 5.1).

Map 5.1: Location of sampled districts (with no. of sampled villages)



5.5.2. Selection of villages

A complete list of all the villages (for the eight sampled districts) covered under the scheme of village woodlots was obtained from the office of the Chief Conservator of Forests (Social Forestry), Vadodara. The names of all villages having village woodlots (created between 1980 to 1989) were then arranged in alphabetical order (for each of the eight districts, separately). Out of this list of villages, four villages from each district were selected randomly. This provided a

total sample of 32 villages in eight different districts of Gujarat for the purpose of village-level questionnaire survey work.

5.5.3. Selection of the respondents

At the village level, looking at the time and resources available, a total of fifteen respondents was thought reasonable to include a true representation of villagers belonging to five different categories, as under:-

- one panchayat member (overall representative of the village);
- two big farmers (landholding more than 4.0 ha.);
- three small farmers (landholding more than 2.0 but less than 4.0 ha.);
- four marginal farmers (landholding up to 2.0 ha); and
- five landless (without any landholding).

Thus in all, fifteen respondents belonging to the above-mentioned five categories (from each of the 32 sampled villages) were to be chosen at random. The estimated size of the sample was, therefore, kept at 480, i.e. 15 per village for 32 villages. But, in two villages, there were no marginal farmers and, therefore, eight respondents could not be selected for this category. Similarly, in one village, there were no big farmers. Therefore, against the estimated sample size of 480, the actual number of sampled respondents included 470 respondents. Furthermore, in three villages, none of the panchayat members could be contacted on the day of the interviews because they were pre-occupied for some other work outside their villages. Thus the final number of respondents who could be interviewed was 467 (97.3% of the estimated sample size).

While selecting the respondents, in the above five categories, an all-out effort was made to cover all sections of villagers for obtaining representative information about village woodlots raised under the social forestry project of Gujarat. The final sample included 8 districts, 32 villages and 467 respondent villagers. The percent distribution of the respondents is shown in table 5.1.

Table 5.1: Percent distribution of respondents

Respondents	No.	Percent
panchayat members	29	6.21%
big farmers	62	13.28%
small farmers	96	20.56%
marginal farmers	120	25.70%
landless	160	34.26%
total	467	100.00%

Table 5.2 presents the district-wise number of respondents and their percent shares. The number of respondents, category-wise and village-wise for each of the eight districts, is given in the annexure 5.3.

Table 5.2: District-wise number of sampled respondents

District	No. of villages	No. of respondents estimated	actual	Percent
Bharuch	4	60	60	12.85%
Junagadh	4	60	55	11.78%
Kachchh	4	60	58	12.42%
Kheda	4	60	59	12.63%
Mahesana	4	60	60	12.85%
Rajkot	4	60	60	12.85%
S.nagar	4	60	55	11.78%
Valsad	4	60	60	12.85%
Gujarat	32	480	467	100.00%

5.6. The fieldwork

5.6.1. Planning for fieldwork

The fieldwork was one of the most important parts of the study because the data requirement for this study was mainly based on the fieldwork only. Since the study covered as

many as eight different districts of Gujarat state well-suited logistics for the fieldwork was considered necessary. Therefore, a well-thought out plan for the complete fieldwork was developed well in advance and the necessary permissions were taken from the concerned officials before going to Gujarat. The concerned officials both in Government of India and Government of Gujarat were formally requested to issue instructions to their field officers and staff to extend the necessary support and cooperation during the time of survey work (annexure 5.4).

5.6.2. Pre-testing of questionnaire

First of all, a pre-testing of the questionnaire was undertaken in two of the selected districts (Valsad and Mahesana). On the basis of the experiences of preliminary survey and the responses of the villagers, the questionnaire was slightly modified to include a maximum of fifty questions in order to obtain the full details of village woodlots from the sampled respondents.

5.6.3. Final questionnaire

The required number of copies (500) of the finally designed questionnaire were cyclostyled. To avoid any confusion and mixing of various forms from different villages, they were stapled together in 32 separate bundles of fifteen forms each to be used separately for each of the 32 selected villages in eight districts of Gujarat. The covering page of each bundle was the 'village profile format'.

5.6.4. Conducting of the survey work

The fieldwork was carried out between December 1991 and May 1992. The selected villages were arranged district-wise and a suitable itinerary was decided to complete the survey work within the stipulated time period. The selected respondents were contacted in their villages

and the purpose of the interviews was explained. With their consent, they were exposed to each of the questions (of the questionnaire) to elicit their responses. None of the villagers were forcibly asked to give their options in respect of the questions asked. In all the sampled villages, the respondents proved to be highly cooperative during the interviews. Wherever it was felt necessary and unavoidable, the help of local forestry field staff was taken to complete the interviews on time.

5.6.5. Collection of the secondary data

5.6.5.1. General details on social forestry

The state-level data were obtained from the office of the Chief Conservator of Forests (social forestry). The standard formats were used for this purpose.

However, it was impossible to collect the data for all the districts of Gujarat. Therefore, the same eight representative districts (sampled for questionnaire survey) were chosen for collection of the district-level secondary data. All the relevant information on social forestry including the village woodlot scheme (in the standard formats) was procured from the respective offices of the deputy conservator of forests in each of the eight sampled districts. The data included the district-wise details of area coverage, number of villages covered and amount spent.

5.6.5.2. Specific details on costs and benefits of harvested village woodlots

In Gujarat, the harvesting of village woodlots began in 1983 and since then hundreds of village woodlots have been harvested. It is believed that the villagers have received substantial benefits in terms of fuelwood, fodder, small timber, minor forest products, etc.

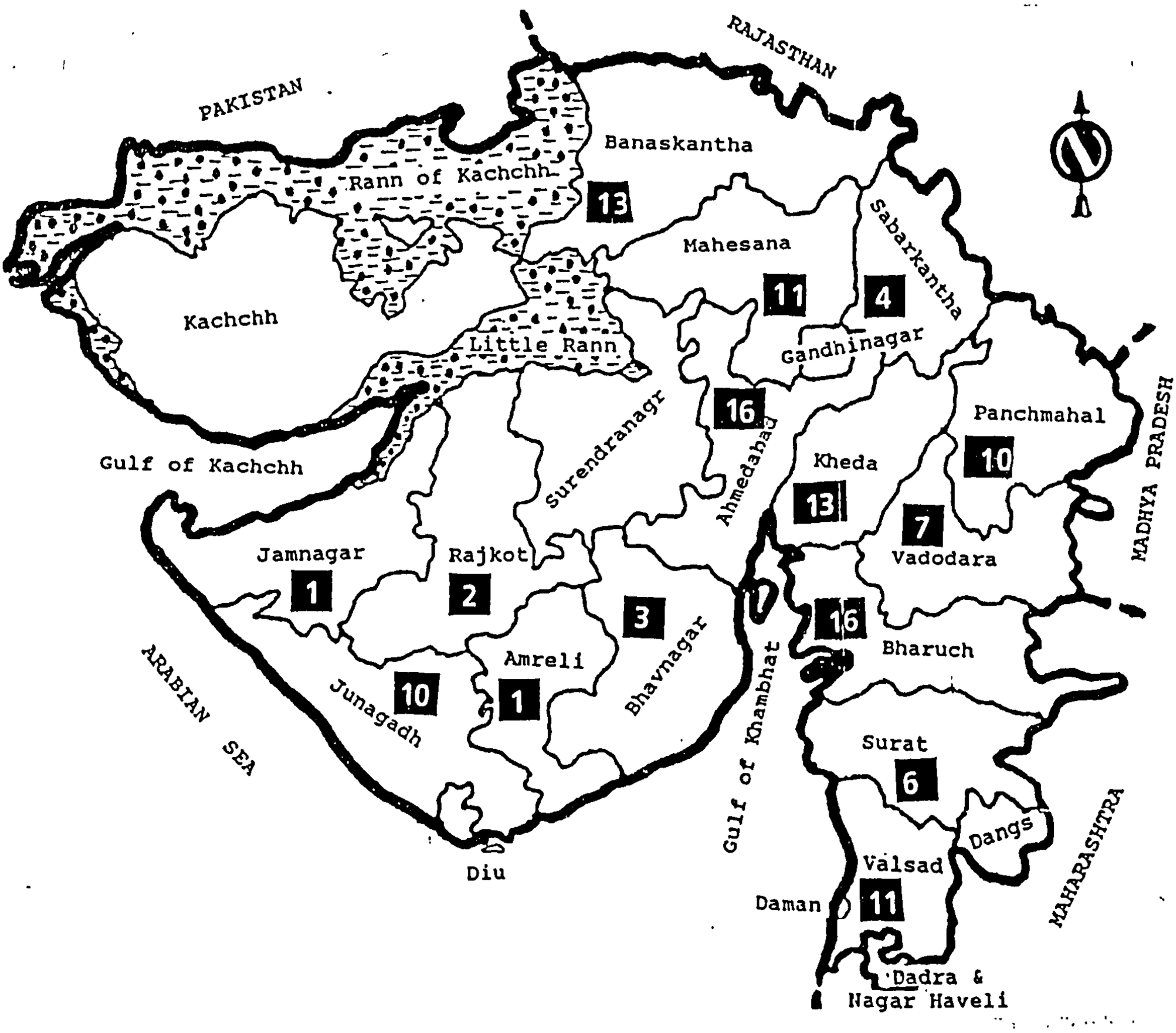
During the fieldwork every effort was made to collect and collate the data on harvested village woodlots in all parts of the state. Finally, it was possible to get the details for 15 districts

(map 5.2), Including 113 rainfed village woodlots and 11 irrigated village woodlots. The following details were obtained for each of those villages:-

- village-wise details of type of woodlot, area, planting year, harvesting year, number of trees planted, number of trees harvested,
- planting costs,
- harvesting costs,
- details of intermediate benefits,
- details of main benefits, and
- distribution of benefits among the villagers, village panchayats and forest department.

Map 5.2: Distribution of harvested village woodlots

(districts with no. of woodlots)



5.7. Summary

Looking at the nature of data for the cost-benefit analysis of village woodlots, the fieldwork was designed to gather all the relevant information through the help of formats and questionnaire. The logistics for fieldwork was carefully planned in advance and every care was taken to complete the work on time. The officers and staff of the social forestry extended their full cooperation and help by providing the relevant details of the social forestry programme in Gujarat.

Chapter Six

Description of the secondary data

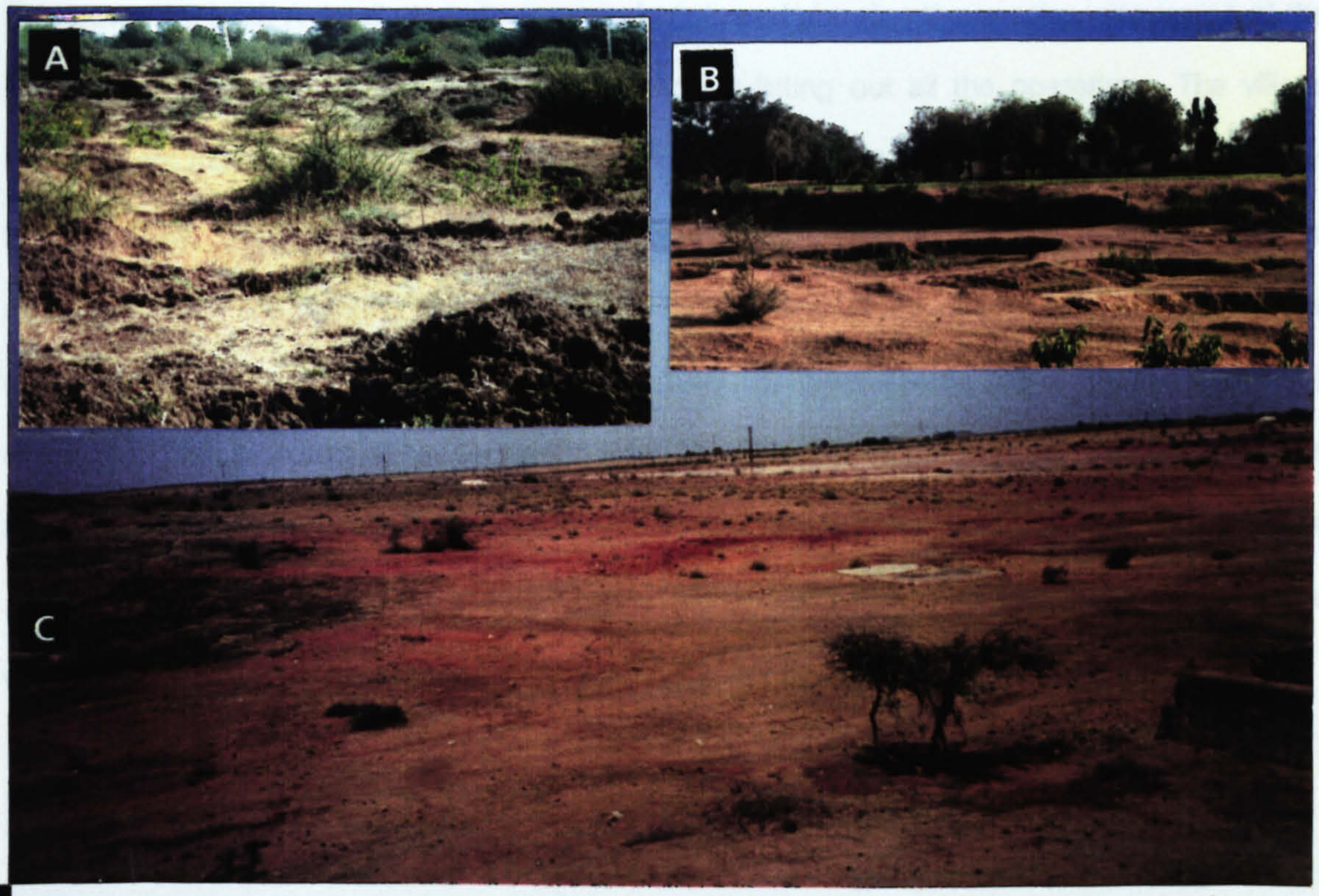
This chapter describes the secondary data and provides an over-view of year-wise details on various aspects of social forestry, especially the village woodlots in Gujarat and also in the eight sampled districts. The quantitative data presented in this chapter form the basic framework for carrying out a comprehensive cost-benefit analysis (in the next chapters) which is the prime objective of this thesis.

6.1. The village woodlot scheme: main features

Gujarat state has about 0.844 million hectares of village common grazing land, spread over 18,275 villages (of which two-thirds have no forest at all). The ownership of this land lies with the village panchayats who have no resources to develop and manage these lands in a proper manner. In the majority of the villages, the condition of these lands is very disappointing in terms of vegetation cover (photograph 1). It is largely because of heavy grazing and overuse, leading to severe erosion and compaction of the top soil (photograph 2). In general, these lands present a highly degraded site, yielding hardly any useful produce.

To regenerate these common lands, the village woodlot scheme has been implemented in Gujarat since 1974. As per the guide-lines, about 4 hectares of land is generally taken up for establishing a village woodlot. The village panchayat's involvement is considered important in assigning the land for this purpose. The village panchayat passes a resolution to allow the forest department to raise the woodlot. The panchayat is also motivated to help in choosing the species, and to cooperate in protection and management of woodlots. The government provides the money for raising of the woodlots. The work is implemented by the forest department which carries out the maintenance and protection work for the first three years. Afterwards, as per the guide-lines,

further protection and management needs to be transferred to the village panchayats. But, in reality, most of the village panchayats have been avoiding this responsibility and the forest department has continued to look after the village woodlots till the harvest.



1 The present condition of village common lands in different parts of Gujarat (A) Junagadh, (B) Mahesana and (C) Rajkot

2 The severity of erosion in the village common lands (Junagadh, Gujarat)

The site for village woodlots is selected at least one year in advance in consultation with the village panchayat. An agreement between the forest department and village panchayat is signed, mentioning especially the protection measures, benefit sharing mechanism and tenurial rights over the land. A detailed treatment map is prepared showing the species-wise layout of the woodlot. A plantation register is also maintained for listing out all the operations. The village woodlots are mainly raised under rainfed conditions (photograph 3). However, wherever irrigation facilities exist, effort is made to raise irrigated woodlots for generating maximum revenue (photograph 4). The planting and after-care operations differ in these two types of woodlots as mentioned in annexure 6.1. Between 1974 and 1990, the plant density has been changed many times. In rainfed woodlots, it has increased from 400 trees per ha before 1980 to 2,026 trees per ha. On the other hand, the number of trees per ha in the irrigated woodlots was first increased from 1,800 to 7,656 and then decreased to 6,400 followed by 3,300. The fruit tree species are planted at 4x4 metres in both types of woodlot.

3 A rainfed village woodlot
(Kachchh, Gujarat)

4 An irrigated village woodlot (Surendranagar, Gujarat)

The village panchayat is free to collect grass, fodder, fruits, etc. The panchayat may decide either to provide these intermediate benefits free of charge to the villagers or to sell to the villagers to raise some revenue. Initially the final harvest was to be shared on 50:50 basis between the village panchayat and the forest department (after deducting the expenditures). Now the revised guide-lines provide 100% net benefit to the village panchayats. Out of this, one-fourth is reserved for creation of new village woodlots in the village. The remaining 75% of the revenue can be utilised by the panchayat for rural development works.

6.2. Progress of the village woodlot scheme

6.2.1. Physical progress

Between 1974-75 and 1989-90, a total of 76,319 hectares of village common land was undertaken for raising of the 13,297 village woodlots in Gujarat. In all 8,937 villages were covered. About 89% of the woodlots were raised under rainfed conditions. Table 6.1 provides the details of

achievements. The forest department has been the main agency for raising of these village woodlots. However, a few progressive village panchayats have also participated in raising their own village woodlots, called the self-help village woodlots, covering 10,014 hectares during the same period (included in the total achievement figures). The funds for such woodlots came from the rural development schemes and the technical know-how was provided by the forest department.

Table 6.1: Progress of the village woodlots in Gujarat

Period	No. of village woodlots	No. of villages	Rainfed ha	Irrigated ha	Total@ ha
1974-79	2,206	1,426	17,576	-	17,576
1980-84	6,601	5,085	34,372	3,836	38,208
1985-90	4,490	2,426	16,202	4,333	20,535
Total	13,297	8,937	68,150	8,169	76,319

@ includes the figures of self-help village woodlots.

District-wise coverage (for the eight sampled districts) under the village woodlot scheme during 1980-81 to 1989-90 is given in table 6.2. On an average in each of the districts, 300 ha of rainfed and 40 ha of irrigated woodlots were raised during 1980-81 to 1989-90. The overall coverage was maximum in Rajkot district (4,265 ha) and minimum in Valsad district (2,864 ha). However, the irrigated woodlots covered maximum area in Bharuch and Kheda districts.

Table 6.2: District-wise details of area coverage under village woodlots (1980-81 to 1989-90)
(in hectares)

Districts	Rainfed	Irrigated	Total
Bharuch	3,040	546	3,586
Junagadh	3,161	296	3,457
Kachchh	3,263	261	3,524
Kheda	2,340	529	2,869
Mahesana	2,838	360	3,198
Surendranagar	2,651	440	3,091
Rajkot	3,915	350	4,265
Valsad	2,423	441	2,864

6.2.2. Financial progress

A total of Rs 311.90 million was spent during 1980-81 to 1989-90 for raising of village woodlots in Gujarat. Year-wise figures are given in table 6.3. District-wise amounts spent during 1980-81 to 1989-90 for raising of village woodlots are shown in table 6.4.

Table 6.3: Details of expenditure on village woodlots in Gujarat (1980-81 to 1989-90)

(in Rs. million)

Year	Social forestry total	Expenditure on village woodlots	
		total	in %
1980-81	79.88	15.42	19.32
1981-82	105.14	19.54	18.58
1982-83	140.72	26.45	18.80
1983-84	176.24	30.55	17.33
1984-85	174.37	34.90	20.00
1985-86	172.20	34.74	20.17
1986-87	173.39	26.55	15.31
1987-88	206.39	31.53	15.28
1988-89	251.89	46.00	18.26
1989-90	291.50	46.22	15.86
Total	1771.20	311.90	17.60

Table 6.4: Details of district-wise expenditure on village woodlots (1980-81 to 1989-90)

(in Rs. million)

Districts	Details of expenditures		
	on social forestry	on village woodlots	Percent of total
Bharuch	47.60	19.44	40.85
Junagadh	47.31	14.08	29.77
Kachchh	96.20	19.44	20.20
Kheda	64.63	20.54	31.78
Mahesana	99.94	12.57	12.58
Surendranagar	92.53	27.21	29.41
Rajkot	73.64	14.58	19.80
Valsad	107.96	24.14	22.36

It shows that the overall expenditures on village woodlots were between 15 to 20 percent of the total expenditure. The highest amount was spent in Surendarnagar district. In the case of Bharuch district, 40% of the total expenditure was incurred for raising of the village woodlots. This also indicates that the village woodlot scheme is an important component of the social forestry programme in Gujarat.

6.3. Choice of species for the village woodlots

Selection of species is done in accordance with the people's choice and agro-climatic conditions of the area. Seedlings are raised in polythene bags of suitable sizes and reasonable gauges. In the case of rainfed woodlots, half of the trees belong to the fast growing species and one-fourth each belong to the local species and fruit trees. On the other hand, the irrigated woodlots have 50% timber and fuelwood species, one-fourth fruit species and one-fourth other species including bamboos. But in most cases, the site-specific conditions override the proposed proportion of various species. However, the multi-purpose species are the preferable ones.

A separately carried out random sampling of village woodlots in eight districts of Gujarat (Khan, J.A., unpublished) showed that as many as 46 different species were used for planting in the village woodlots. Table 6.5 mentions the overall number and percent of village woodlots showing the species-mix in the rainfed and irrigated woodlots. So the majority of the woodlots were carefully planted with a mix of species to avoid a monoculture, as far as possible. Overall, only 7.76% of the rainfed village woodlots and 3.28% of the irrigated village woodlots in Gujarat had only one species, i.e. monocultures, while 42% of the rainfed village woodlots and 59% of the irrigated village woodlots had more than four species.

Most common species and their uses planted in the rainfed and irrigated village woodlots are tabulated in table 6.6. As such all species can be said to be of multi-purpose because they are used in many different ways by the villagers. The choice of fruit species included the local and indigenous trees. Efforts have also been made to plant bamboos in sufficient numbers.

Table 6.5: Number of species used in the village woodlots

No. of species	Rainfed woodlots		Irrigated woodlots	
	No.	% of total	No.	% of total
One species	34	7.76	4	3.28
Two species	66	15.07	10	8.20
Three species	92	21.00	17	13.93
Four species	60	13.70	19	15.57
Five species	53	12.10	21	17.21
Six species	48	10.96	15	12.30
Seven species	31	7.08	10	8.20
Eight species	17	3.88	8	6.56
Nine species	14	3.20	4	3.28
Ten species	13	2.97	6	4.92
More than ten	10	2.28	8	6.56

Table 6.6: Choice of main species and their uses

Type of woodlot	Name of species as per their main uses
Rainfed	Fuelwood species *Acacia auriculiformis*, , *A. tortilis*, *Casuarina equisetifolia*, *Prosopis juliflora*, etc. Small timber species *Ailanthus excelsa*, *Albizia lebbek*, *Dalbergia sissoo*, *Eucalyptus* spp., *etc.* Minor forest species *Acacia catechu*, *Bamboos*, *Madhuca latifolia*, *Salvadora persica*, Multi-purpose species *Acacia nilotica*, *Azadirachta indica* *Leucaena leucocephala*. Fruit species *Pithocolobium dulce*, *Emblica officinalis*, *Moringa oleifera*, *Cordia dichotoma*, *Zizyphus nummularia*, *Psidium guajava*, *etc.*
Irrigated	Fuelwood species *Acacia nilotica*, *A. tortilis*, etc. Small timber species *Casuarina equisetifolia*, *Eucalyptus* spp., *Leucaena leucocephala*, *Dalbergia sissoo*, *Gmelina arborea*, *Tectona grandis*, etc. Multi-purpose species *Leucaena leucocephala*, *Azadirachta indica*, etc. Fruit species *Pithocolobium dulce*, *Emblica officinalis*, *Tamarindus indica*, *Cordia dichotoma*, *Zyziphus nummularia*, *etc.*

6.4. Details of the harvested village woodlots

6.4.1. General background

The harvesting of village woodlots began in 1983. The first three village woodlots to be harvested in Gujarat were located in three districts, namely Bharuch (Asuriya village), Bhavnagar (Nari village) and Valsad (Dhanori village). Since then many other village woodlots have been harvested in Gujarat (photographs 5, 6 and 7). The villagers have realised the potential of the common lands and have seen the actual benefits in terms of forest produce on their door steps (photograph 8). Efforts were made to gather the information about all such village woodlots. It was possible to collect the details of costs and benefits for 124 village woodlots, belonging to 16 districts of Gujarat (table 6.7). District-wise figures are given in annexure 6.2.

Table 6.7: Region-wise details of harvested village woodlots

Region	Rainfed woodlots			Irrigated woodlots		
	No.	Ha	Average	No.	Ha	Average
South	40	183.00	4.575	-	-	-
Central	31	142.07	4.583	8	27.00	3.375
North	28	141.01	5.036	-	-	-
Saurashtra	14	190.20	13.586	3	20.00	6.660
Total	113	656.28	5.808	11	47.00	4.273

In all, 113 woodlots covering an area of 656 ha belonged to the rainfed type and only 11 woodlots covering an area of 47 ha were of the irrigated type.

6.4.2. Average size of the harvested village woodlots

The average size of the harvested village woodlots was 5.81 hectares under the rainfed conditions and 4.27 hectares under the irrigated conditions. Region-wise distribution (table 6.8)

indicates that the majority of the woodlots were limited to 4 hectares. However, 23% of the woodlots were above 4 hectares.

Table 6.8: Distribution of woodlots according to their sizes

Range hectares	Rainfed village woodlots: South Gujarat	Central Gujarat	North Gujarat	Saura-shtra	Irri-gated	Total
<2.0	-	-	-	-	5	5
2.0-4.0	35	22	26	3	4	90
4.0-6.0	3	1	2	3	-	9
6.0-8.0	-	1	2	4	1	8
8.0-10.0	-	1	-	-	-	1
>10.0	2	3	1	4	1	11

6.4.3. Rotation

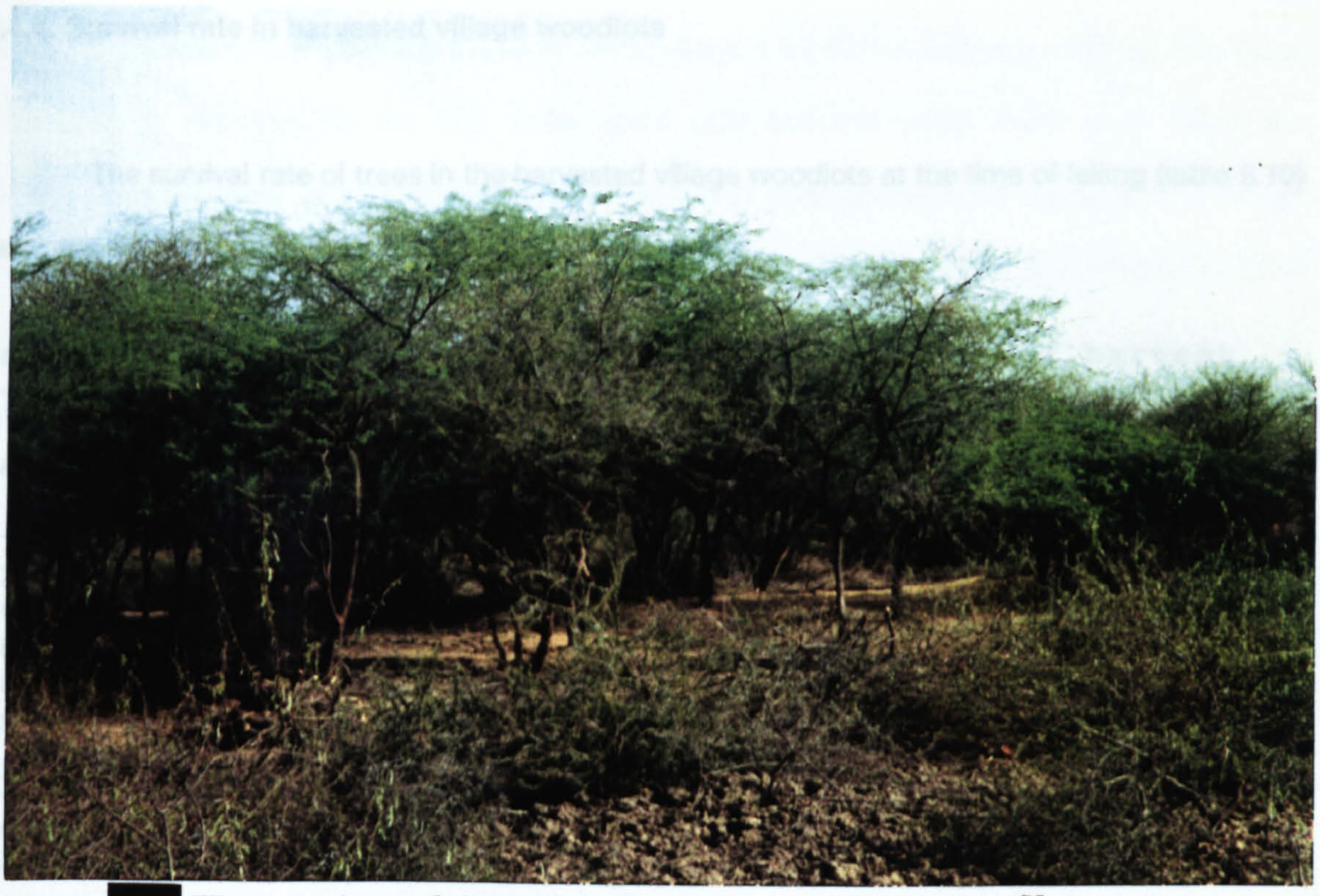
The raising of woodlots was started in 1974 and the harvest of woodlots was started in 1983 when only three of the rainfed village woodlots were harvested. Table 6.9 furnishes the year of planting and year of harvest for the harvested village woodlots.

Table 6.9: Year of plantations vs year of harvest
(No. of village woodlots)

Year of planting	Year of harvest: 1983	1984	1985	1986	1987	1988	1989	1990	1991	Total
1974	2	1	3	11	-	1	6	-	-	24
1975	1	1	9	37	2	-	4	-	1	55
1976	-	-	1	12	2	-	-	-	4	19
1977	-	-	-	6	3	-	-	-	-	9
1978	-	-	-	2	-	-	-	-	3	5
1979	-	-	-	-	-	-	-	-	-	-
1980	-	-	-	3	1	-	1	-	-	5
1981	-	-	-	1	-	-	-	-	2	3
1982	-	-	-	2	-	-	1	-	-	3
1983	-	-	-	-	-	-	1	-	-	1
Total	3	2	13	74	8	1	13	-	10	124

5 **Harvesting of Eucalyptus hybrid in a village woodlot (Kheda, Gujarat) Fruit trees (Emblica officinalis) have been left out.**

6 **Harvesting of Casuarina equisetifolia in a village woodlot (Valsad, Gujarat)**



7 **Harvesting of Acacia nilotica in a village woodlot**
(Junagadh, Gujarat)

8 **Lops and tops stacked for distribution to the people**
(Mahesana, Gujarat)

6.4.4. Survival rate in harvested village woodlots

The survival rate of trees in the harvested village woodlots at the time of felling (table 6.10) Indicates that 64 woodlots had above 40% of survival rate.

Table 6.10: Survival rate of trees at the time of harvest

Range	Rainfed village woodlots				Irri-gated	Total
	South	North	Central	Saura-shtra		
<20%	7	5	13	2	4	31
20-40%	9	2	3	1	1	16
40-60%	9	11	7	2	2	31
60-80%	7	4	1	2	-	14
>80%	4	6	4	4	1	19
N.A.	4	-	3	3	3	13
Average	45.85	49.76	35.80	70.14	19.35	124

In the case of the rainfed woodlots, the overall survival rate was higher in Saurashtra region followed by north Gujarat and south Gujarat. It is quite strange that the irrigated woodlots were having only 19% survival. This might have been because of termite attacks, insufficient water availability in the area and failure of tube-wells. District-wise survival rate figures are given in the annexure 6.3. In Bhavnagar district, the survival rate was maximum because of the profuse natural regeneration of *Prosopis juliflora*. On the other hand, the survival was very low in Panchamahal and Vadodara district.

6.4.5. Type of produce from the harvested village woodlots

6.4.5.1. Details of the intermediate produce

By and large, the village woodlots provide a number of intermediate products to the local villagers. The enclosure of the area for village woodlots right in the first year itself promotes the

growth of grasses which are made available to the villagers by the cut and carry method. The grass availability is restricted to the first three years only because when trees grow taller, the regeneration of grass is suppressed. From the fourth year onwards, in some of the village woodlots, the fruit species (*Zizyphus* spp.) start providing some fruits for the people. In most cases, the grass and fruits are given to the local villagers, free of charge. However, in some cases, the village panchayats opt to sell the grass as well as fruits for increasing their income.

Table 6.11 provides the details of the intermediate produce obtained from the harvested village woodlots in different regions of Gujarat. It appears that none of the village panchayats had taken up the auction of the grass. In fact, the grass, amounting to 5,719 quintals (1 quintal = 100 kilograms) obtained from 40 village woodlots was given free of charge to the local people. District-wise figures are given in annexure 6.4. Although grass is available in almost all the village woodlots, the usage varies from village to village. The district-wise figures indicate the amount of used grass from the woodlots.

Table 6.11: Details of the intermediate produce

Type of produce/ disposal	Rainfed village woodlots				Irri-gated	Total
	South Gujarat	central Gujarat	North Gujarat	Saura-shtra		
Grass auction						
Qtl	-	-	-	-	-	-
Plots	-	-	-	-	-	-
Grass free						
Qtl	2,028	2,274	530	9	878	5,719
Plots	7	17	11	2	3	40
Minor forest produce auction						
Plots	1	-	-	-	-	-
Minor forest produce free						
Plots	3	3	3	-	-	9

6.4.5.2. Details of the main produce

At the time of harvest, the main produce includes small timber, and fuelwood. In some cases, specially north Gujarat (Banaskantha district), fuelwood was converted into charcoal. A summary of the harvested village woodlots (table 6.12) shows that timber was obtained from 67 woodlots, fuelwood from 111 woodlots and charcoal from 13 village woodlots. District-wise figures are shown in annexure 6.5.

Table 6.12: Details of the main produce

Type of produce/ disposal	Rainfed village woodlots: South Gujarat	Central Gujarat	North Gujarat	Saura-shtra	Irri-gated	Total
Timber auction						
Cmt	849	780	51	10	1,101	2,740
Plots	24	28	3	2	10	67
Timber retained						
Cmt	17	44	-	-	68	129
Plots	6	6	-	-	4	16
Timber concessional						
Cmt	-	-	-	-	-	-
Plots	6	5	-	-	4	15
Fuelwood auction						
Qtl	13,582	17,881	8,713	13,339	3,248	56,763
Plots	37	31	15	14	11	108
Fuelwood retained						
Qtl	350	740	-	745	523	2,358
Plots	8	3	-	3	4	18
Fuelwood concessional						
Qtl	-	-	-	-	-	-
Plots	8	2	-	3	4	17
Fuelwood free						
Qtl	1,510	3,332	1,282	569	931	7,624
Plots	39	24	28	9	11	111
Charcoal auction						
Qtl	-	-	2,487	-	-	2,487
Plots	-	-	13	-	-	13

About 2,740 cubic metres of timber, 56,763 quintals of fuelwood and 2,487 quintals of charcoal were auctioned. A total of 129 cubic metres of timber and 2,358 quintals of fuelwood were retained by the village panchayat for the community uses. The local people were able to buy the timber at 60% of the market rate in fifteen villages only. In the case of fuelwood, in seventeen villages, the local people had bought the fuelwood at 60% of the market rate. However, in 111 villages, the local people, especially the poorer ones, were given 7,624 quintals of fuelwood free of charge.

6.5. Details of yield and revenue from the social forestry plantations

So far, the strip woodlots have not been taken up for harvesting in Gujarat. However, the dry, dead and fallen material from the social forestry plantations (mainly the strip woodlots) has been providing fuelwood and timber in reasonable quantities. The forest department collects all such material and arranges the sale through open auctions from time to time. A number of minor forest products, particularly fruits from strip plantations, are also auctioned on a yearly basis. The details of yield for the eight sampled districts are given in table 6.13. The maximum quantity of fuelwood was available in Surendranagar district whereas the timber was maximum in Valsad district.

Table 6.13: Details of the fuelwood and timber obtained from social forestry plantations (1980-81 to 1989-90)

Districts	Fuelwood Quintals	Timber Cmt
Bharuch	18,742	1,280
Junagadh	1,730	105
Kachchh	N.A.	N.A.
Kheda	44,526	1,465
Mahesana	56,274	694
Surendranagar	266,956	104
Rakjkot	7,884	20
Valsad	16,254	2,049

The details of revenue in the same eight sampled districts is given in table 6.14. The total revenue in Mahesana and Surendranagar districts included a substantial contribution from fuelwood and minor forest produce, respectively.

Table 6.14: Details of the revenue in Gujarat state from social forestry plantations (1980-81 to 1989-90)
(in Rs million)

Districts	Fuelwood	Timber	Minor forest produce	Total
Bharuch	0.59	0.36	0.11	1.06
Junagadh	0.60	0.06	0.13	0.79
Kachchh	N.A.	N.A.	N.A.	0.85
Kheda	1.44	1.05	0.08	2.57
Mahesana	2.40	0.63	0.88	3.12
Surendranagar	0.76	0.63	1.47	2.30
Rakjkot	0.30	0.00	0.01	0.31
Valsad	0.46	1.29	0.14	1.89

6.6. Employment generation through social forestry

Between 1980-81 and 1989-90, a total of 63.51 million man-days of employment was created through social forestry in Gujarat. The year-wise and quarter-wise break-down is given in table 6.15. The figures indicate that usually the social forestry programme has been helpful in creating a total of about 5 to 6 million man-days every year except in 1983-84 when it was nearly 10 million man-days. The quarter-wise figures show that more than one-third of the annual man-days is available during January to March months, mainly on account of the preparatory works like fencing, digging of pits, nursery raising, etc. According to the ILO/ARTEP (1988), in Gujarat the women's involvement was 42% during 1983-84. The estimates of USAID (1988) showed that women's participation was 30% during 1985-86 to 1987-88.

A comparison of employment generation through social forestry in the eight selected districts (table 6.16) shows that between 1980-81 and 1989-90, the maximum number of man-days was available in Kachchh district (6.01 million man-days), followed by Valsad district. It was lowest

in Bharuch district. Thus in each of the districts, every year about 0.2 to 0.3 million man-days are generated through the implementation of the social forestry programme.

Table 6.15: Quarter-wise percent employment generation (mandays) through social forestry in Gujarat

Year	Total (million)	Quarter-wise percents			
		Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar
1980-81	5.296	6.76	20.35	35.76	37.14
1981-82	6.184	16.10	23.20	31.32	29.39
1982-83	7.057	15.74	20.76	28.73	34.77
1983-84	9.835	9.03	23.75	30.53	36.69
1984-85	5.951	14.91	20.81	26.96	37.32
1985-86	5.625	15.46	22.67	21.32	40.55
1986-87	5.018	12.11	21.68	26.24	39.97
1987-88	5.725	13.73	19.11	24.55	42.62
1988-89	5.954	15.49	30.39	24.58	29.55
1989-90	6.237	14.70	24.11	20.88	40.32
Total	63.514	13.29	22.78	27.32	36.61

Table 6.16: District-wise details of employment generation

Districts	Employment generation (million mandays)		
	1980-85	1985-90	Total
Bharuch	0.853	1.030	1.883
Junagadh	0.980	1.134	2.114
Kachchh	2.789	3.225	6.014
Kheda	1.657	1.594	3.251
Mahesana	1.312	1.319	2.631
Rajkot	1.437	1.395	2.833
Surendranagar	1.357	1.289	2.646
Valsad	1.658	1.664	3.322

6.7. Summary

From the above description, it becomes clear that the village woodlots are one of the important components of social forestry programme in Gujarat state. Their contribution in the rural economy appears to be quite important. In addition, the enormous amount of employment generation through social forestry presents a substantial contribution to the state economy, as a

whole. The production of fuelwood and timber from the village woodlots has a direct impact on the preservation of natural forests of Gujarat because of lessening the rural demands for forest produce.

Chapter Seven

Results of the questionnaire survey

This chapter brings out the results of the questionnaire survey. A brief description of the sampled villages, region-wise, is also given with an idea to appraise the specific features relating to the area, size of panchayat land, population and livestock. The question-wise results are presented in the later parts.

7.1. Data entry and computations

First of all, the questionnaires (having the village profiles and questionnaires for five categories of respondents together) were sorted out for each of the eight sampled districts to avoid any mixing and confusion while handling the questionnaires for computing purposes. The data from the questionnaires in the form of coded responses were then entered into Borland Quattro Pro (v4.0).

Region-wise tables summarising the village profiles (land-use, population and livestock) have been prepared to provide an idea of the sampled villages. Thereafter, the responses have been sorted out in the form of frequency tables (annexure 7.1) which contain a full counting of responses for each question (option-wise), respondent-wise, district-wise and region-wise. It is important to mention here that all the respondents had answered all the questions. So there are no missing data.

To present a comparative account of the responses, the numbers were converted into percentages. Using the respondent-wise frequencies, chi-square tests have been carried out to see if there are any significant differences among the responses of the five categories of respondents. The category-wise responses are also shown through suitable figures.

7.2. Characteristics of the sampled villages

The first part of the questionnaire survey was the collection of village-wise figures on land-use, population and livestock. The land-use figures (table 7.1) suggest that the average size of village is 665 hectares with comparatively bigger size in Saurashtra and Kachchh region.

Table 7.1: Region-wise average figures on land-use in the sampled villages

(in hectares)

Regions	Total	Agricul-tural	Common grazing land Total	Common grazing land woodlot	Other
South	648	465	28	11	144
Central	668	589	20	5	53
North	433	333	45	11	44
Saurashtra & Kachchh	731	599	83	10	39
Average	665	531	57	10	68

The average sizes of the common grazing land in four regions varies between 20 and 83 hectares with about 10 hectares under the village woodlots in three regions except central Gujarat which has only 5 hectares. The village woodlots have thus occupied from 12 to 39 percent of the common grazing lands.

The population (table 7.2) is lowest in Saurashtra and Kachchh region. Though the north-western part of state is of arid type, north Gujarat has high density of population and livestock to support them with. The average family size in the sampled villages is 4.33 and the average population of landless is between 28 and 48 percent, while the overall population of big farmers is about 20 percent.

The average number of livestock per village comes to 1359, including 845 cattle (table 7.3). Because of well-organised and well-established dairy co-operatives, the proportion of cattle is quite high in all parts of Gujarat, particularly in central and north regions.

Table 7.2: Region-wise average figures on population in the sampled villages

(in number)

Regions	Total	House-holds	Percents of farmers Big	Small	Marginal	Land-less	Other
South	1691	385	24.4	8.7	21.7	32.7	12.4
Central	3982	956	5.2	16.8	28.1	48.5	1.4
North	4275	1085	9.9	22.8	20.6	27.4	19.3
Saurashtra & Kachchh	1925	413	31.9	14.4	13.0	40.6	0.2
Average	2417	558	19.5	15.9	19.6	37.7	7.2

Table 7.3: Region-wise average figures on livestock in the sampled villages

(in number)

Regions	Total	Cattle	Sheep & goats	Others
South	1090	633	368	89
Central	1998	1609	317	72
North	2429	1481	656	293
Saurashtra & Kachchh	1067	602	352	113
Average	1359	845	390	124

The data on village profiles indicate that basic features of the sampled villages are quite varying from region to region.

7.3. Presentation of overall results

While the texts of individual questions and their results by category of respondents are presented in the next section (7.4), it is considered appropriate to give an overall picture of responses of people at the state level. A summary of results of all the questions with the distribution of responses by options (in percent) for Gujarat as a whole has, therefore, been tabulated in the table 7.4.

Table 7.4: Question-wise overall response percents for Gujarat state

Question 1	N	Forest department	Village panchayat	Other
Agency to raise village woodlots	467	100.0	2.4	2.4

Question 2	N	Forest department	Village panchayat	Other
First agency to raise woodlot	467	98.7	1.1	0.2

Question 3	N	Fuel wood	Fod-der	Tim-ber	Inc-ome	Empl-oym-ent	Land recl-aim.
Reasons for raising of woodlots	467	60.8	28.9	19.7	37.3	37.3	5.6

Question 4 & 5	N	Aware	Not aware
Awareness about the - Resolution	467	68.7	31.3
- Agreement	467	39.2	60.8

Question 6	N	Forest department	Village panchayat	Both
Agency to choose the species	467	78.2	2.8	19.1

Question 7	N	Agree	Disagree
Agreement with the chosen species	467	96.4	3.6

Question 9	N	Grazing	Damage by people	Fire hazard	Other
Protection problems in the woodlots	467	74.1	3.4	43.9	6.9

Question 10	N	Very good	Good	Bad	Very bad
Condition of the woodlots	467	19.5	46.0	25.5	9.0

Question 11	N	Landless	Farmers	None	All
Access to the produce	467	15.4	5.6	37.3	46.5

Question 12	N	Fodder	Fuel wood	Poles	MFP	None
Type of the Intermediate produce	467	82.7	14.1	12.6	4.3	10.1

Question 13	N	Forest dept	Village panchayat	Villagers
Agency to extract the intermediate produce	467	52.9	25.7	27.4

Question 14	N	Yes	No	Don't know
Main harvest of any village woodlot	467	25.7	68.3	6.0

Question 15	N	Forest dept	Village panchayat	Both	Other
Harvesting agency	120	98.3	0	0.8	0.8

Question 16	N	Fuelwood	Timber	Poles
Main produce from harvested woodlots	120	86.7	50.0	9.2

Question 17	N	Free distribution	Subsidised rates	Auction
Disposal mechanism of main produce	120	9.2	15.8	92.5

Question 18	N	Yes	No	Don't know
Opposition to the auction of main produce	120	5.0	57.5	37.5

Question 19	N	Aware	Not aware
Realisation of income from woodlots	120	76.7	23.3

Question 20	N	Buildings: School	Panchayat	Village road	Raising woodlot	Other
Use of income by the village panchayats	120	24.2	2.5	13.3	20.0	69.2

Question 21	N	High	Medium	Low	Don't know
People's involvement in raising of woodlots	467	34.3	54.0	8.8	3.0

Question 22	N	Panchayat meetings	Gram sabha	By forest dept.	Don't know
Resolving of issues of woodlots	467	31.0	19.5	50.7	13.3

Question 23	N	Yes	No
Willingness to manage woodlots by panchayats	467	48.2	51.8

Question 24	N	Yes	No	Don't know
Request for transfer of woodlots for management	467	16.3	30.6	53.1

Question 25	N	Yes	No	Don't know
Transfer of management of any woodlot to the panchayat	467	20.6	28.5	51.0

Question 26	N	Very good	Good	Bad	Don't know
Condition of the transferred woodlot	119	14.2	50.0	9.0	26.9

Question 27	N	Yes	No
Self-help woodlot, if any	467	22.5	77.5

Question 28	N	For 100% benefits	People's cooperation	Freedom for: work	use	External funds
Reasons for raising of self-help woodlot	105	25.7	41.9	8.6	1.0	26.7

Question 29	N	Yes	No	Don't know
Payments of wages in self-help woodlots	105	51.4	28.6	20.0

Question 30	N	Better	Both good	Bad
Comparison of self-help woodlots with departmental woodlots	105	9.5	68.6	21.9

Question 31	N	Barren	Grass land	Degr-aded	Prod-uctive	Don't know
Condition of common land before raising of the woodlot	467	73.4	29.3	10.5	0.2	6.6

Question 32	N	Gra-zing	Fodder source	Fuel source	Under encro-achment	Oth-er	Don't know
Main use of the common land before raising of the woodlot	467	83.3	27.0	1.5	4.9	0.6	4.7

Question 33	N	Yes	No	Don't know
Income from common land before raising of woodlot	467	4.7	66.4	28.9

Question 34	N	Yes	No
Any other remaining common land in the village	467	78.6	21.4

Question 35	N	Barren wasteland	Grass land	Under encro-achment	Other	Don't know
Condition of the remaining common land	467	55.2	53.5	7.3	1.5	10.9

Question 36	N	Graz-ing	Fuel source	Fodder source	Minor forest produce	Don't know
Main benefits from the remaining common land	467	75.6	4.9	25.7	2.1	7.5

Question 37	N	Yes	No	Don't know
Income from the remaining common land	467	12.4	81.2	6.4

Question 38	N	Land less	Graziers	Small/ Marginal farmers	Big farmers	Don't know
Opposition to the tree planting on common land	467	11.6	54.6	0.9	25.9	13.1

Question 39	N	Yes	No
Employment opportunities for the villagers	467	92.7	7.3

Question 40	N	Yes	No	Don't know
Objection, if any for not employing the villagers	567	3.2	75.8	21.0

Question 41	N	Yes	No	Don't know
Role of woodlots in meeting the demands of villagers	467	82.0	5.8	12.2

Question 42	N	Yes	No
Need for raising of more woodlots in the village	467	91.4	8.6

Question 43	N	Forest dept.	Village panchayat	Both	Villagers
Giving the responsibility of Protection of woodlots	467	36.8	13.1	42.8	8.4

Question 44	N	Forest dept.	Village panchayat	Both	Villagers
Ownership of woodlots	467	20.8	40.0	36.4	3.2

Question 45	N	Depart-mental	Self-help	Both	Don't know
Preference for type of woodlot	467	55.0	3.0	32.5	9.6

Question 46	N	Forest dept	Village panchayat	Villa-gers	Cont-ractor	Oth-ers
Agency to organise the harvesting of the woodlots	467	57.4	31.0	15.2	1.9	1.1

Question 47	N	Free	Subsidised	Auction
Distribution of produce from the woodlots	467	9.2	38.8	58.2

Question 48	N	Yes	No
Selling of produce at the market price	467	66.0	34.0

Question 49	N	Yes	No
Allowing villagers to use the produce from woodlots	467	97.0	3.0

Question 50	N	Yes	No
Continuation of the village woodlot scheme	467	94.9	5.1

7.4. Presentation of question-wise results

Regarding the question-wise results, each presentation begins with the text of the question followed by the details of the analysis, referring to the graphs (VPR = Village Panchayat Representatives, BF = Big Farmers, SF = Small farmers, MF = Marginal Farmers and LL = Landless), the chi-square values (at 0.05 level) and the specific comments.

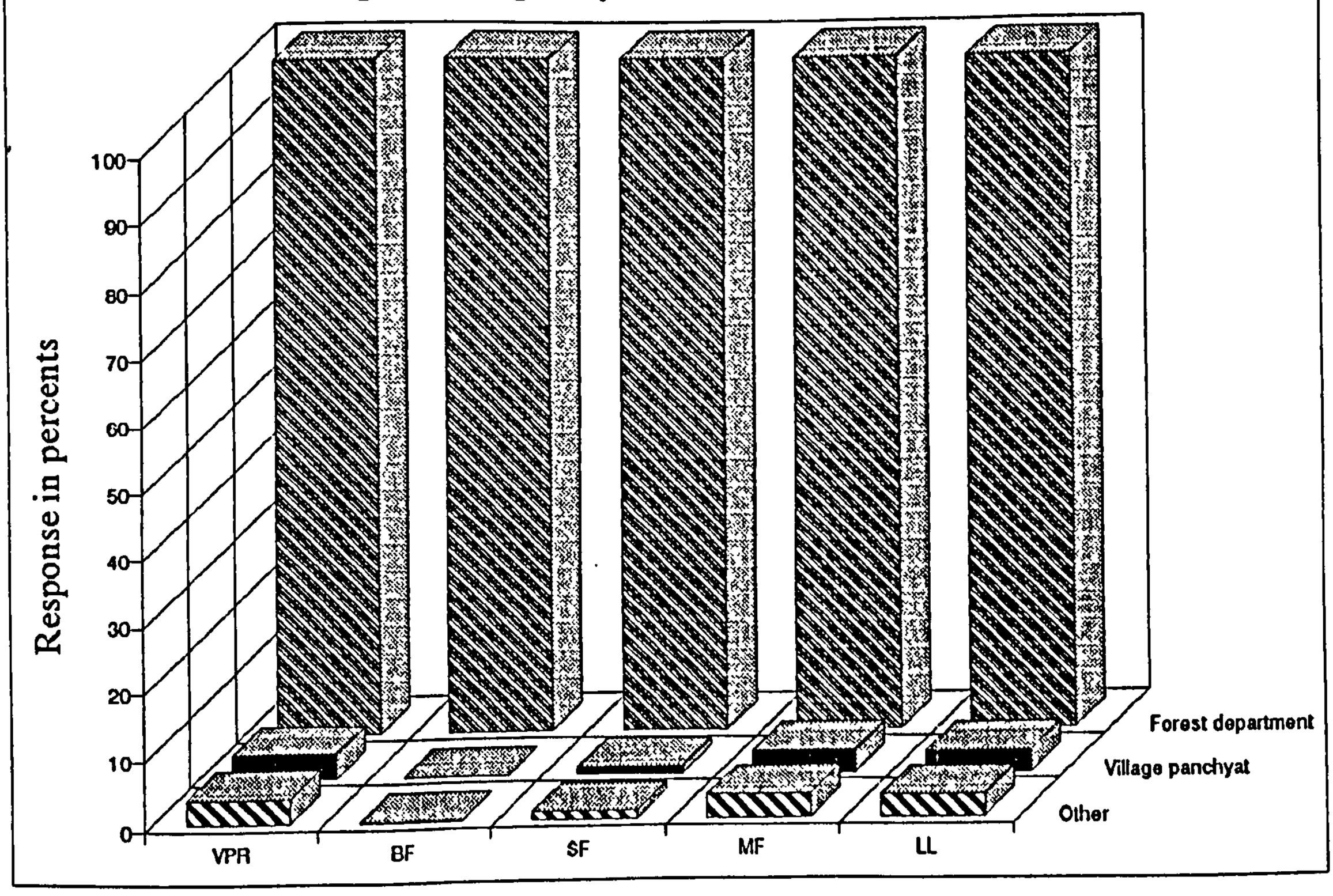
7.4.1. Agency for raising the village woodlots

There were two questions under this category, both designed to solicit the knowledge of the villagers about the implementing agencies. The first question enquired about the agencies who were involved in raising of the village woodlots in their village. The second question sought information about the first agency to raise the village woodlot in their villages. Both questions had three different options, namely forest department, panchayat and other.

Value of X^2 for question 1 is 6.245 (df=8) which fails to reject null hypothesis at the level of 0.05. Similarly, X^2 value of 14.817 (df=8) for question 2 is insufficient to reject the null hypothesis at the 0.05 level. This indicates that the choices of respondents of different categories do not differ much for both question 1 and question 2.

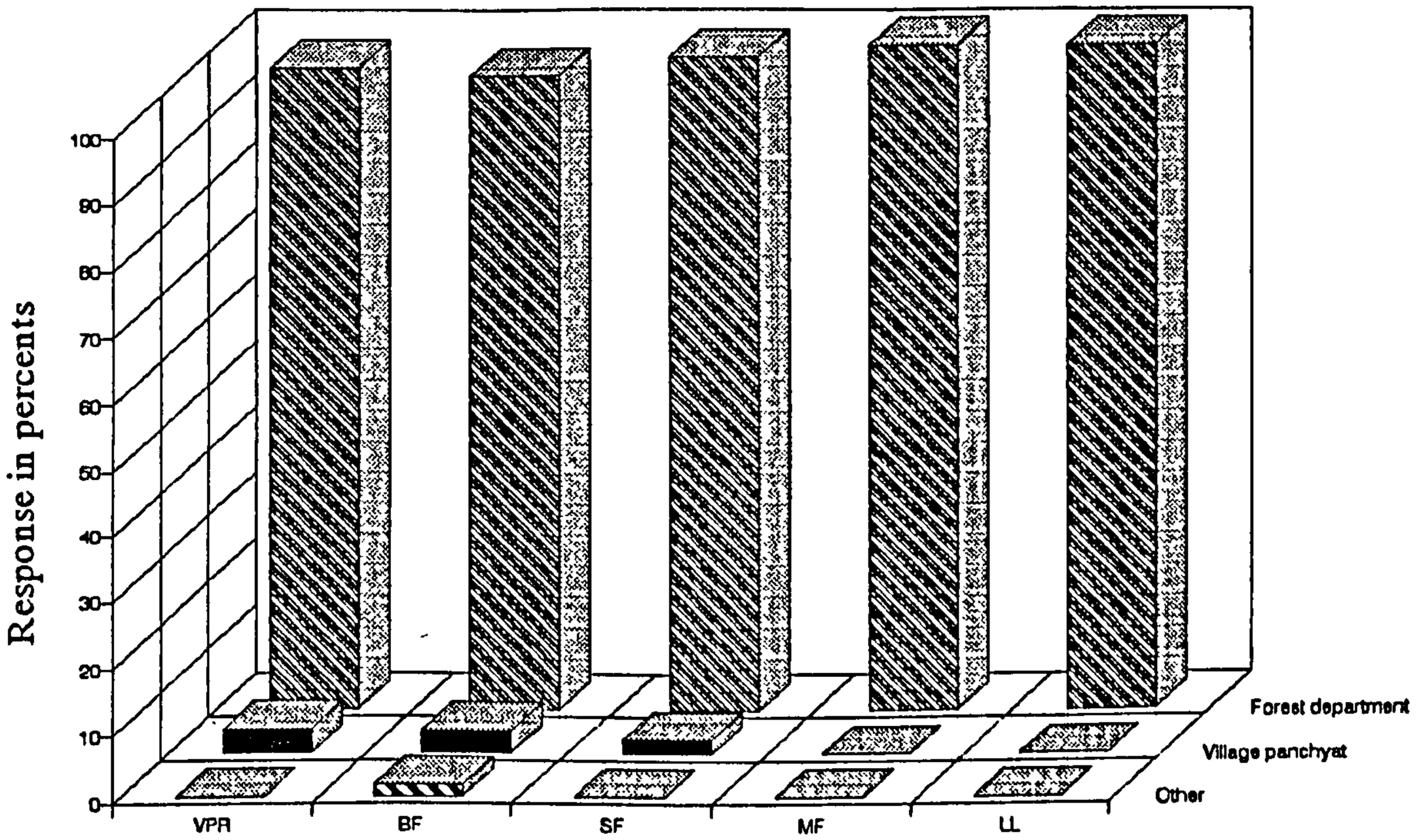
The overall responses suggest that the forest department is the main agency to raise the village woodlots (figure 7.1).

Fig 7.1: Agency to raise the woodlot



The involvement of any other agencies (village panchayats, the rural development department or the voluntary agencies) is rare. In almost all villages, the forest department took the initiative of raising the first village woodlots (figure 7.2).

Fig 7.2: First agency to raise the village woodlot



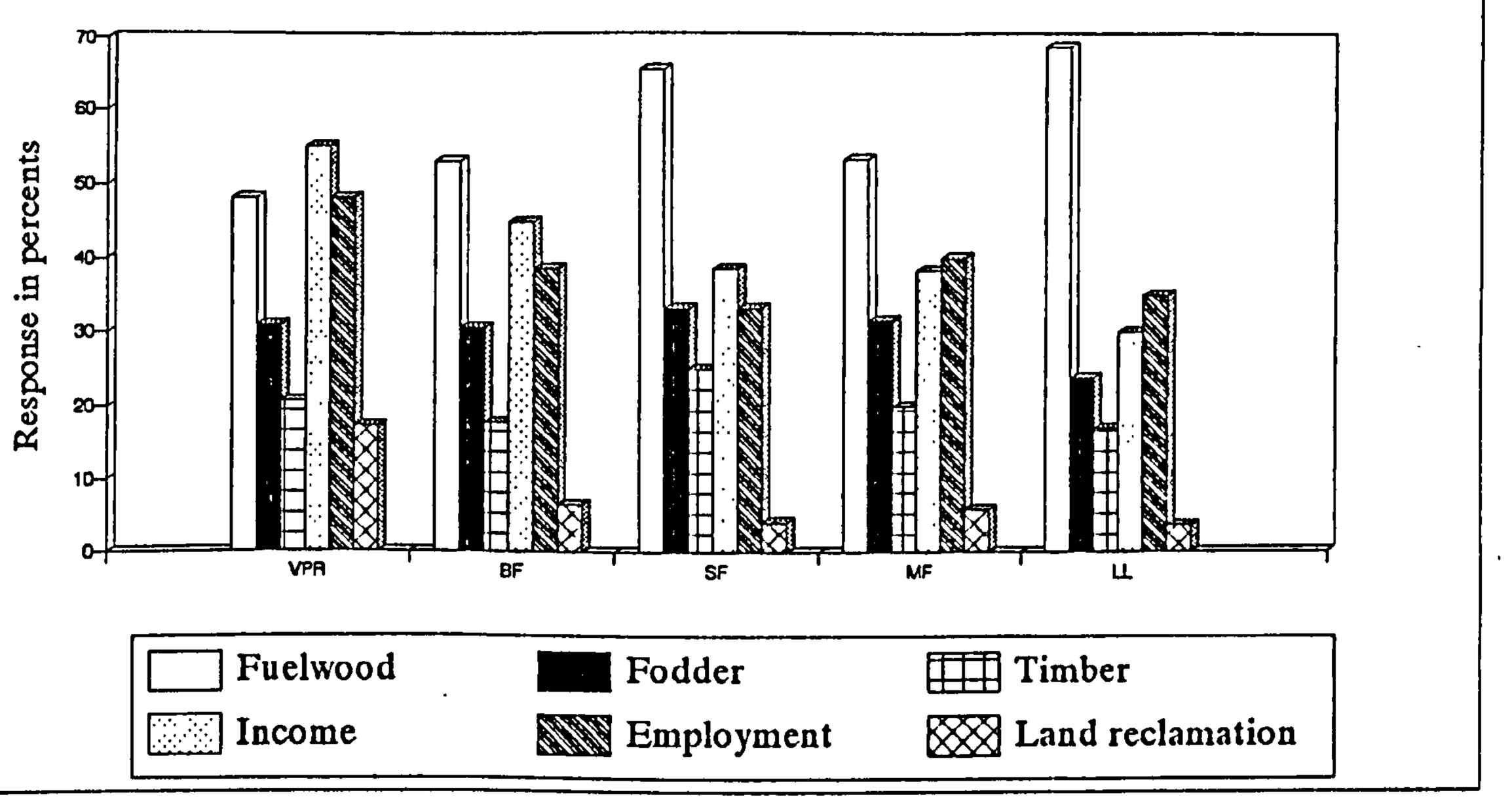
7.4.2. Reasons for raising the village woodlots

The question number 3 attempted to know about the main reasons for raising the village woodlots. There were six different options i.e. fuelwood, fodder, timber, income, employment and land reclamation. The respondents were free to give either only one answer or more than one. The figure 7.3 presents the respondent-wise response percentages, indicating fuelwood as the first choice of the villagers, followed by income and employment generation.

Because the computed chi-square statistic at df=20 (21.067) is smaller than the value in the chi-square table (31.410 at the level of 0.05), we conclude that there is no evidence that respondents' option differ by reasons of raising a village woodlot. As such all categories of people

are faced with more or less similar problems of meeting their demands for forest produce as well as seeking the employment opportunities.

Fig 7.3: Reasons for raising the village woodlot



Comparatively, the village panchayats were more interested in income and employment generation. About 29 percent looked for production of fodder, whereas one-fourth believed that it was for meeting the demand of timber. Very few villagers (5.6%) believed that it would be helpful in reclaiming their common degraded land too. Comparatively, more of the landless people (in all four regions) were in favour of the fuelwood production.

Among the regions, income's consideration overrides all other reasons in south and north Gujarat. In Saurashtra and Kachchh region, employment was the second main choice of villagers. Quite reasonably, the villagers from Bharuch, Kheda, Mahesana and Valsad districts (all with comparatively better climatic and edaphic conditions) were in favour of income as the main reason, whereas in the remaining four districts, the villagers showed their interests for the fuelwood and fodder production.

7.4.3. Awareness about the panchayat's resolution and agreement for the village woodlots

Under this heading, question number 4 and 5 were addressed to seek the knowledge of the villagers about the panchayat's resolution for allowing the forest department to raise the village woodlot on the common grazing land and the agreement between the forest department and the village panchayat, respectively. There were two options, namely aware and not aware.

The computed values of X^2 are 17.092 (df=4) and 14.586 (df=4), for question 4 and 5, respectively. Both of these reject the null hypothesis at the 0.05 level, indicating a significant difference in the options of the respondents by five different categories. The results show that the level of knowledge about the panchayat's resolution and agreement differs for the respondents. In other words, it shows poor involvement of villagers in the policy level decisions while deciding to raise a village woodlot.

Figure 7.4 and 7.5 show the respondent-wise position of responses in percents for question 4 and 5, respectively.

Fig 7.4: Panchayat's resolution for raising the village woodlot

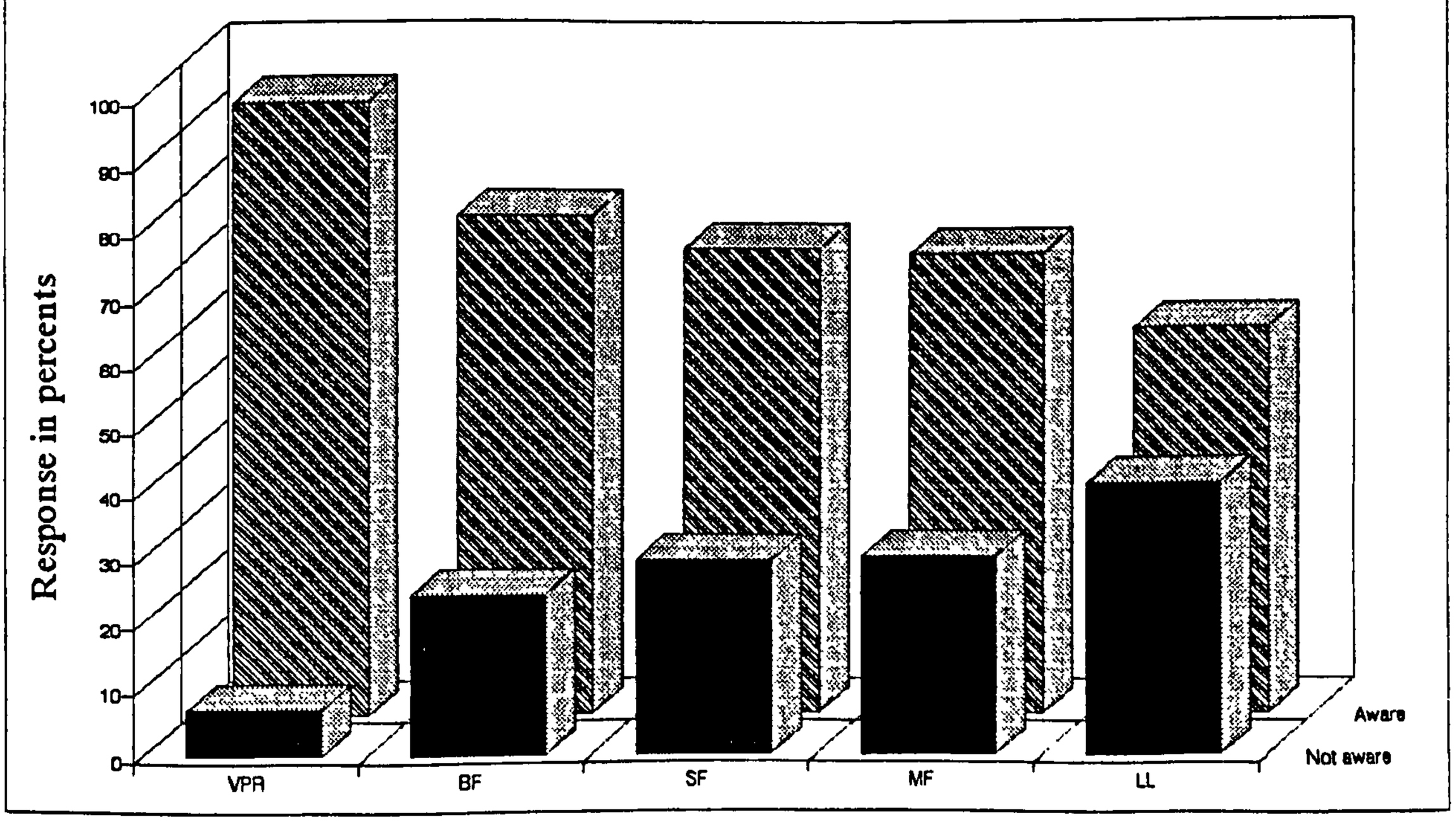
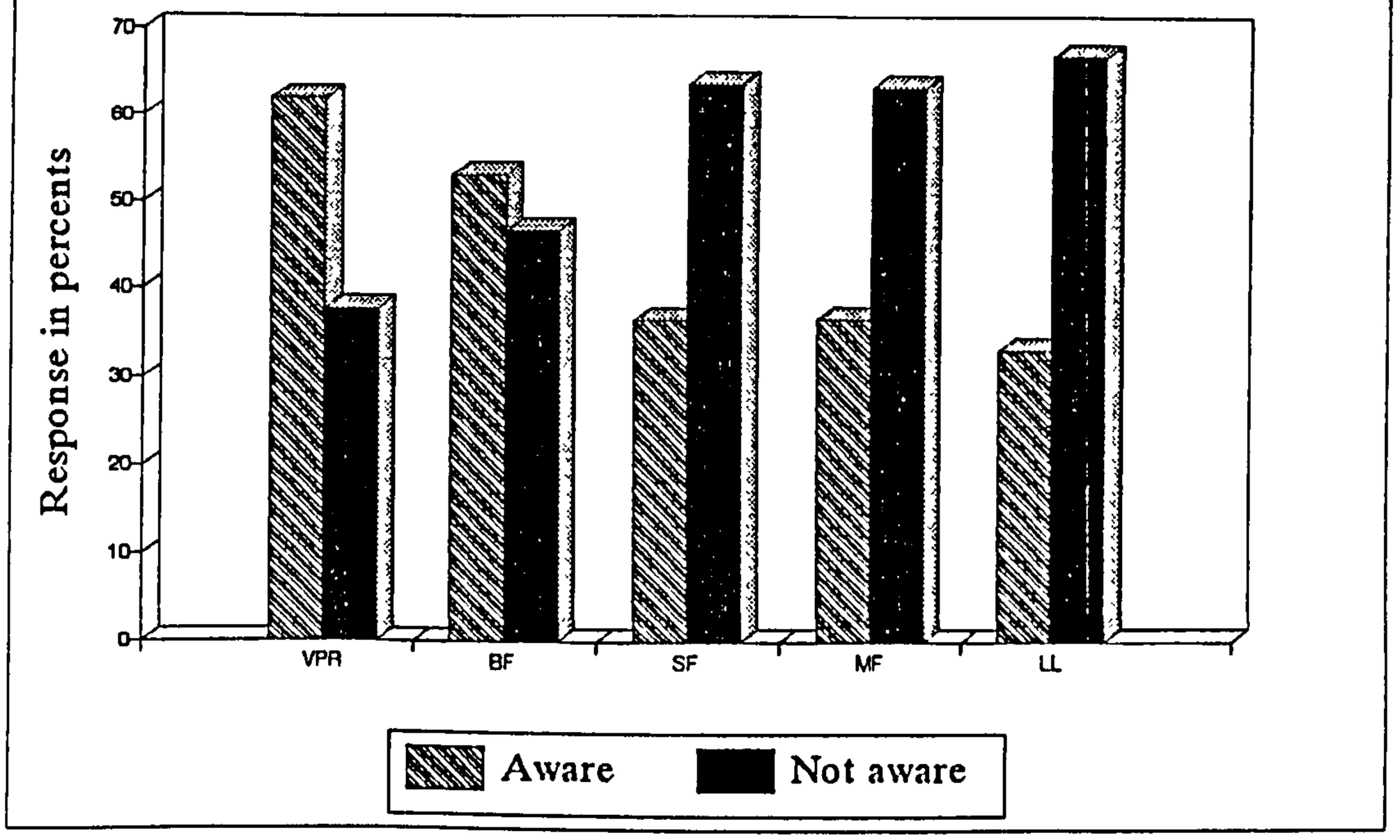


Fig 7.5: Agreement for raising the village woodlot



Quite strangely, one-third of the respondents were unaware of the panchayat's resolution and over 60% of them did not know about the agreement. It is quite surprising too that a little over one-third of the panchayat members did not know anything about the agreement. Comparatively, the landless people were least informed about both the items in all four regions of Gujarat. The awareness about the panchayat's resolution was lowest in Rajkot district and highest in Kheda district (91.5%). On the other hand, the least number of respondents from central region knew about the agreements, followed by Saurashtra and Kachchh region.

7.4.4. Choice of species for the village woodlots

This section covered three questions (6, 7 and 8), relating to the choice of species. Question number 6 sought information about the agency (ies) who were involved in selection of the species for the village woodlots. The respondents had three options, namely forest department,

village panchayat or both. The question number 7 was targeted to know whether the villagers agreed with the choice of species. At the same time, the question number 8 gave an opportunity to the respondents to tell their own preference of five species which should be planted in the village woodlot.

The computed values of X^2 for question 6 and 7 are 17.248 (df=8) and 2.473 (df=4), respectively. At 0.05 level, the first one rejects the null hypothesis while the second one accepts the null hypothesis. This means that the choices of respondents differ significantly for question 6. But in question 7, the differences are insignificant.

The figures 7.6 and 7.7 show the respondent-wise response percents for question 6 and 7, respectively. While looking at the respondent-wise responses for question 6, it is seen that the species selection was mainly done by the forest department alone. Sometimes, the village panchayats were also consulted.

Fig 7.6: Selection of species for the village woodlot

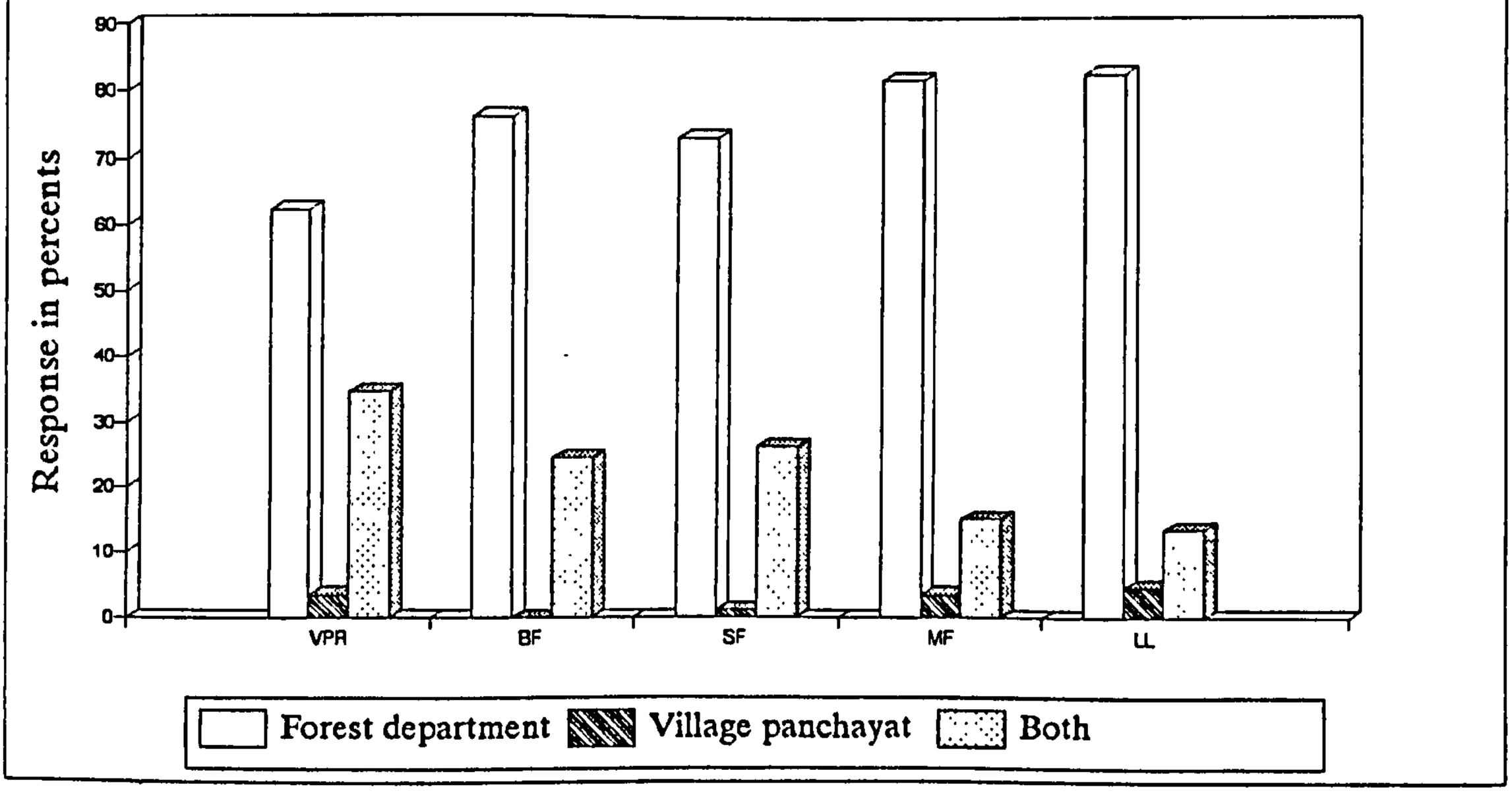
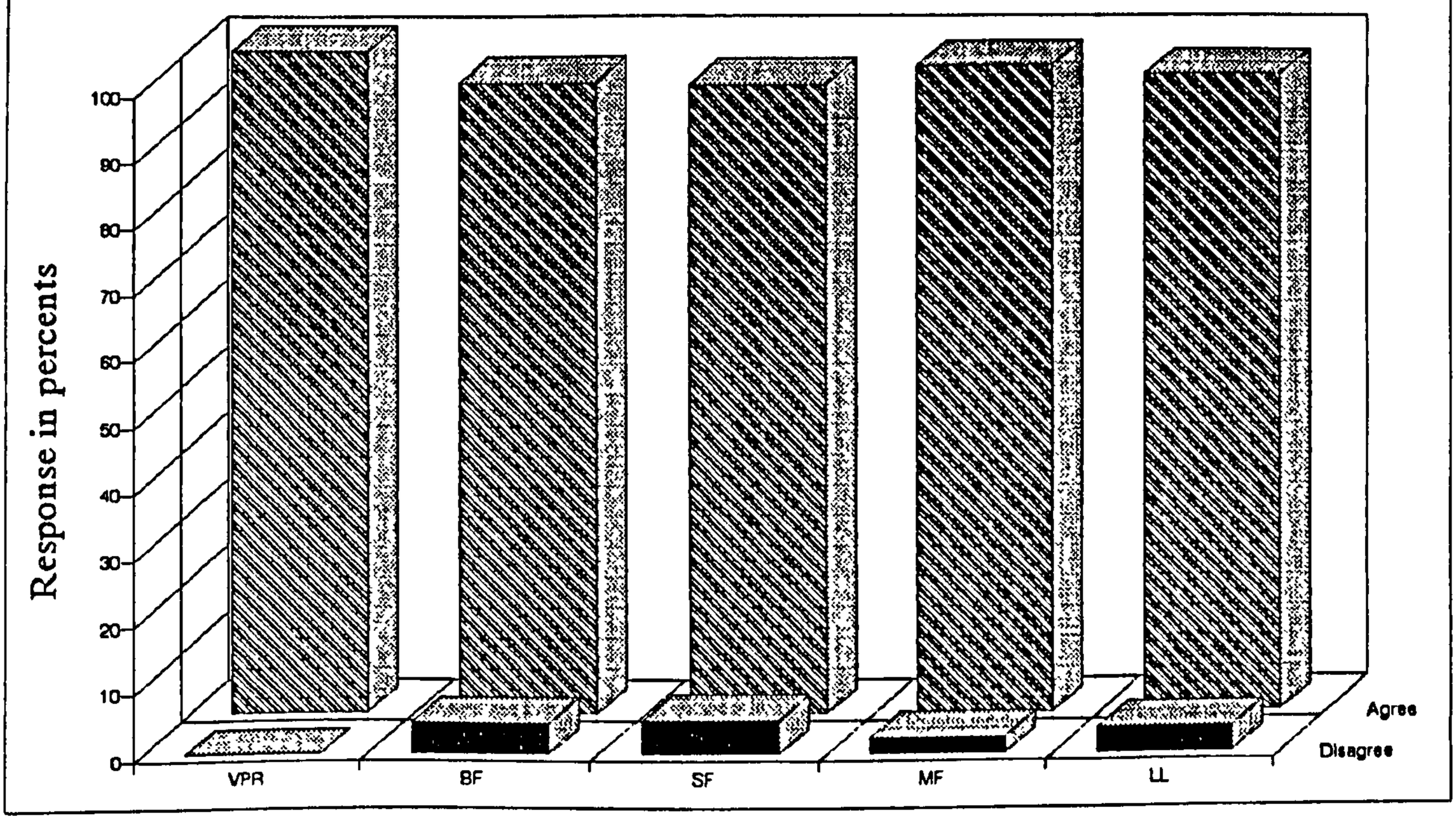


Fig 7.7: Opinion about the chosen species



Despite the exclusive role of the forest department in deciding the species for the village woodlots, the majority of the villagers (96.4%) have no objection to the chosen species (question 7). However, about one-fifth of the respondents in Junagadh district did not agree with the chosen species.

In response to question 8, as many as 45 different tree species were named by the respondents. Looking at the main uses, the suggested species can be grouped into six different categories (annexure 7.2). Considering the agro-climatic peculiarities, the suggested species seem to be quite suitable. The majority of the suggested species were indigenous. They do represent a reasonable balance of all those species which are often used by the villagers for their day-to-day requirements of fuelwood, small timber, minor forest produce, fruits, etc. A considerable variation was noticed among the districts (annexure 7.3). For example, as many as 30 different species were mentioned by the respondents from Rajkot district, while only 13 were named for Kachchh district.

For the respondents, the district-wise numbers of chosen species varied considerably, as given in table 7.5. The list of species suggested by the landless people appeared to be more exhaustive in nature, looking to their requirements of the forest produce for their daily needs.

Table 7.5: District-wise numbers of suggested species for respondent categories

District	Total no.	Panchayat members	Big farmer	Small farmer	Marginal farmer	Landless labourer
Bharuch	20	11	14	19	18	16
Junagadh	18	11	15	14	13	15
Kachchh	17	11	12	13	15	14
Kheda	13	8	11	12	11	10
Mahesana	16	9	12	13	15	14
Rajkot	30	11	13	17	22	22
S.nagar	26	11	12	19	18	17
Valsad	18	11	16	12	14	16
Gujarat	45	34	35	38	38	38

Further analysis of species, named by different categories of respondents, brings out that *Azadirachta indica*, *Acacia nilotica* and *Eucalyptus* spp. are the most preferred species. Preference for bamboos was higher among the landless people. Overall choices favour planting of the multi-purpose and indigenous species. Some of the panchayats suggested the planting of high value timber tree species, i.e *Tectona grandis*, *Gmelina arborea*, etc.

7.4.5. Protection problems in the village woodlots

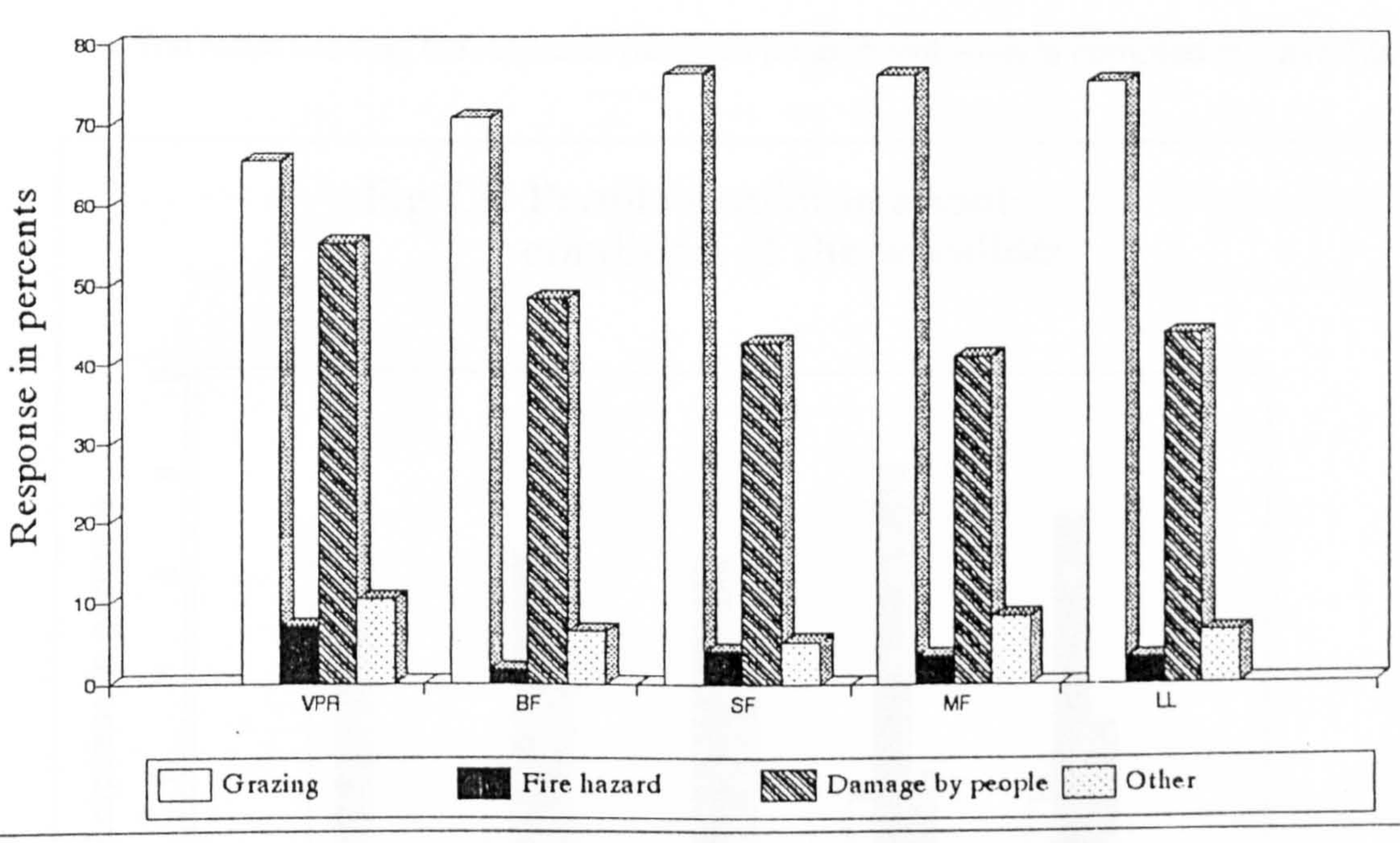
In this section, the only question (number 9) enquired into the problems of protection in the village woodlots. The given options were grazing, fire hazard, damage by people and other.

The respondent-wise result, shown in figure 7.8, indicates the two main protection problems for village woodlots i.e. grazing by cattle and damage by people.

The computed value of X^2 is 4.717 at df=12. This is not enough to reject the null hypothesis at 0.05 level. This shows that the choices of different categories of respondents are

more or less same. This is largely because the nature of problems in protection of village woodlots is similar in all parts of the state.

Fig 7.8: Protection problems in the village woodlots



Comparatively, more of the panchayat members and big farmers felt that the people were causing damage to their village woodlots, while over two-thirds each of the small and marginal farmers and landless people considered that grazing is the main protection problem for their village woodlots. The grazing is thought to be main damaging factor particularly in Kachchh, Kheda, Rajkot, Surendranagar and Valsad districts. On the other hand, damage by the people is considered to be the second most serious problem in protection, especially in Valsad and Kheda districts. The effects of drought and salinity were also mentioned as the other causes of low survival in some parts of Gujarat.

7.4.6. Condition of village woodlots

Respondents were given a chance to judge the overall condition of the village woodlots in question number 10 with four options (very good, good, bad or very bad). The value of X^2, being 18.683 (df=12), is not significant at the level of 0.05. This shows that there are no significant differences among the choices of the respondents.

The result showing the response percents (respondent-wise) is compiled in figure 7.9.

Fig 7.9: People's opinion about condition of the woodlots

In general, the condition of the village woodlots (in terms of visual survival and growth), was judged favourably by about two-third of the respondents, while about one-third of the respondents were not satisfied with the condition of their village woodlots. This showed a reasonable level of success of the plantations even under the harsh and scarce conditions of Gujarat. In extreme conditions, the villagers felt that the condition of the village woodlots was unsatisfactory.

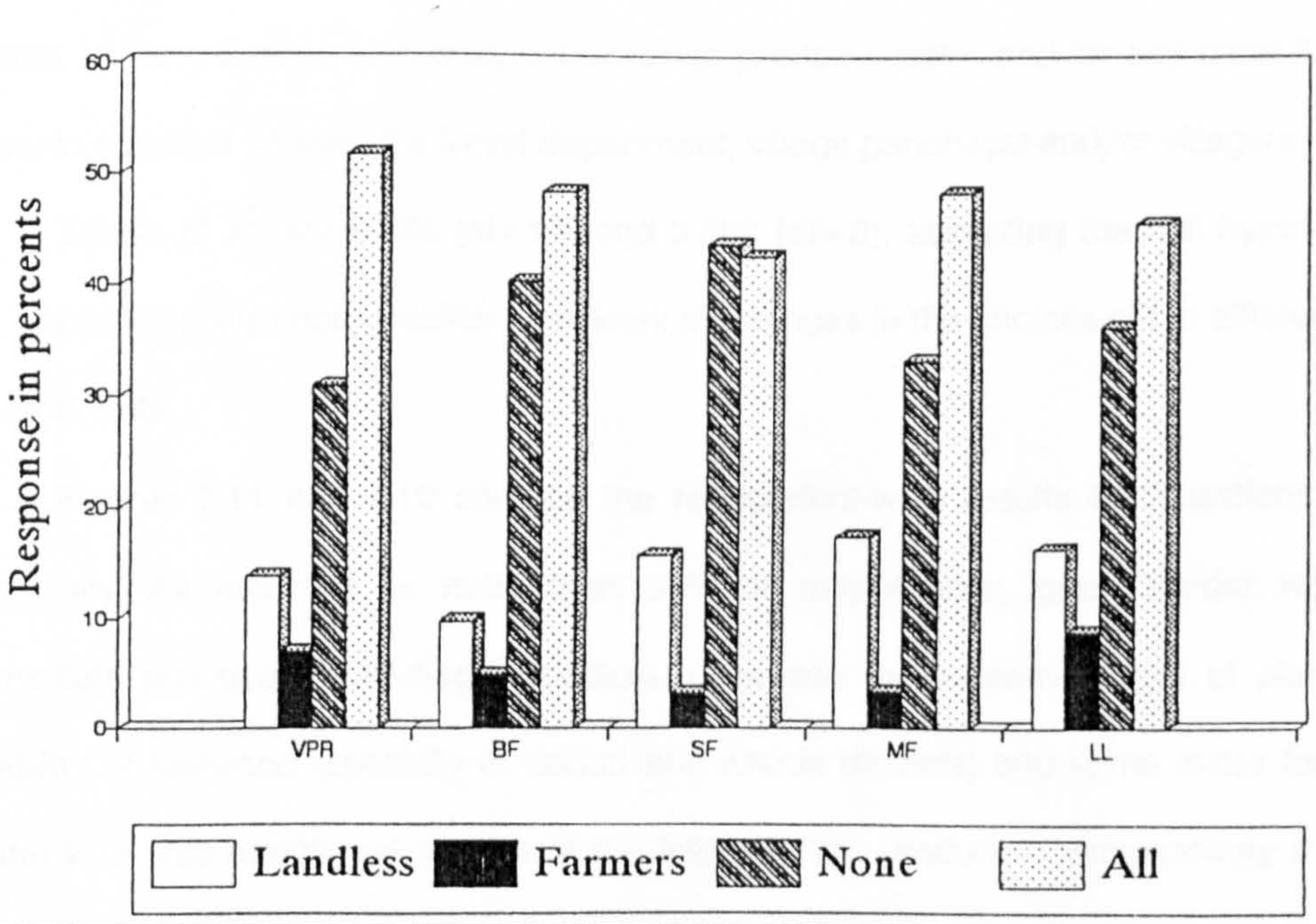
7.4.7. Access to the villagers for using the produce

Question number 11 sought the information about the type of people who are permitted to use the produce from village woodlots. The options were landless, farmers, none and/or all.

At the 0.05 level, the computed value of X^2 is 9.518 (df=12). This does not reject the null hypothesis, indicating the insignificant difference in the choices of the respondents.

Figure 7.10 presents the respondent-wise response percents. The village woodlots, being the common property of the village, the majority felt that everybody was entitled to use the produce. At the same time, the involvement of the forest department, as the implementing agency, might have created a feeling that no one was allowed to use the produce, as opined by one-third of the respondents.

Fig 7.10: Access to villagers for using the produce of woodlots



In actual sense, it appeared that most of the villagers were really not aware of the prevailing mechanism of sharing the produce from their village woodlots. For example, 82.8% from

Kachchh district said that none of the villagers are allowed. At the same time, as high as 80% from Junagadh district reported that all the villagers are allowed. On the other hand, comparatively more respondents from Valsad, Mahesana and Kheda districts mentioned that only landless people are allowed to use the produce from their village woodlots.

Obviously, there was a big confusion among the villagers for use of the produce. This is perhaps because in some villages, the people have not been told of the provisions of the existing benefit-sharing mechanism.

7.4.8. Accrual of benefits from village woodlots:

7.4.8.1. The intermediate benefits from village woodlots

Question number 12 and 13 were designed to find the types of the intermediate produce from the village woodlots and the agency who takes out such produce, respectively. The options in question 12 were fodder, fuelwood, minor forest produce, poles and/or any other item while the options in question 13 were the forest department, village panchayat and/or villagers.

Values of X^2 are 8.983 (df=16) and 3.663 (df=8), accepting the null hypothesis at 0.05 level. These values do not establish significant differences in the choices of the different categories of respondents.

Figures 7.11 and 7.12 compile the respondent-wise results for questions 12 and 13, respectively. As reported by more than 80% of respondents, grass fodder was the main intermediate produce from village woodlots, especially in the early stages of plantations. The availability of fuelwood (specially in Valsad and Kheda districts) and some minor forest produce (Kheda) was also mentioned as one of the intermediate produce. Comparatively more landless people felt that there were no intermediate benefits from the village woodlots. Similarly, in harsh areas, as elicited from one-tenth of the total respondents in Gujarat (one-third in Kachchh), there were no intermediate benefits.

Fig 7.11: Type of the intermediate produce from the woodlots

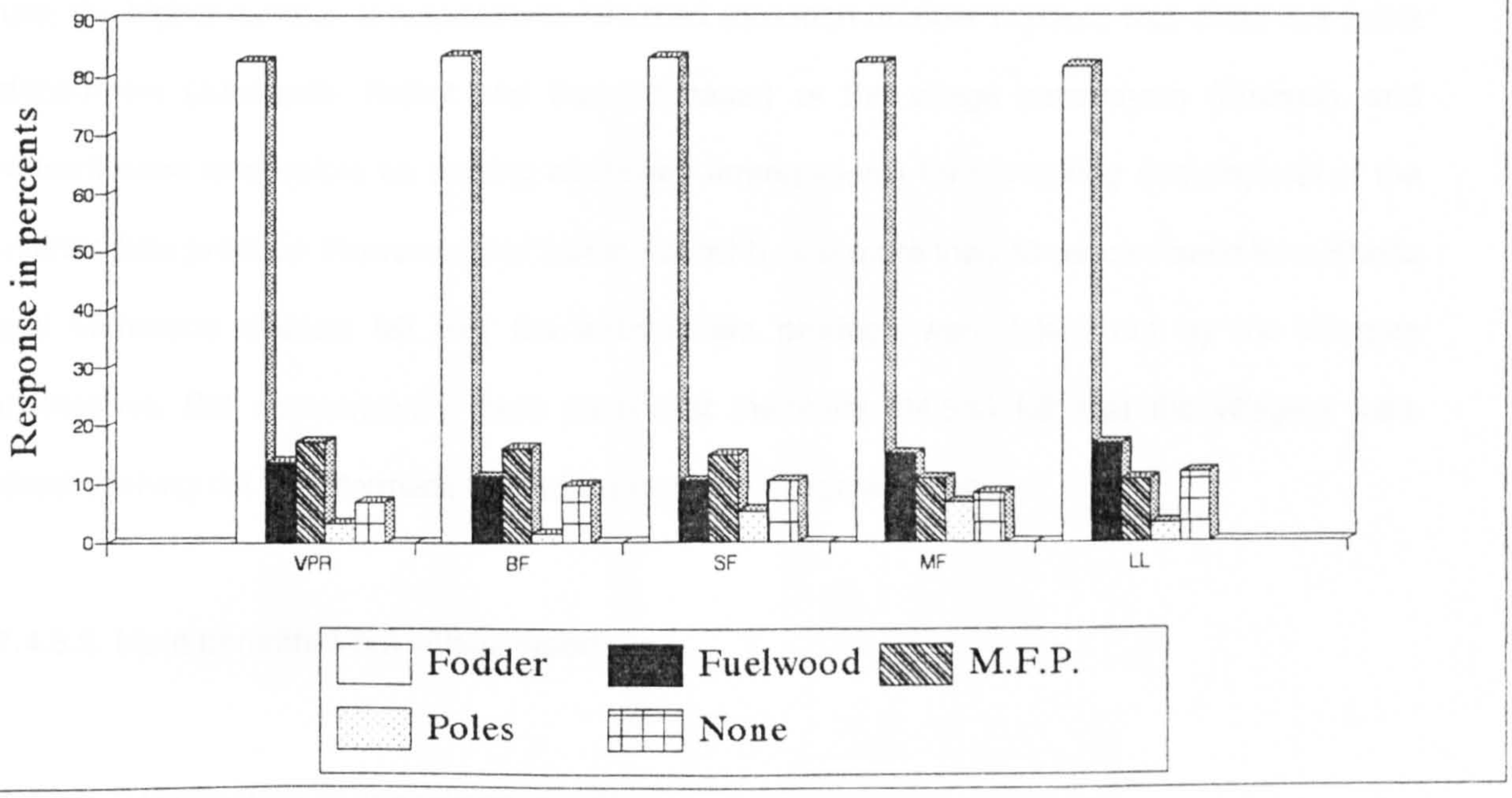
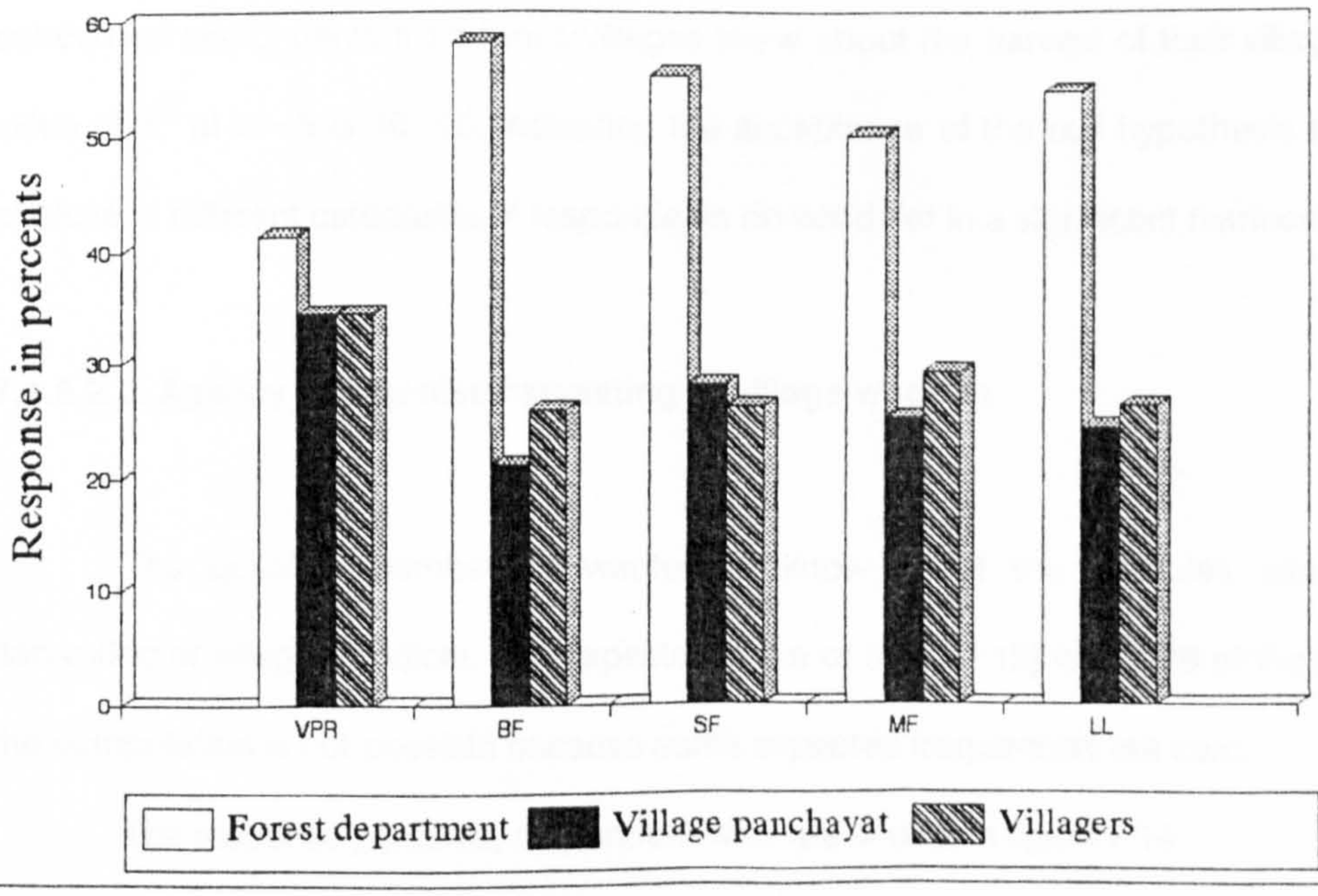


Fig 7.12: Agency to take out the intermediate produce from woodlots



Although the project says that villagers can take the intermediate produce for their own use, the higher number of respondents informed (question number thirteen) that either the forest department (Junagadh, Rajkot and Surendranagar) or the village panchayats (Bharuch, and Valsad) were responsible for making necessary arrangements for harvesting and disposal of the intermediate produce. However, over half in Kachchh, and more than 40 percent each from Kheda and Mahesana districts felt that the intermediate produce were taken out by the villagers themselves. But comparatively more panchayat members (34.5%) felt that the villagers were directly taking out the intermediate produce from the village woodlots.

7.4.8.2. Main benefits from village woodlots

7.4.8.2.1. Harvesting of any village woodlot

Question number 14 was directed to seek the information whether the villager knew about the harvesting of village woodlot in the concerned villages. Thus, out of the 32 sampled villages, only in 7 villages had the village woodlots been harvested (figure 7.13). Their locations were one each in Bharuch and Junagadh, and two each in Kheda, Mahesana and Valsad districts. All the 120 concerned respondents from those villages knew about the harvest of their village woodlots. The value of X^2 at df=8 is 10.105, indicating the acceptance of the null hypothesis at 0.05 level. The choices of different categories of respondents do not differ in a significant manner.

7.4.8.2.2. Agency to organise harvesting of village woodlot

The question number 15 wanted to know about the agencies who organised the harvesting of village woodlots. The expected value of X^2 (df=12) is 21.026 at the level of 0.05. But the computation is not possible because some expected frequencies are zero.

The response percents, respondent-wise are shown in figure 7.14.

Fig 7.13: Harvesting of any of the village woodlots

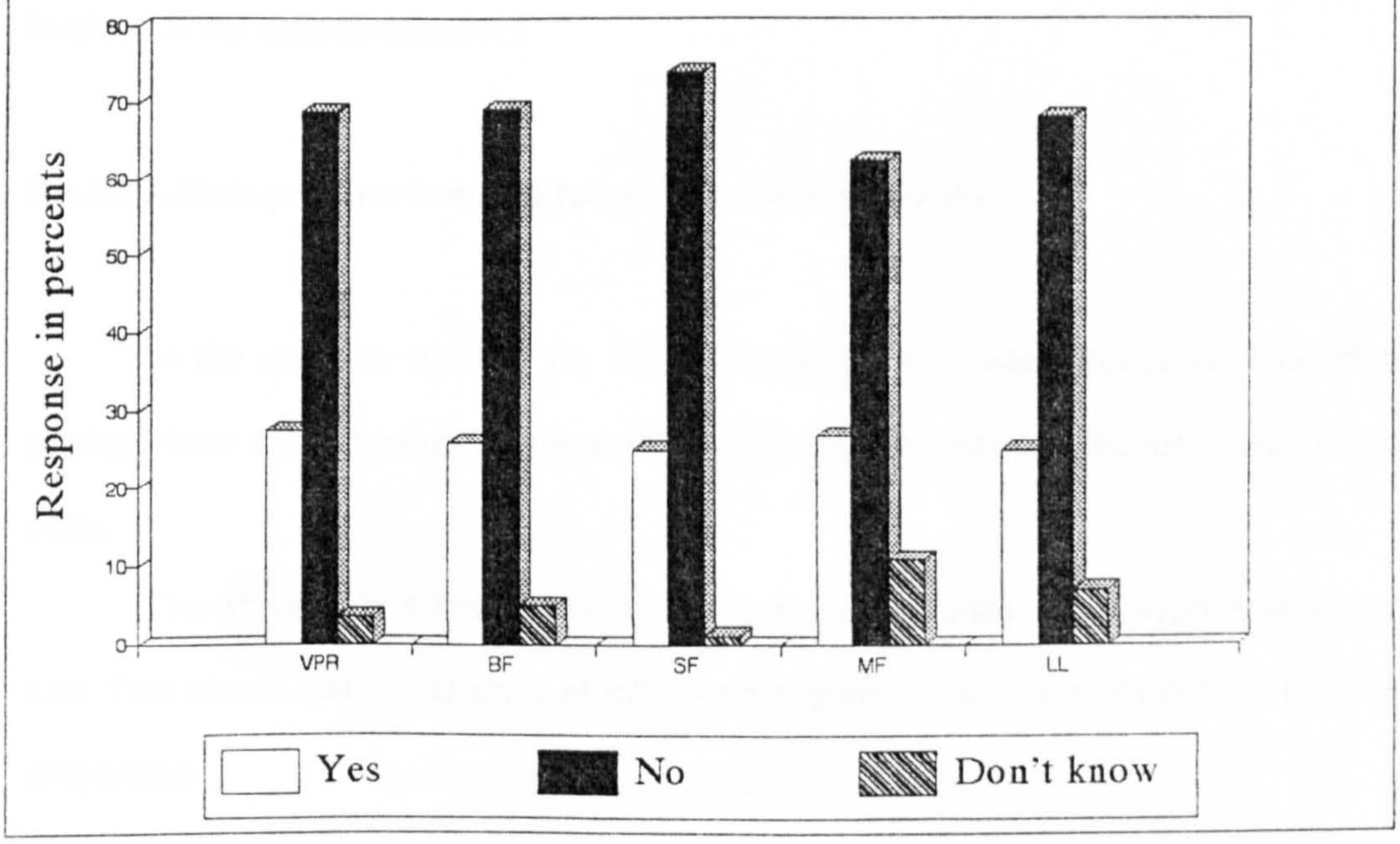
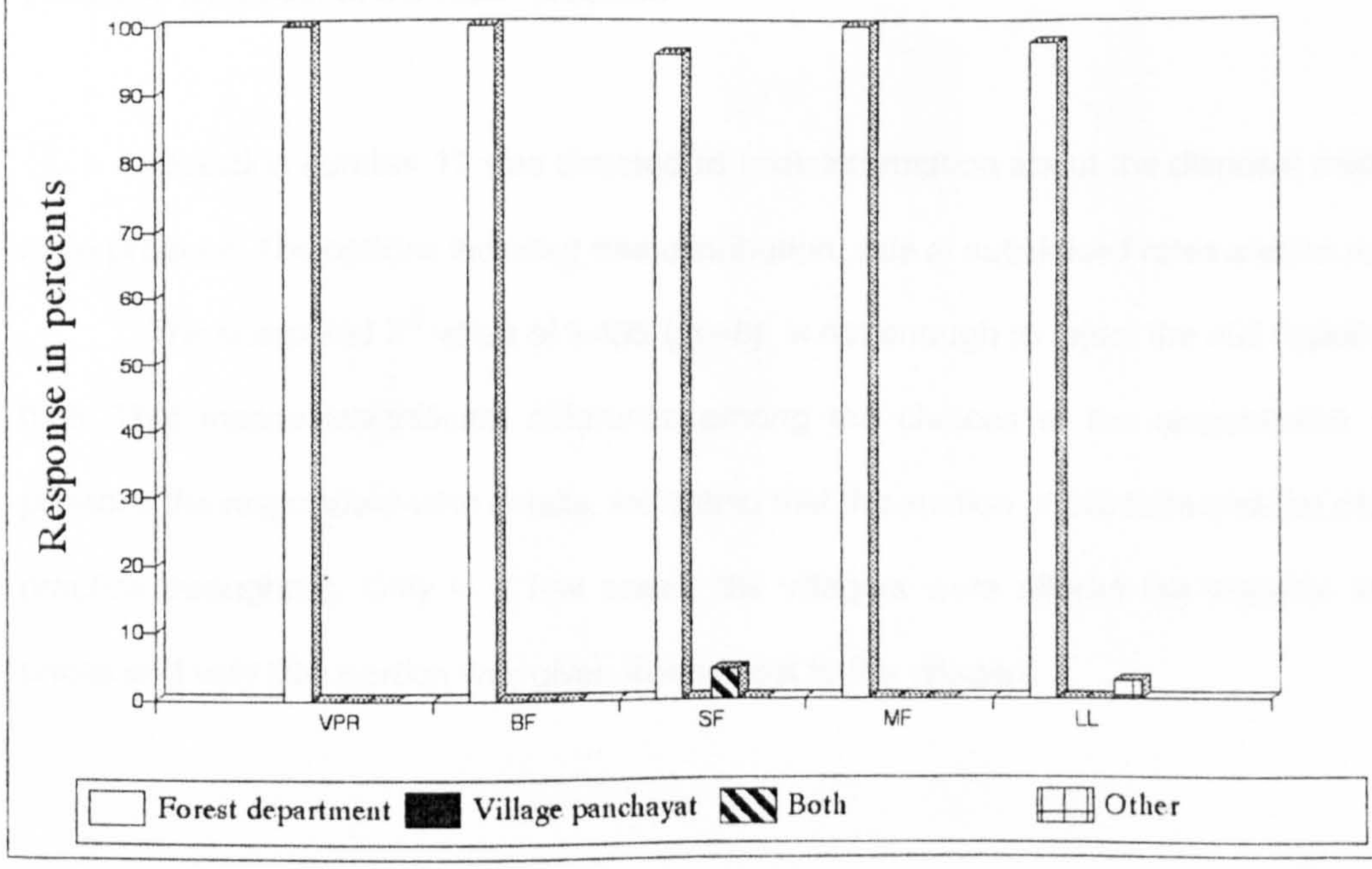


Fig 7.14: Agency to organise harvest of the village woodlots



In all of the seven villages, almost all respondents knew that the harvesting works were organised exclusively by the forest department. The village panchayat and other agencies were not involved in the harvesting activity.

7.4.8.2.3. Main produce from the harvested village woodlots

In the question number 16, the respondents were asked about the type of the main produce from the harvested village woodlots. The options included the fuelwood, timber and/or poles.

The X^2 value is 4.718 (df=8), indicating the acceptance of null hypothesis at the level of 0.05. This shows that the choices of different categories of respondents did not have significant differences.

The respondent-wise percent responses, shown in figure 7.15 suggests that the main produce from harvesting of the village woodlots was fuelwood in almost all the villages (as informed by 86.7% of the respondents). Timber appeared to be the second most important produce, specially in Kheda and Valsad districts.

7.4.8.2.4. Disposal of the main produce

Question number 17 was directed to seek information about the disposal methods for the main produce. The options included free distribution, sale at subsidised rates and/or auction.

The computed X^2 value of 3.495 (df=8), is not enough to reject the null hypothesis at level 0.05. That means insignificant difference among the choices of the respondents. Figure 7.16 provides the respondent-wise details, indicating that the auction of produce was the most common practice throughout. Only in a few cases, the villagers were offered the material at subsidised prices and very little portion was given free of cost to the villagers.

Fig 7.15: Main produce from the harvested village woodlots

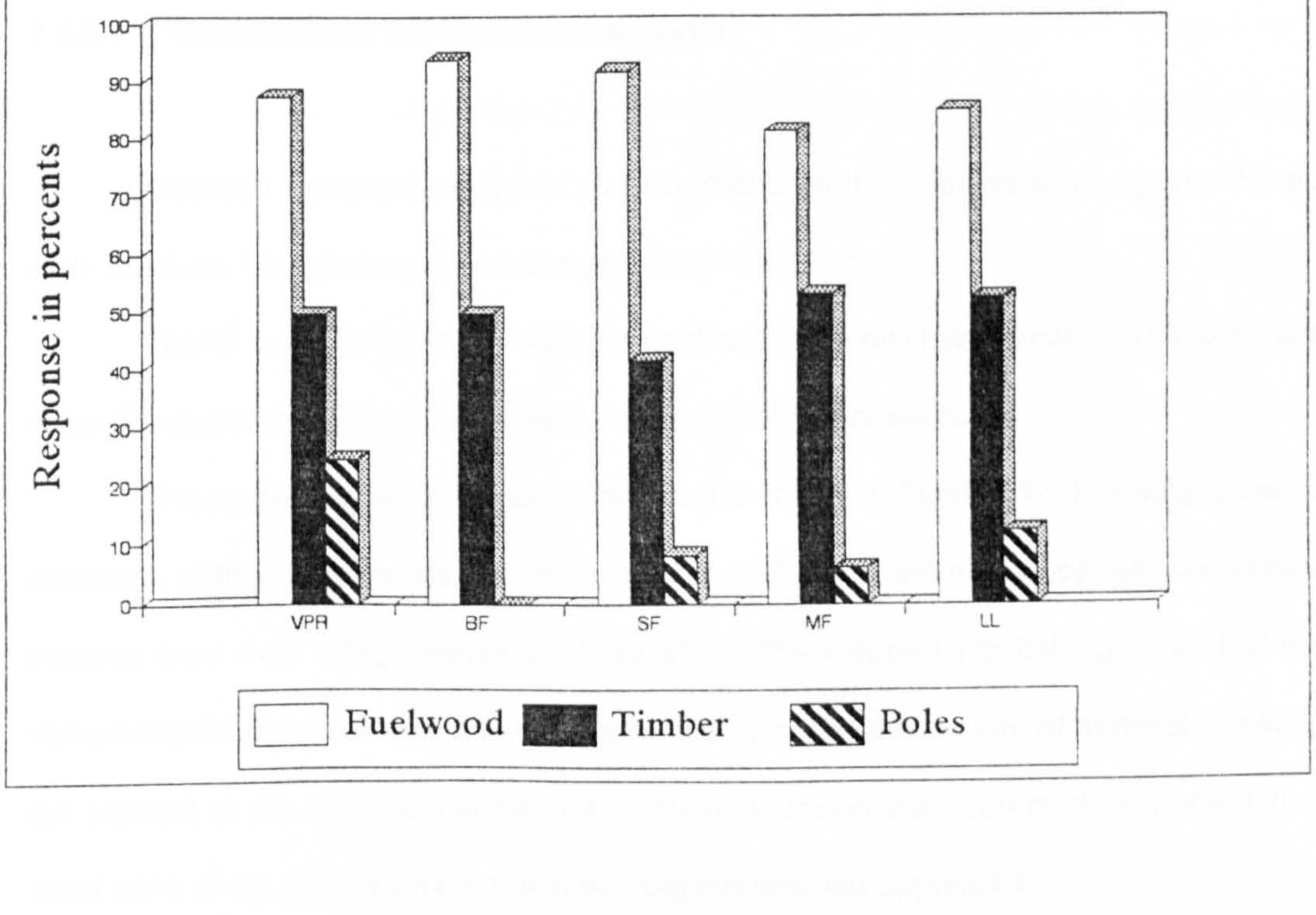
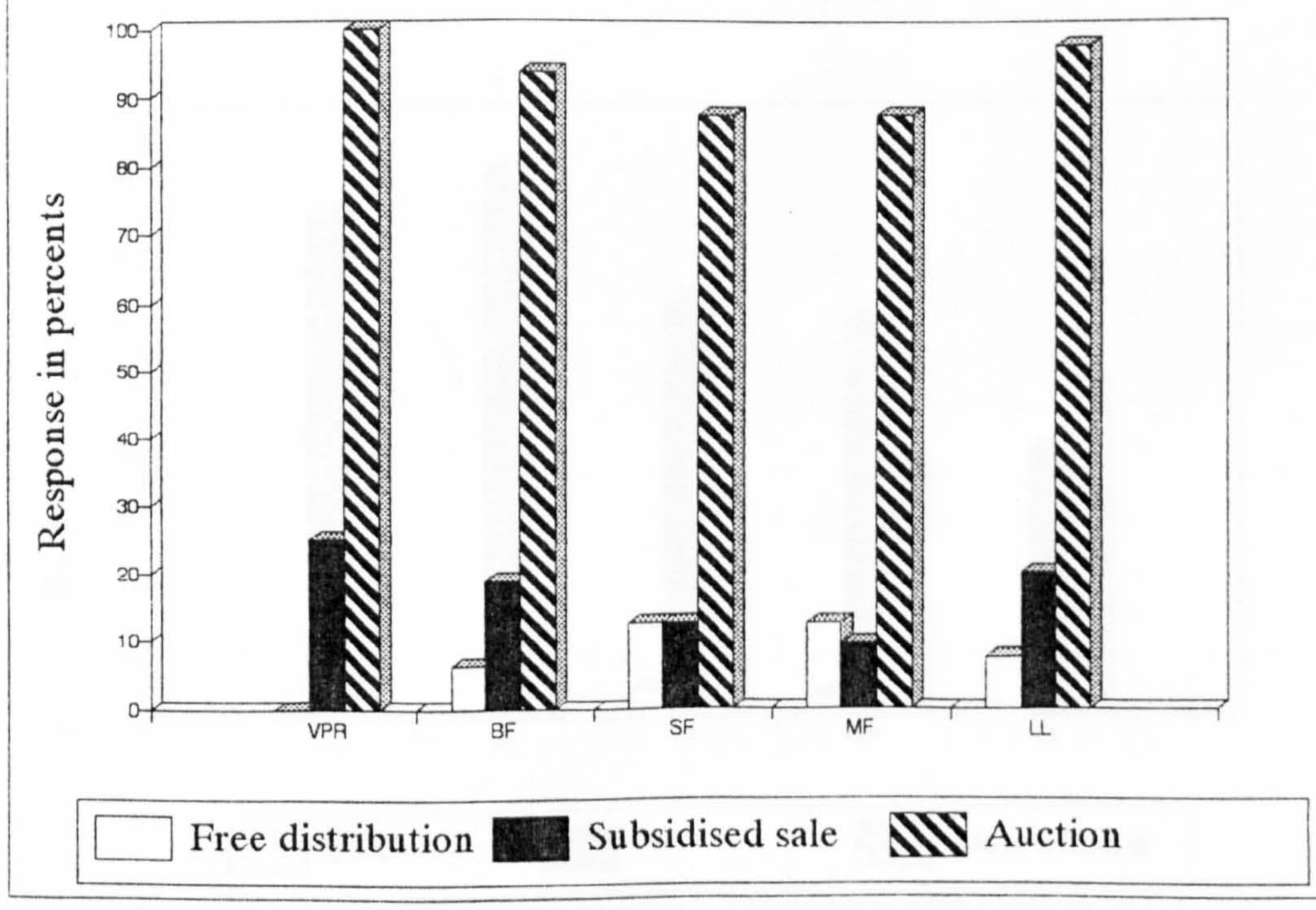


Fig 7.16: Disposal of main produce



This shows the desire of realising maximum income by the village panchayats.

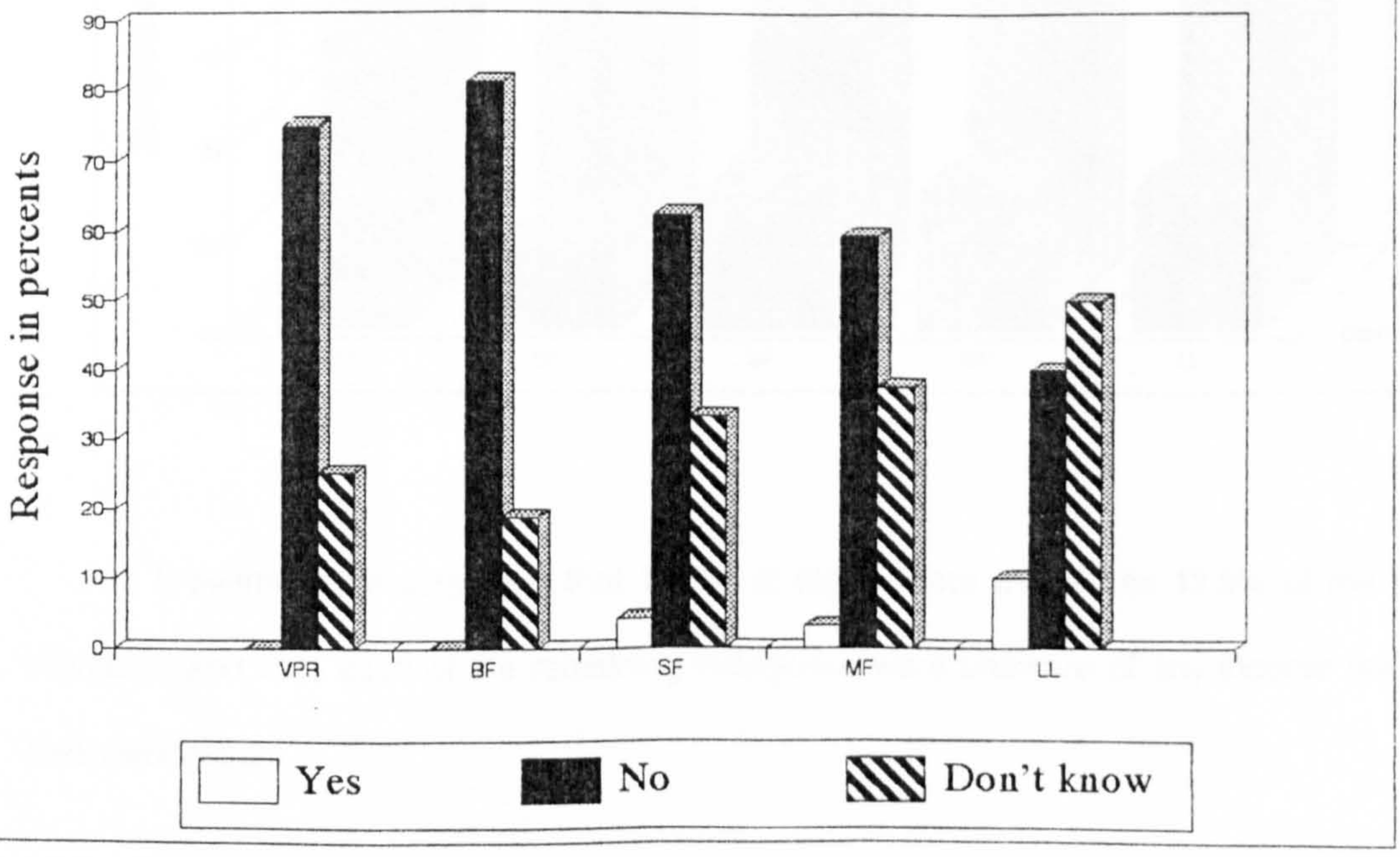
7.4.8.2.5. Opposition to the auction of produce

Question number 18 solicited the information if the villagers were against the auction of main produce. The given options were yes, no or don't know.

The X^2 value of 11.319 (df=8) does not reject the null hypothesis at 0.05 level, suggesting insignificance in the choices of different categories of respondents.

The respondent-wise response details are shown in figure 7.17. Knowing about exclusive decisions of their panchayats, the majority of the villagers had never opposed the auction of the material from their village woodlots. Only 5% of the respondents belonging to Mahesana and Valsad districts informed that a few villagers had opposed the auction of material. However, about ten percent of the landless people did mention opposing the auction of produce. On the other hand none of the panchayat members and big farmers had opposed it.

Fig 7.17: Villagers' opposition to the auction of produce

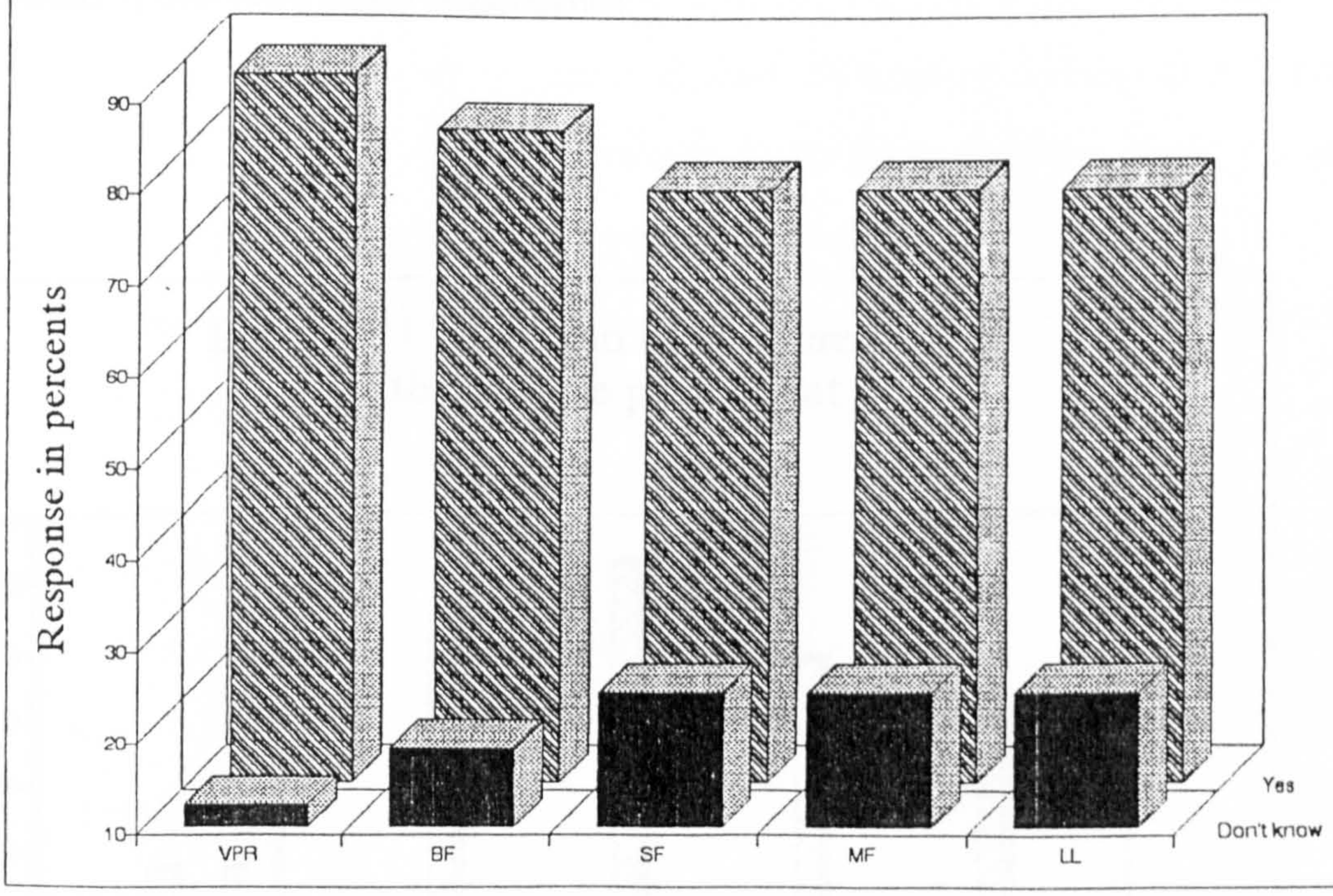


7.4.8.2.6. Realisation of income to the panchayat

The villagers were asked in question 19 if they knew about the realisation of income by their village panchayats. The value of X^2 is 0.862 (df = 4), accepting the null hypothesis at 0.05 level and suggesting insignificant differences in the choices of respondents.

The respondent-wise response percents are compiled in figure 7.18 which shows that about three-fourth of the respondents knew about income realisation by their panchayats from the sale of forest produce (obtained from the harvested village woodlots).

Fig 7.18: Realisation of income by the village panchayat



It seems quite surprising that 18.8% of big farmers as well as 12.5% of the panchayat members and 25% each of the remaining categories were unaware of any income realisation by their panchayats.

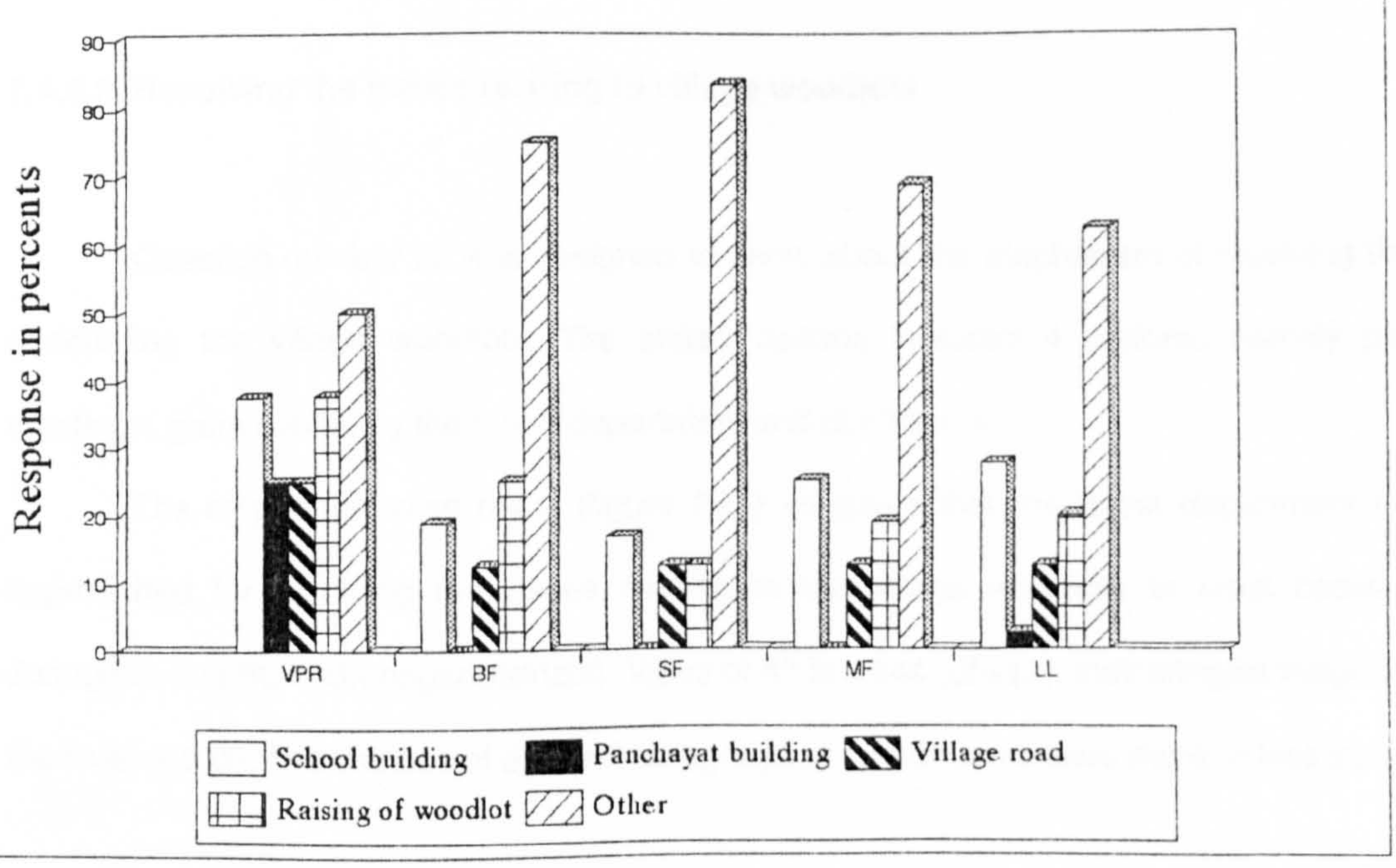
7.4.8.2.7. Utilisation of income by the panchayat

Question number 20 was designed to seek information about the utilisation of the income by the panchayats. The options were school building, panchayat building, village road, raising of woodlot and/or other. The idea was to know the type of works for which the money was used.

The computed X^2 value of 17.965 (df = 16) is not enough to reject the null hypothesis at the level of 0.05. This shows that the choices of different categories of respondents did not differ in a significant manner.

The respondent-wise response percents (figure 7.19) indicate that main use of the income obtained from harvesting of village woodlots had been the payment of charges for electricity, water and watchmen for the day-to-day working of the village panchayats' offices (categorised as 'other' represented by over two-thirds of respondents).

Fig 7.19: Utilisation of income by the village panchayat



However, in a few villages (Bharuch, Kheda and Mahesana districts), part of the money was reserved for raising of new village woodlots. The creation of social infrastructures, i.e. construction and/or repair of road, school and panchayat buildings were also one of the uses in Kheda, Mahesana and Valsad districts.

7.4.9. Involvement of people

7.4.9.1. Opinion about involvement of people

Question number 21 pursued the villagers' opinion about their involvement in the activities of the village woodlots. The options were high, medium, low or don't know.

The respondent-wise response percents are mentioned in figure 7.20. The overall opinion of the respondents was medium to high, indicating a reasonable level of cooperation in all villages.

The X^2 value is 13.229 (df=12), indicating the insignificance at the level of 0.05. This shows that the choices of different categories of respondents did not differ significantly.

However, about one-third from Mahesana did mention about the low involvement of people. The marginal farmers and landless villagers too felt comparatively less involved.

7.4.9.2. Resolving the issues relating to village woodlots

Question number 22 was designed to know about the mechanism of resolving the issues concerning the village woodlots. The stated options included 4 options, namely panchayat meetings, gram sabha, by the forest department and don't know.

The respondent-wise result (figure 7.21) suggests that the forest department had been approached for resolving the issues relating to the village woodlots in most cases (Kheda, Junagadh and Surendranagar districts). Value of X^2 is 8.844 (df=12), indicating its insignificance at the level of 0.05. The choices of different categories of respondents were more or less same.

Fig 7.20: Opinion about involvement of people in raising of village woodlot

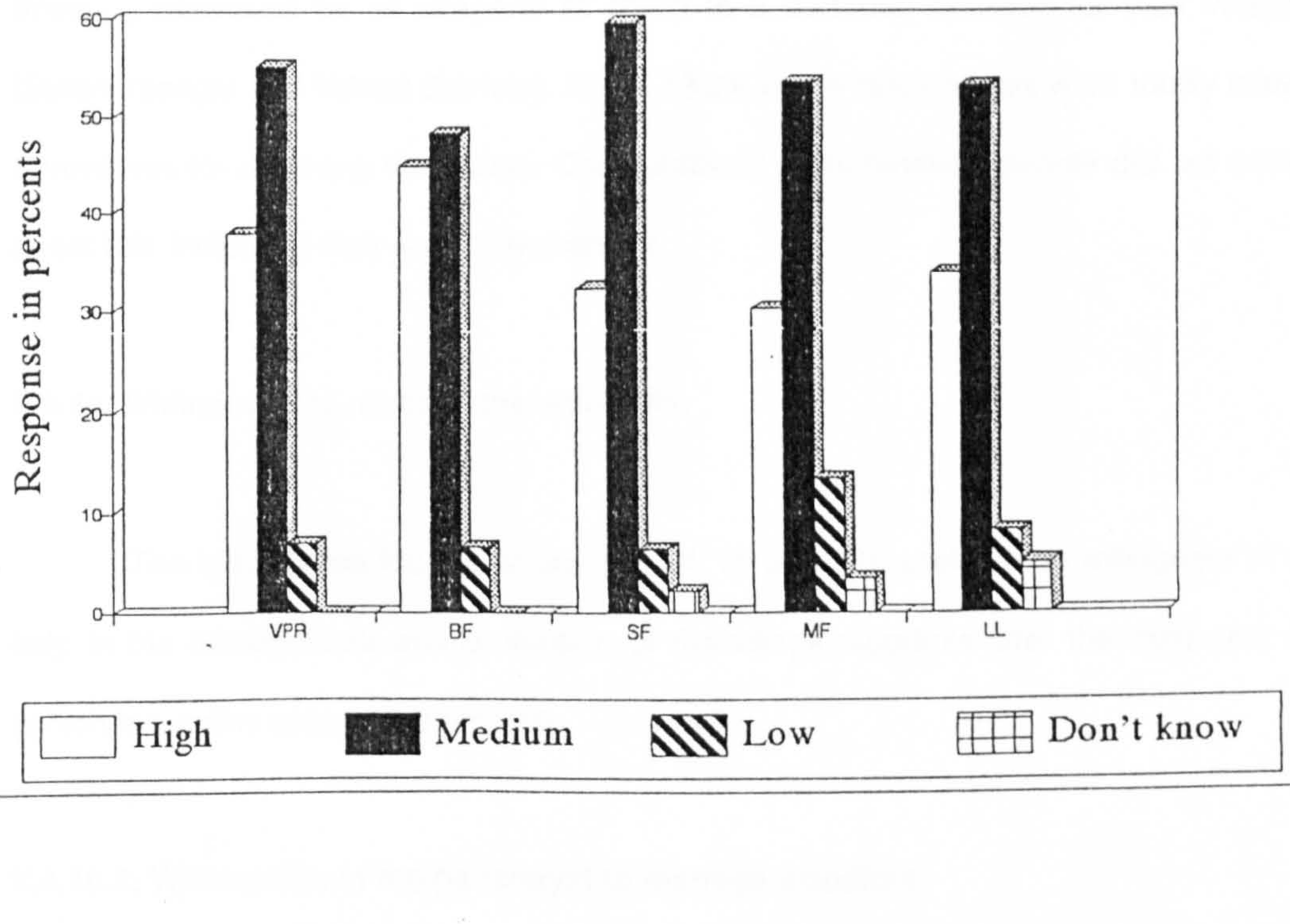
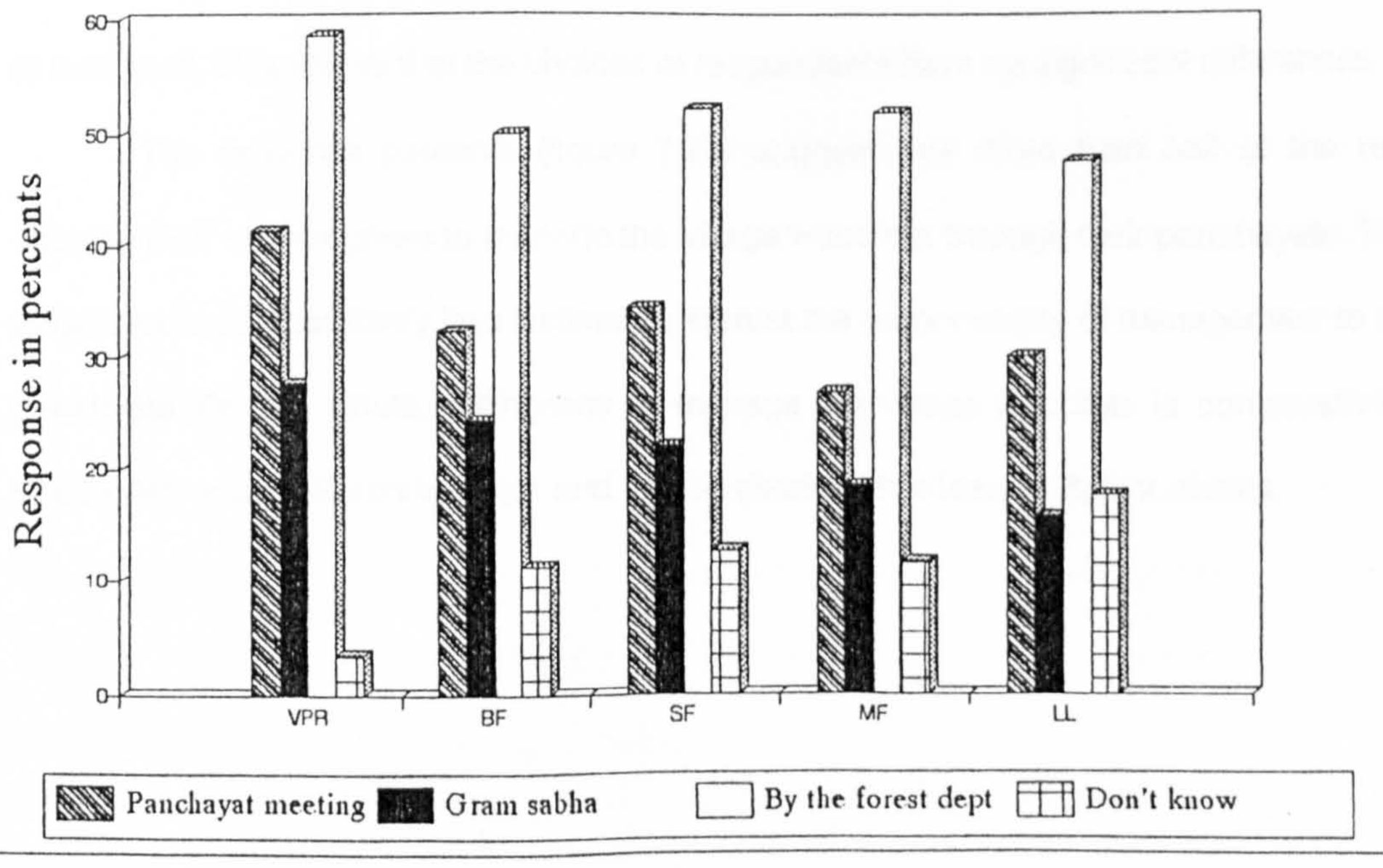


Fig 7.21: Resolving the issues related to the village woodlot



But sometimes, the issues were also resolved in the panchayat's meetings (Kachchh, Mahesana and Valsad districts). In fewer cases, all villagers were involved by holding a gram sabha (meeting convened for all villagers) to reach to a common decision for their village woodlots (Surendranagar and Valsad districts). About 13.3% of the respondents were totally unaware of the procedures for resolving the issues. Comparatively more landless people did not know anything about this, indicating their lesser involvement.

7.4.10. Willingness to manage the woodlots:

This section has four questions (23, 24, 25 and 26), seeking the willingness of villagers to help in the management and protection of the village woodlots after the third year of planting (which is a policy issue in the project).

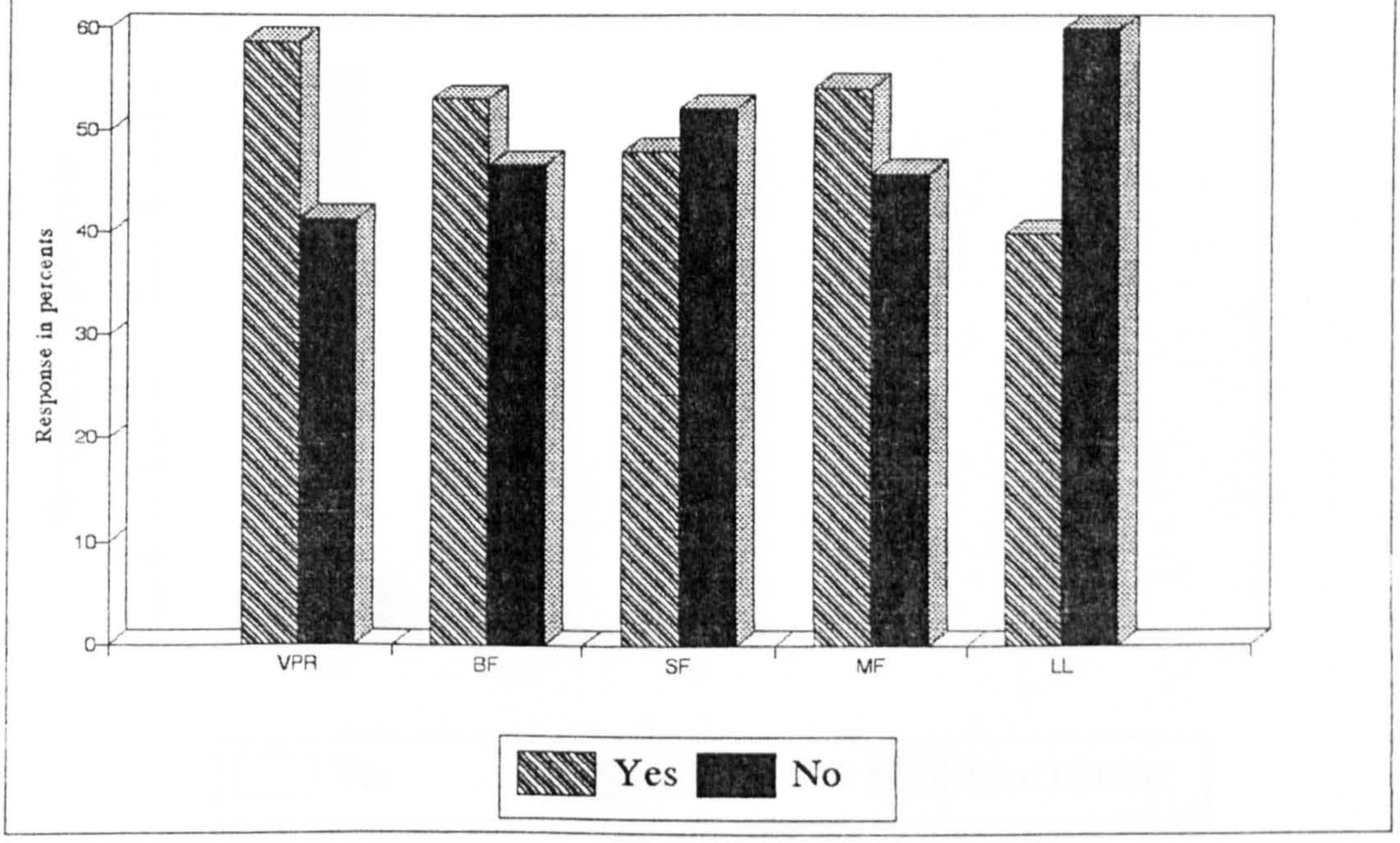
7.4.10.1. Willingness of the panchayat to manage woodlots

Question number 23 pursued the willingness of the respondents to manage the village woodlots through their panchayats. The options were yes or no.

The computed value of X^2 being 7.912 (df=4) is insufficient to accept the null hypothesis at 0.05 level. This shows that the choices of respondents have no significant differences.

The response percents (figure 7.22) suggest that more than half of the respondents showed their unwillingness to manage the village woodlots through their panchayats. The landless people were comparatively less inclined to entrust the responsibility of management to their village panchyats. On the whole, willingness to manage the village woodlots is comparatively more in Kheda, Mahesana, Surendranagar and Valsad districts. It is least in Rajkot district.

Fig 7.22: Willingness to manage the village woodlot



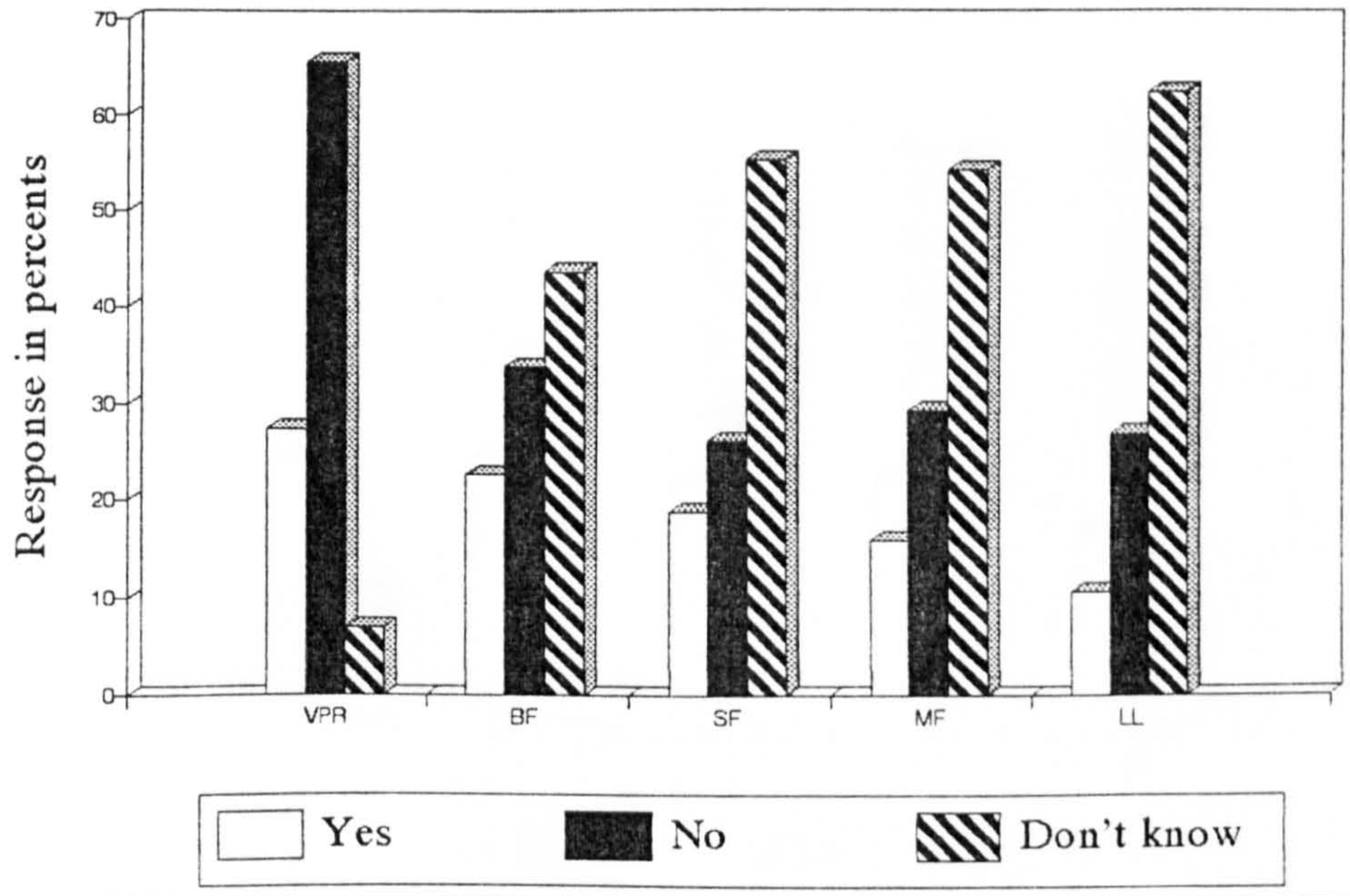
7.4.10.2. Request for transfer of village woodlots

Question number 24 sought if the village panchayats had requested the forest department to transfer the management of the village woodlots. The stated options were yes, no and don't know.

The computed value of X^2 is 36.076 (df=8), indicating the significance at the level of 0.05. This shows that there is significant difference in choices of different categories of respondents. This is mainly because of the less involvement of people in policy decisions taken by the village panchayats.

The respondent-wise positions are compiled in figure 7.23, suggesting that only a few of the panchayats had made some kind of request in this regard (Valsad, Kachchh and Mahesana districts). However, nearly two-thirds of the landless and more than half of the small and marginal farmers were unaware of any such request.

Fig 7.23: Request for transfer of of the village woodlot

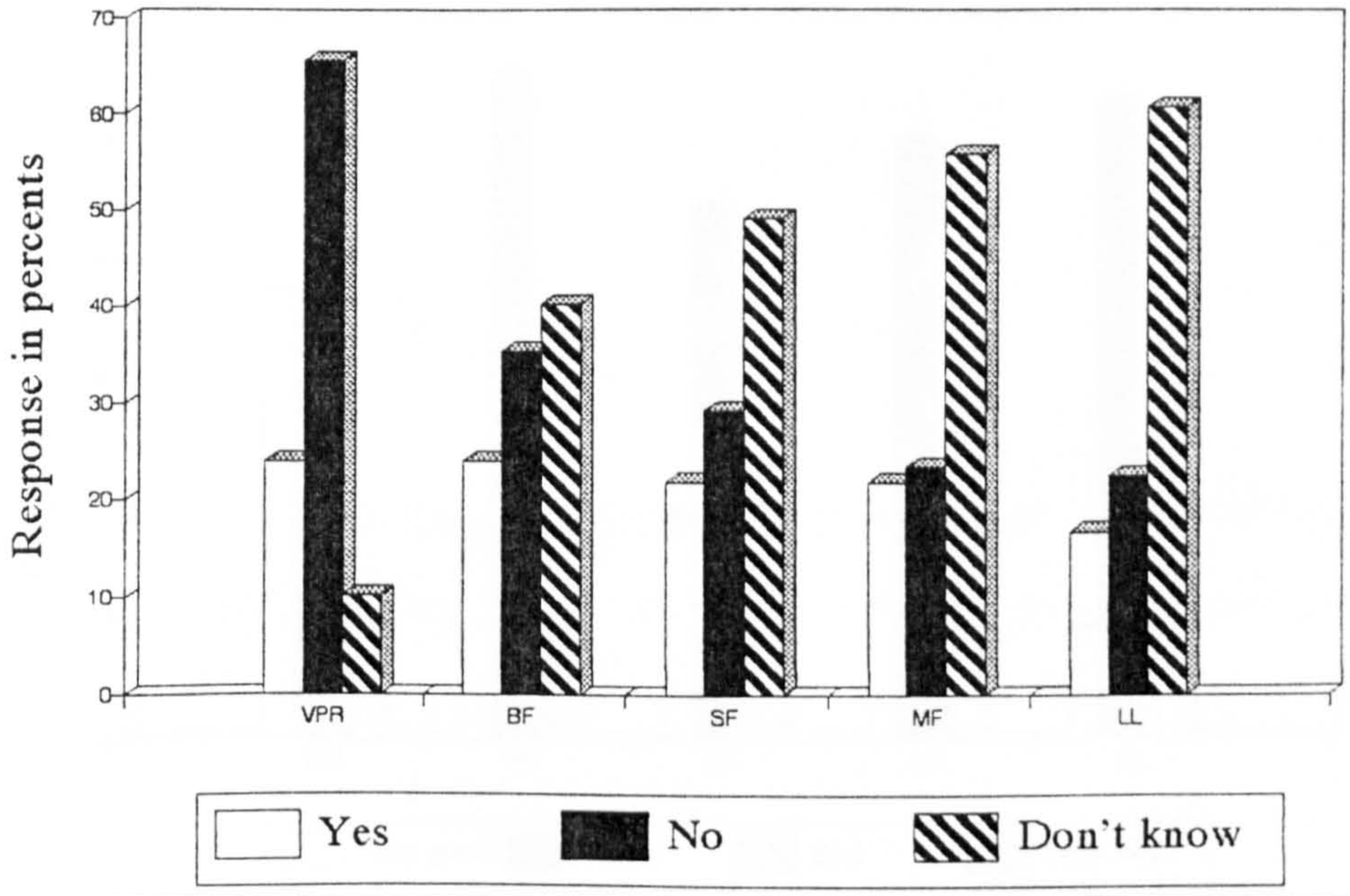


7.4.10.3. Transfer of any of the village woodlot to the panchayat

Question number 25 went further into the point of transfer seeking if any village woodlot was transferred to the village panchayats for further management and protection purposes. The three options included in questionnaire were yes, no and don't know.

The respondent-wise details (figure 7.24) suggests that the management of only 8 village woodlots (out of 32 sampled ones) were transferred to the concerned village panchayats. They were located one each in Bharuch and Kachchh and two each in Kheda, Mahesana and Valsad districts. But not all of the respondents from those eight villages were aware of this kind of transfer. Once again, more than half of the marginal farmers and the landless did not know anything about such transfers of village woodlots.

Fig 7.24: Transfer of any of the village woodlot



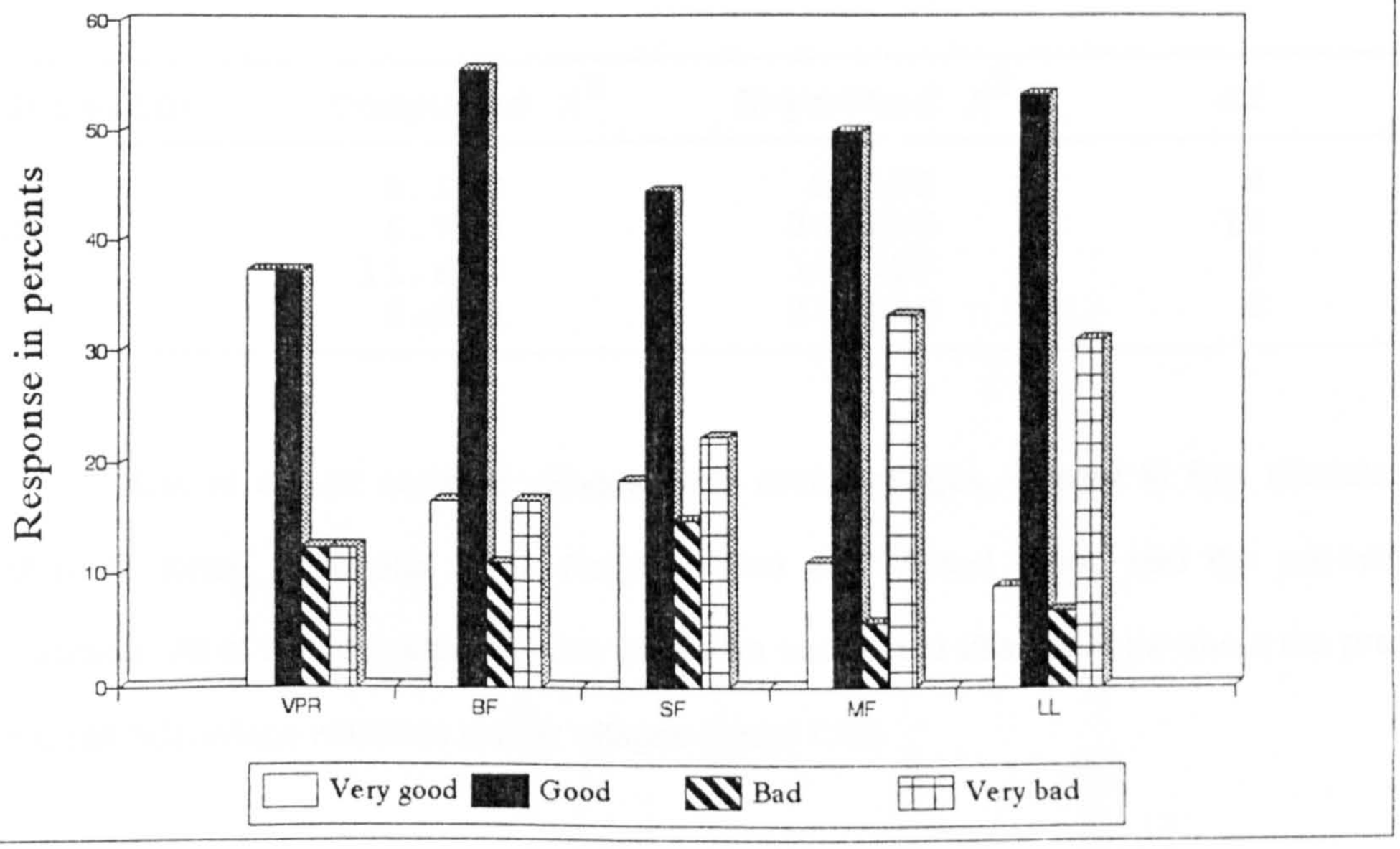
7.4.10.4. Condition of the transferred village woodlots

In question number 26, the respondents were asked to judge the condition of the transferred village woodlots. There were four options in this question, namely very good, good, bad and don't know.

Value of X^2 is 17.965 (df=16), indicating the insignificance at the level of 0.05. This means that the choices of different categories of respondents did not differ in a significant manner.

The majority of them said that the transferred village woodlots were well looked after by their panchayats, as their assessment was mostly good and very good (figure 7.25). But one-fourth of them did not opine on the condition of the transferred village woodlots. One-third in Mahesana informed that the condition was 'bad'.

Fig 7.25: Condition of the transferred village woodlot



7.4.11. Self-help village woodlots

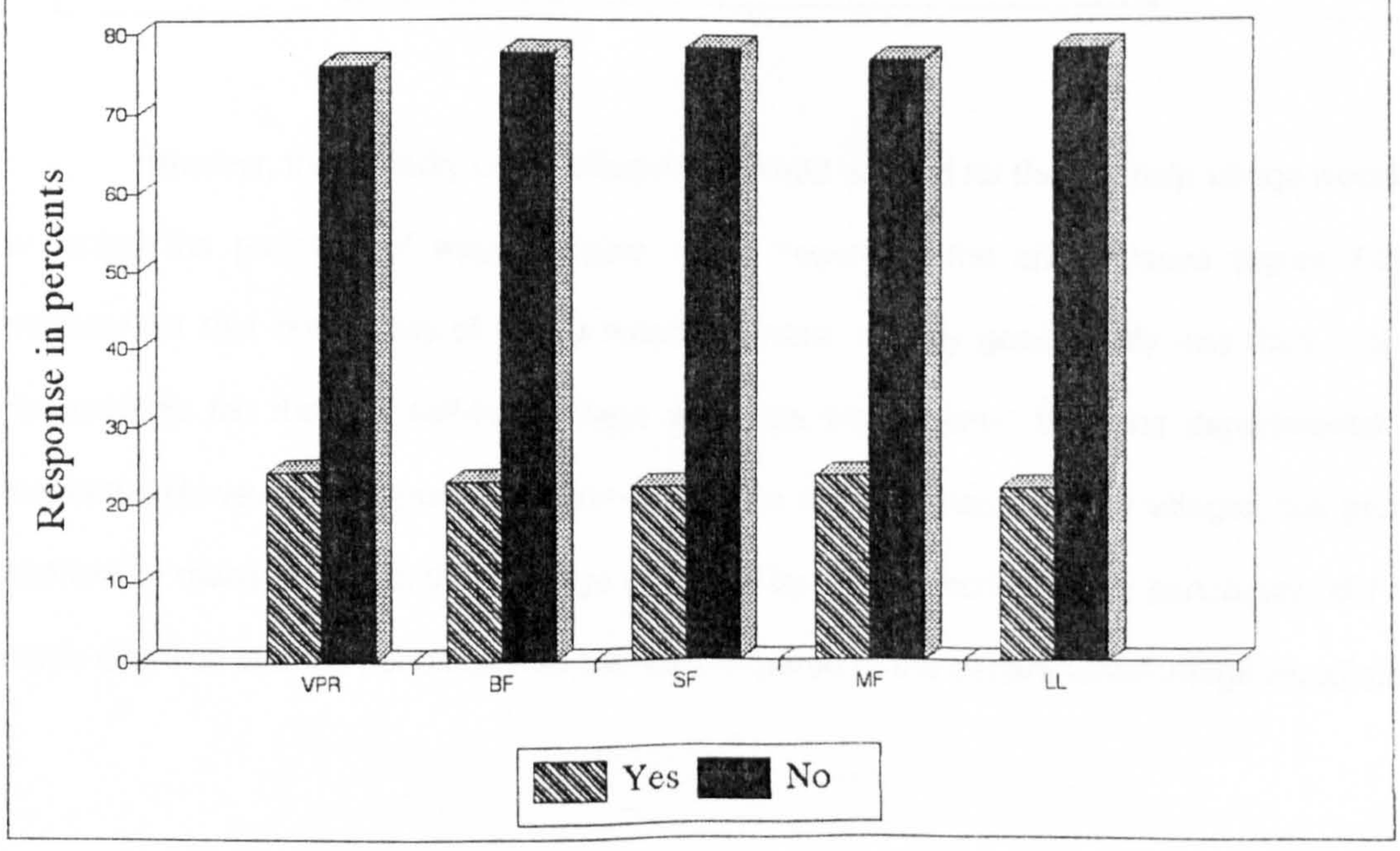
There were four questions (27, 28, 29 and 30) under this heading. These questions were designed to seek the respondents' knowledge about the self-help village woodlots. Question number 27 asked if there was a self-help village woodlot in the village. If yes, it was followed by the other three questions addressing the reasons for raising self-help village woodlots (question 28), payment for works in self-help village woodlots (question 29) and comparison of self-help village woodlot with the departmental village woodlot (question 30). Five options included in question 28 were for 100% benefits, people's cooperation, freedom for works, freedom for use and external funding. The options in question 29 were yes, no and don't know. The question 30 had three options, namely better, both good and bad.

The computed values of X^2 for these four questions, as shown below do not reject the null hypothesis at 0.05 level, indicating similarities in the choices of five categories of respondents.

Question	Computed X^2	Expected X^2	df
27	0.150	9.488	4
28	6.768	26.296	16
29	11.636	15.507	8
30	6.979	15.507	8

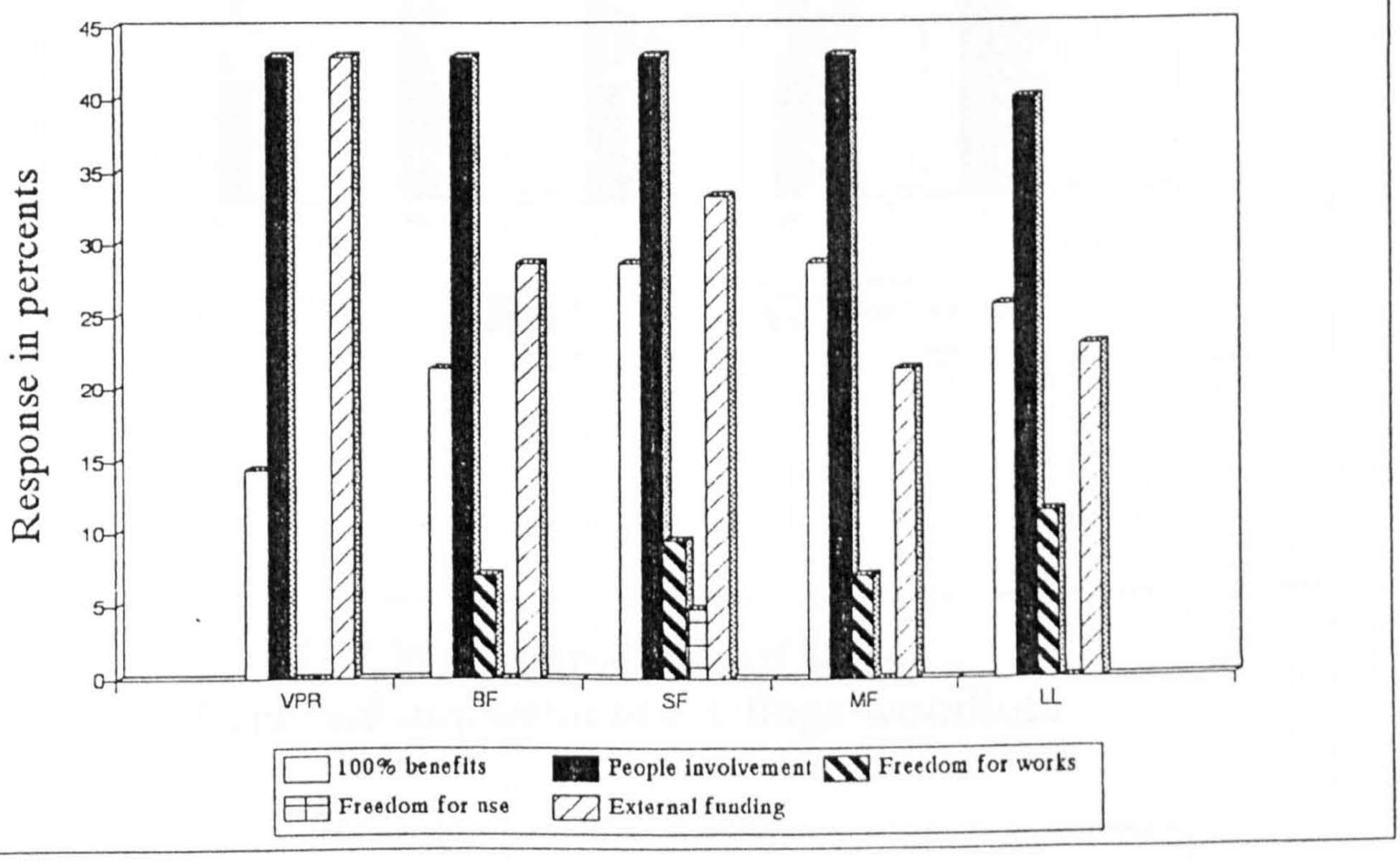
Out of the 32 sampled villages, only seven villages, located in four districts, namely Bharuch (one), Mahesana (two), Rajkot (three) and Valsad (one), had the self-help village woodlots. All of the respondents from the seven concerned villages knew about the presence of the self-help village woodlots in their villages (figure 7.26).

Fig 7.26: Raising of self-help village woodlot



The respondents believed that the main reasons were the favourable people's cooperation, accrual of 100% benefits to their panchayats and possibility of getting funds for their village. Over 43% of panchayat members felt that the self-help village woodlots were raised because of easy availability of funds (figure 7.27).

Fig 7.27: Reasons for raising the self-help village woodlot



However, the majority of the villagers who had worked for the self-help village woodlot had accepted the payment of wages (figure 7.28). Regarding the comparisons (figure 7.29), the majority felt that both types of village woodlots were 'equally good'. Only less than 10% of the respondents felt that the self-help village woodlots were 'better' than the departmental village woodlots. However, as reported by one-fifth of the respondents, in a few villages, the protection and further management of these village woodlots by the respective village panchayats did not get much attention and the condition was bad as compared to the departmental village woodlots.

Fig 7.28: Payment for the works in the self-help village woodlot

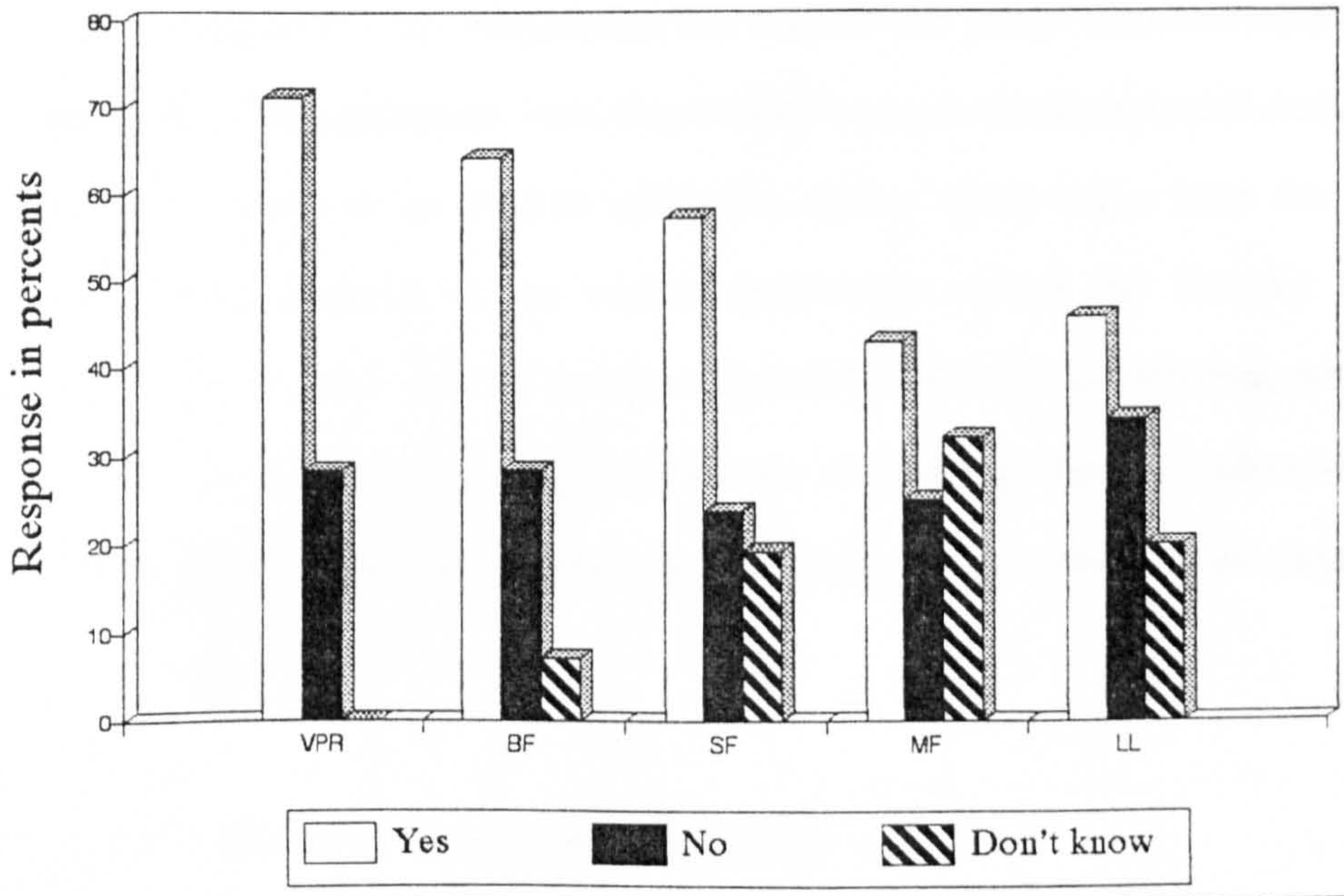
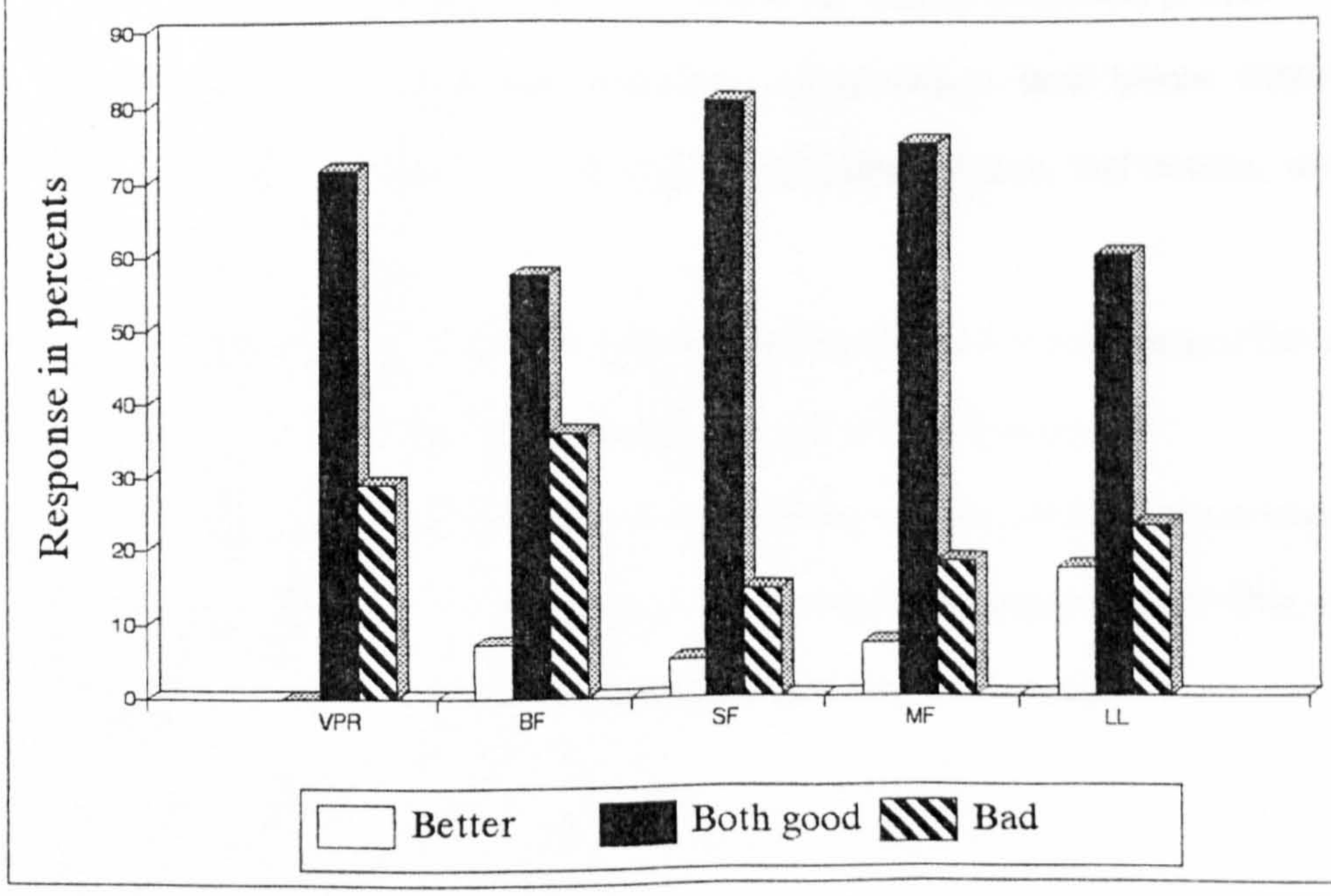


Fig 7.29: Comparison of self-help and departmental village woodlots



If we look back to the responses for question number one about the agencies who had raised the village woodlots, no one had named the village panchayat as an agency. When this was further enquired into, the villagers told that the self-help village woodlots were raised by the forest department. The panchayats were responsible for further protection and management purposes. This was done with an idea to utilise the money which came from the two different rural development schemes of the central government, called the National Rural Employment Programme (N.R.E.P.) and the Rural Landless Employment Guarantee Programme (R.L.E.G.P.).

As envisaged in the project document, the self-help village woodlots were supposed to be established by the intervention of village panchayats with the help of their people. But this was not so.

7.4.12. Condition and use of panchayat land

This section comprised seven different questions (31 to 37) seeking information about the condition of the common land before raising the village woodlot and also the condition of any other remaining common land in the present circumstances. The text of questions are as follows,

Question 31: What was the condition of panchayat land before establishment of the village woodlots? The options were barren wasteland, grassland, degraded, productive and don't know.

Question 32: What were the main uses of panchayat land before establishment of village woodlots? The six options included grazing, fodder source, fuel source, under encroachment, other and don't know.

Question 33: Was the panchayat getting any income from this panchayat before establishment of the village woodlots? The answers were yes, no, and don't know.

Question 34: Is there any other panchayat land in your village? The options were yes and no.

Question 35: What is the condition of the remaining panchayat land? Five options were barren wasteland, grassland, under encroachment, other and don't know.

Question 36: What are the main benefits of the remaining panchayat land? The options included grazing, fuel, fodder, minor forest produce and don't know.

Question 37: Is there any income to the panchayat from the remaining panchayat land? The options were yes, no and don't know.

The computed values of X^2 for these seven questions are tabulated below:-

Question	Computed X^2	Expected X^2	df
31	8.259	26.296	16
32	12.796	31.410	20
33	14.951	15.507	8
34	0.635	9.488	4
36	13.340	26.296	16
37	9.715	26.296	16
38	16.477	15.507	8

The computed chi-square values for question number 31, 32, 33, 34, 35, 36 and 37 being smaller than the expected values of chi-square do not reject the null hypothesis. As such the choices of the respondents do not differ in a significant manner, indicating the similarities in the awareness of the people belonging to different groups. However, in the case of the question number 38, the value of X^2 is higher than the expected value and therefore rejects the null hypothesis. This indicates difference in the choices of the respondents about realisation of income by the village panchayats from the remaining common grazing land.

As shown in figure 7.30, in most of the villages, the condition of the panchayat land (before raising the village woodlot) was not very useful, as it was lying barren or in a degraded condition supporting very sparse vegetation. In a few cases, the seasonal grass fodder was available for the local cattle. Rarely, they had some bushes and trees being used as fuel by the local people. Nowhere, was the panchayat land considered to be productive. On the whole, over three-fourths of the respondents informed that the common land (where the village woodlots exist) was mostly barren. About one-third said that it was a grassland.

Fig 7.30: Condition of the panchayat land before village woodlots

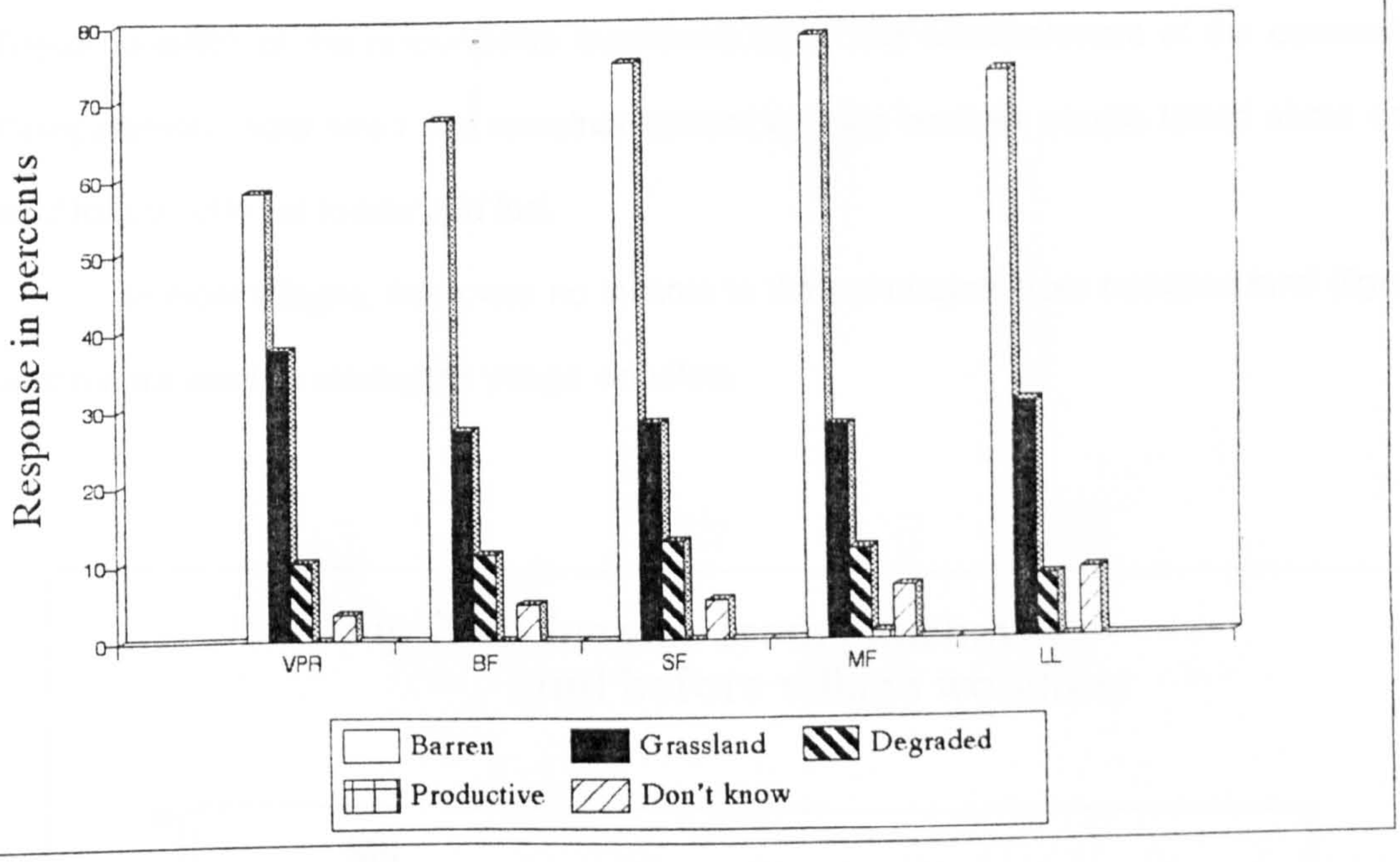
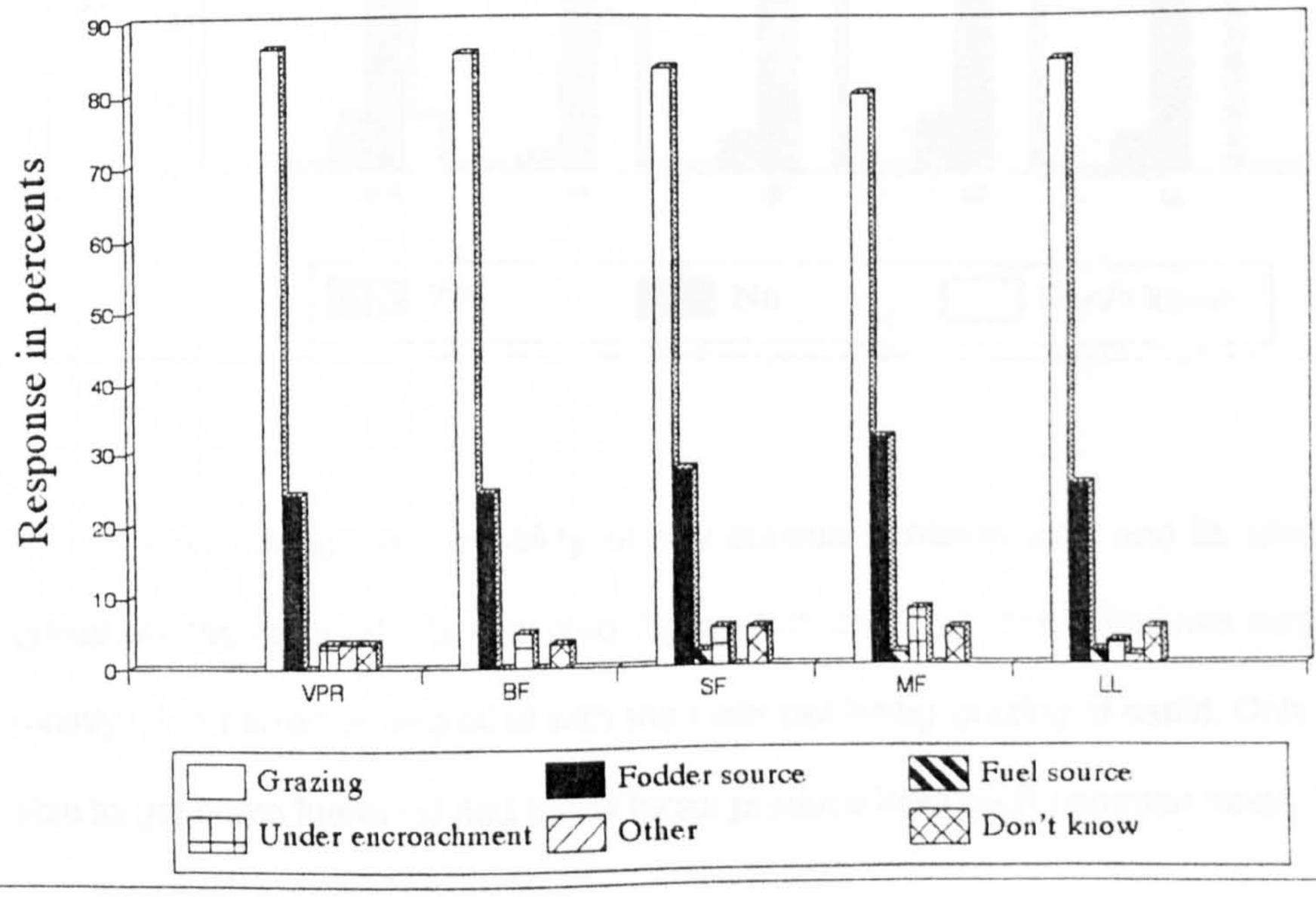


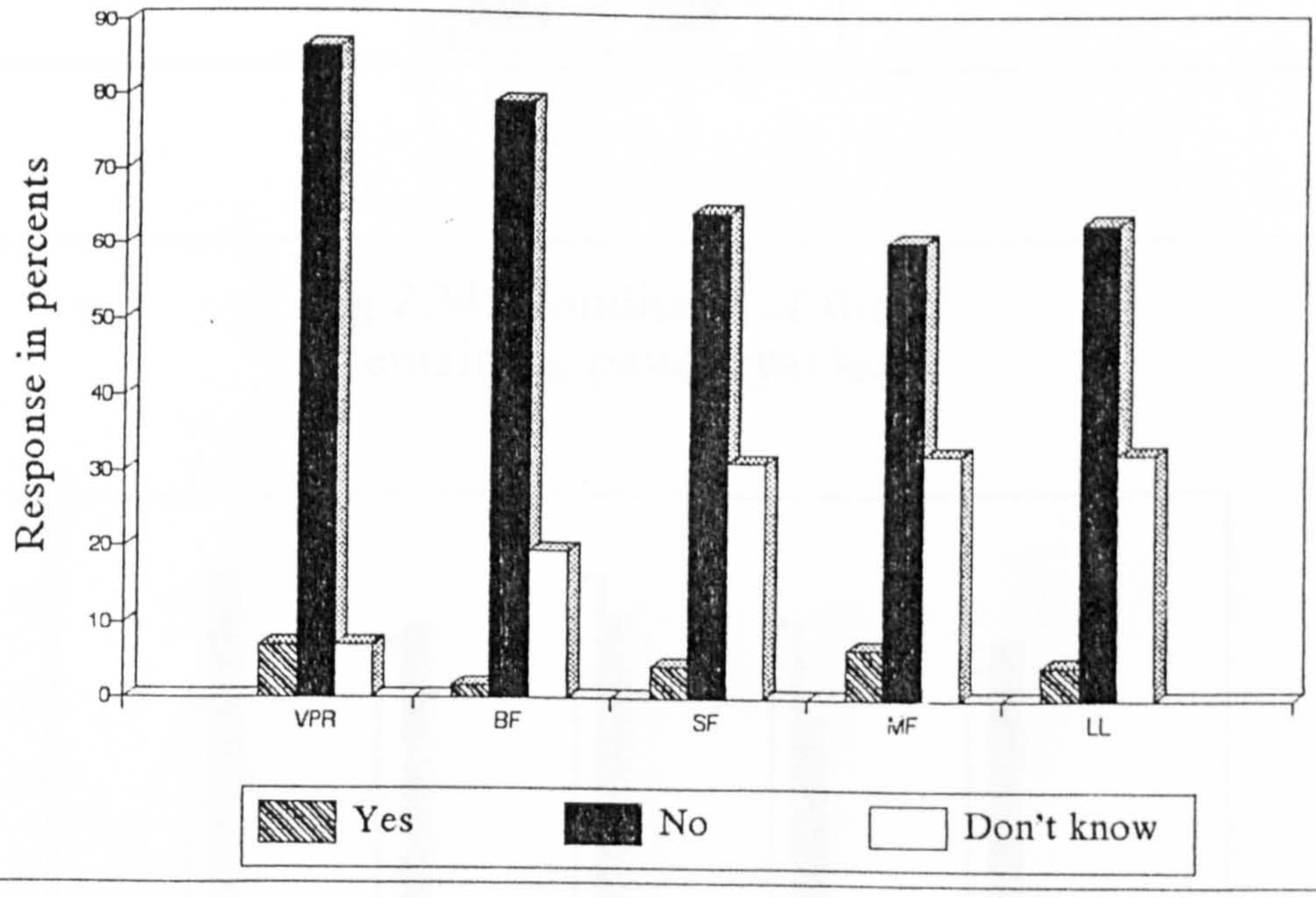
Fig 7.31: Main use of panchayat land before village woodlots



In general, the common land was used as a pasture for grazing of the local cattle and fodder collection (figure 7.31). Fewer numbers supported the fuel collection or any other use. In Rajkot, one-fifth of the respondents mentioned about the encroachment of the common lands. Comparatively more small and marginal farmers and the landless people talked about using the land for collection of fodder and fuel.

In most villages, there was no income to the panchayats from common land (figure 7.32) which were used for raising the village woodlots.

Fig 7.32: Income from panchayat land before village woodlots



Concerning the availability of any surplus common land and its present condition and utilisation, the respondents accepted (figure 7.33 and 7.34) that there was surplus common land, mostly lying barren or degraded with the main use being grazing of cattle. Only a few people were able to get some fuelwood and minor forest produce from such common lands.

Fig 7.33: Any other remaining panchayat land in the village

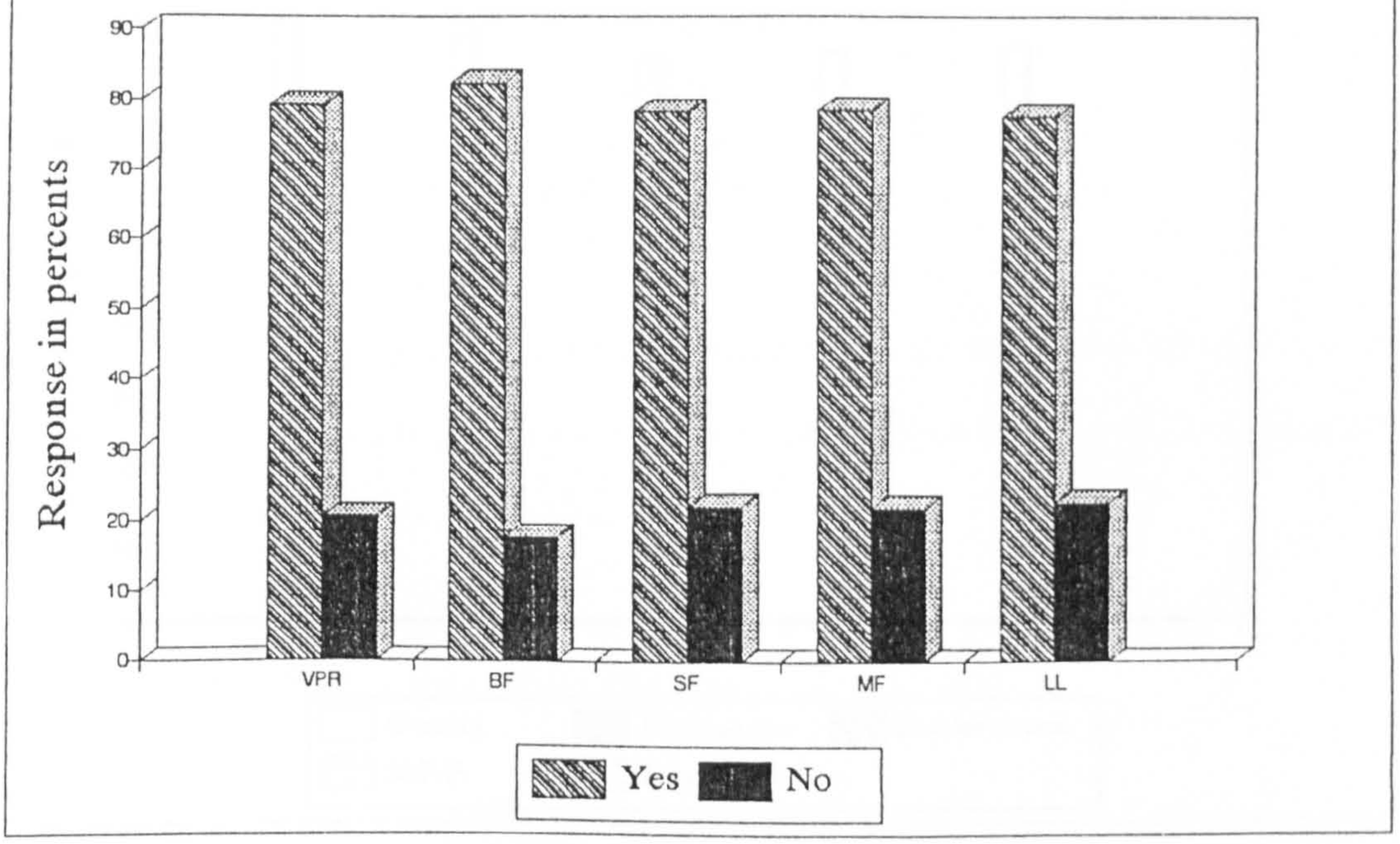


Fig 7.34: Condition of the remaining panchayat land

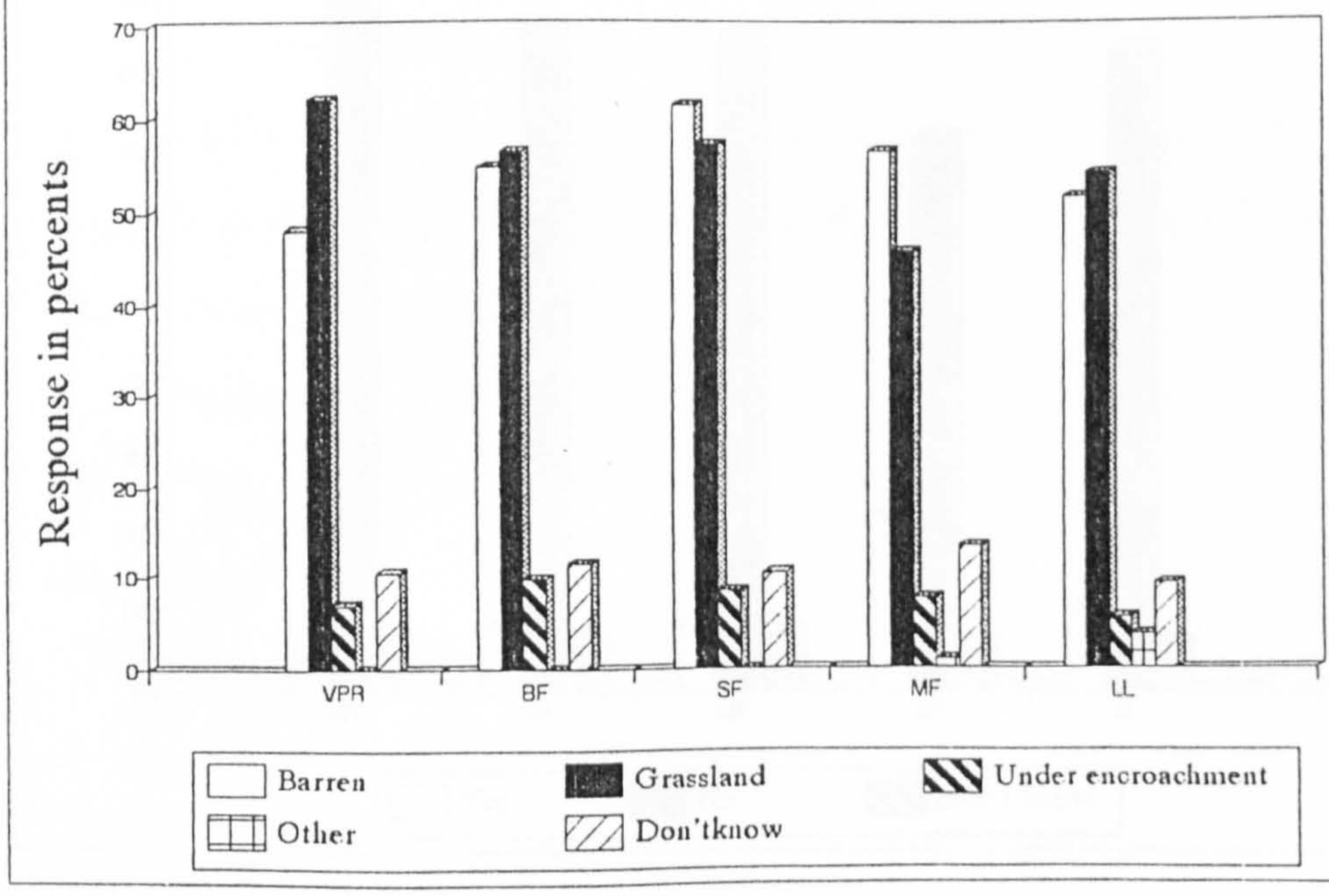


Fig 7.35: Main benefits of the remaining panchayat land

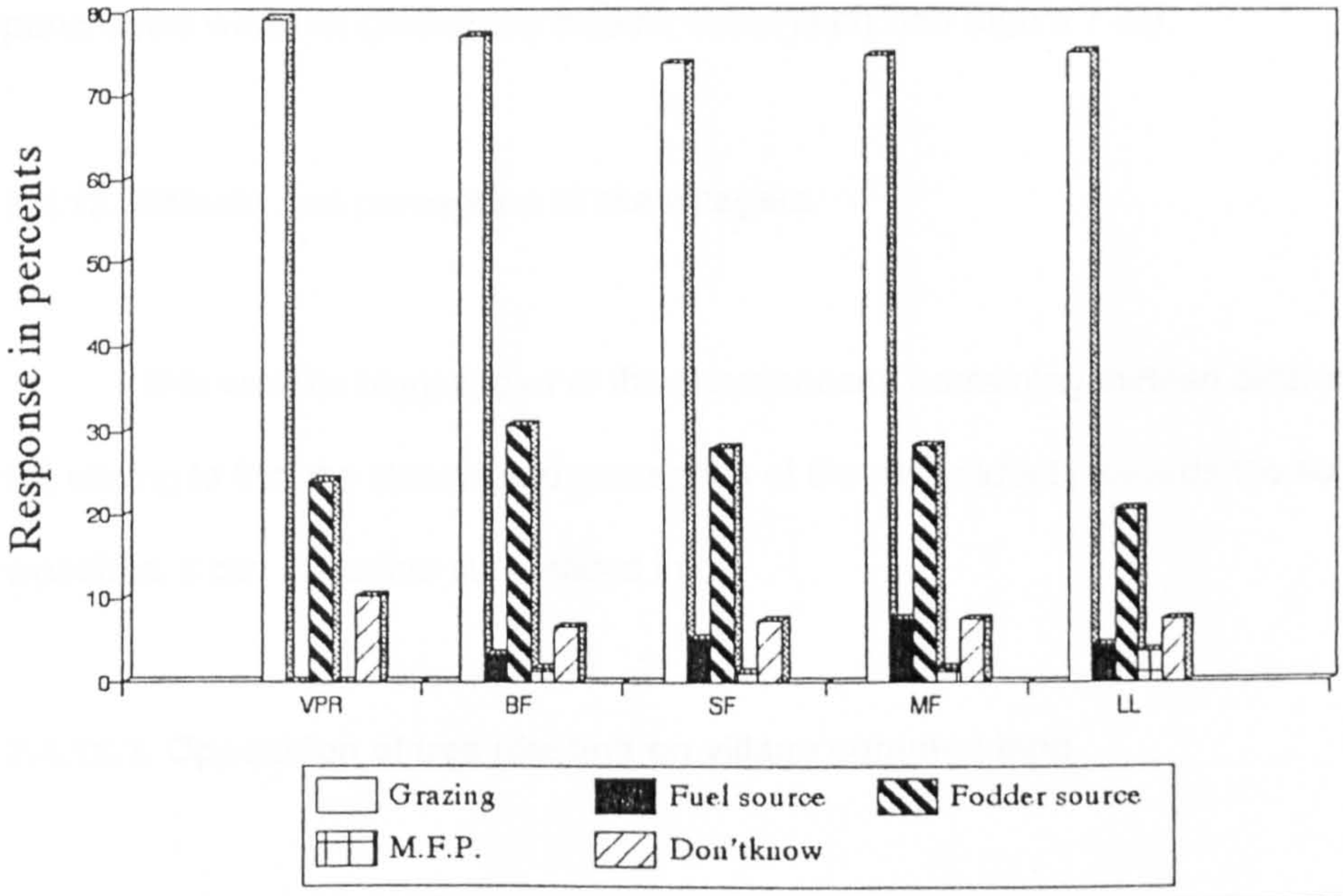
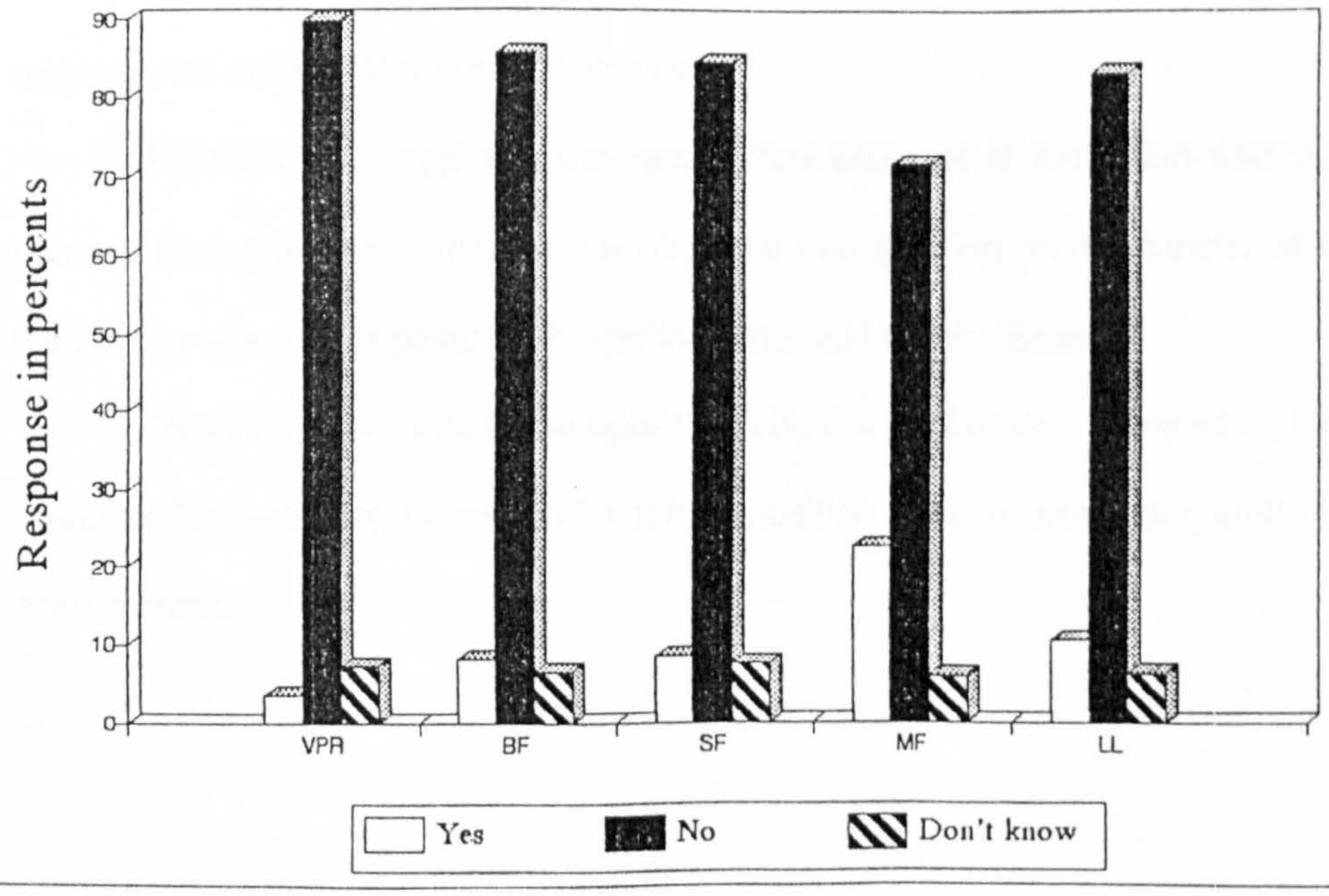


Fig 7.36: Income to the panchayat from the remaining land



Comparatively more small and marginal farmers and landless were using the land for collection of fuelwood and minor forest produce (figure 7.35). The majority of the village panchayats were not getting any income out of such land (figure 7.36).

7.4.13. Attitude and perception of the villagers

This was the biggest part of the questionnaire containing thirteen different questions (38 to 50) aiming to find the attitude and perception of the respondents towards the scheme of the village woodlots. It can be further sub-divided into

7.4.13.1. Opposition of tree planting on village common land

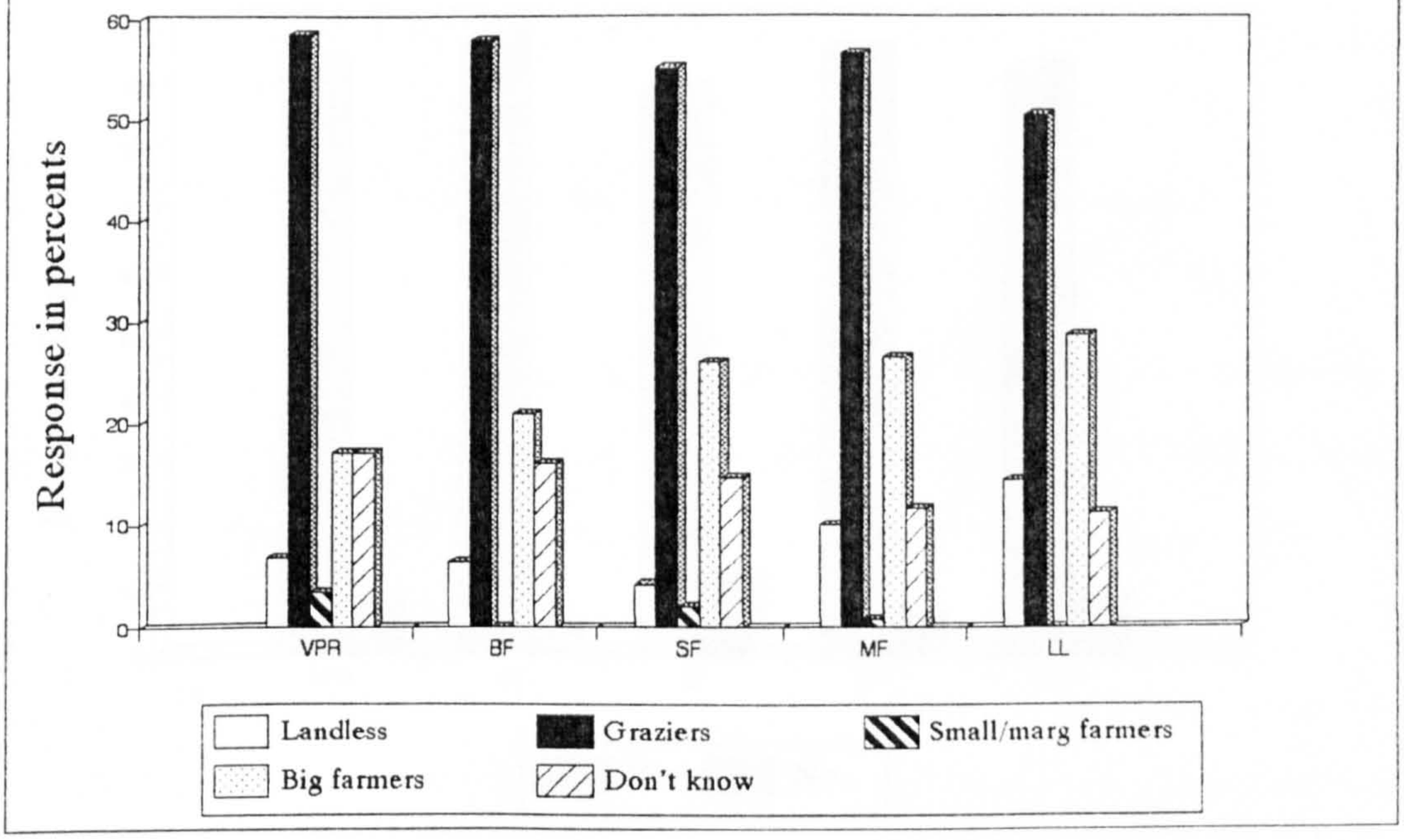
Question number 38 attempted to find if any group of villagers had ever opposed the tree planting work on the village common land. The options were landless, graziers, small/marginal farmers, big farmers and don't know.

Since the computed value of X^2 (17.777 at df = 16) is smaller than the expected value of X^2 at 0.05 level, the null hypothesis is accepted. This shows that the choices of different categories of respondents do not differ in a significant way.

Figure 7.37 brings out the respondent-wise result indicating that the graziers (cattle owners, known as maldharis) were against the tree planting on the panchayat land because they felt that the area under pasture was getting reduced in their villages.

However, there was some opposition by the big farmers, followed by landless people and marginal farmers. The intensity of such opposition was noticed comparatively more in fodder scarce areas.

Fig 7.37: Opposition to tree planting on the panchayat land



7.4.13.2. Employment to the villagers

This part went into the issues of creation of employment opportunities for the villagers due to the implementation of the scheme (question 39) and opposition by villagers if they were not provided the employment (question 40). The options in question 39 were yes and no, while the options in question 40 included yes, no and don't know.

The computed values of X^2 are 5.092 (df=4) and 9.298 (df=8), respectively. Since these values do not reject the null hypothesis, they indicate insignificant differences in the choices of different categories of respondents.

The respondent-wise results are shown in figures 7.38 and 7.39, respectively. The people felt satisfied with the employment prospects due to social forestry works in their villages. The tree planting was considered as highly labour-oriented programme and the implementation of the village woodlot scheme had provided employment in almost all villages.

Fig 7.38: Employment to the village people

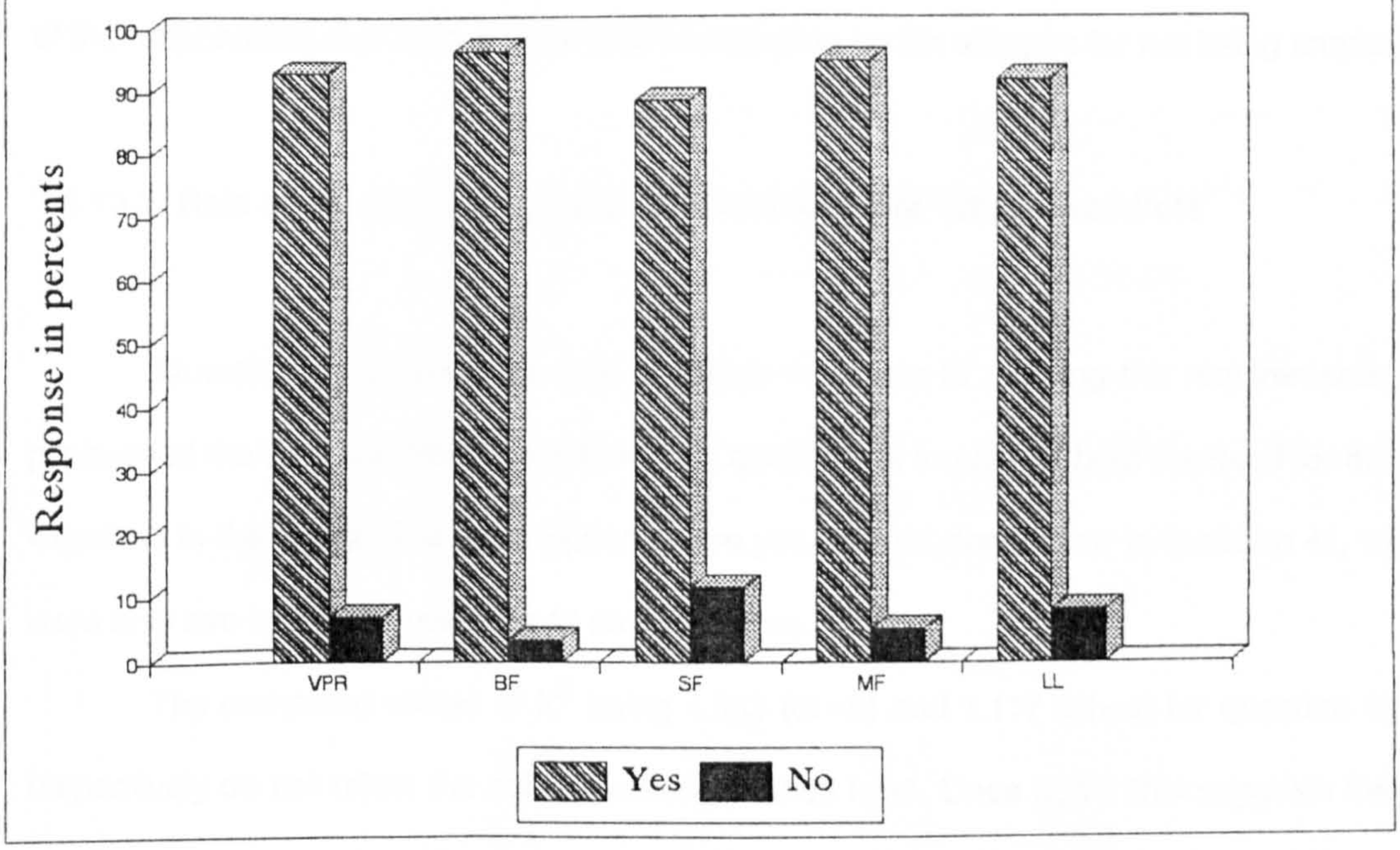
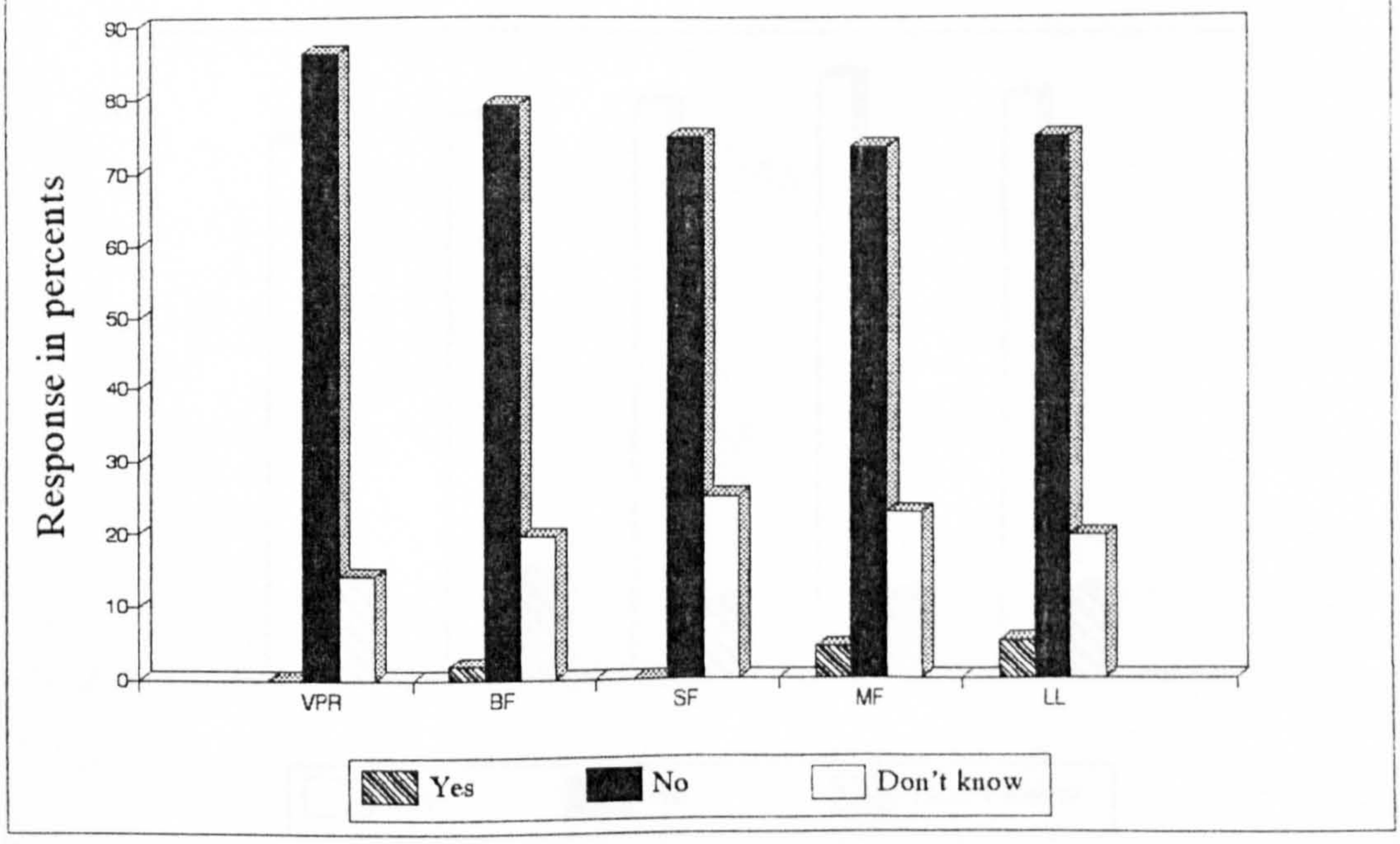


Fig 7.39: Objection for not employing the village people



About one-fifth in Mahesana and one-sixth in Valsad districts did say that the villagers were not employed for the works. But there was no serious opposition in this regard as only 3.2 percent of the respondents mentioned some kind of objection by the villagers for not being employed.

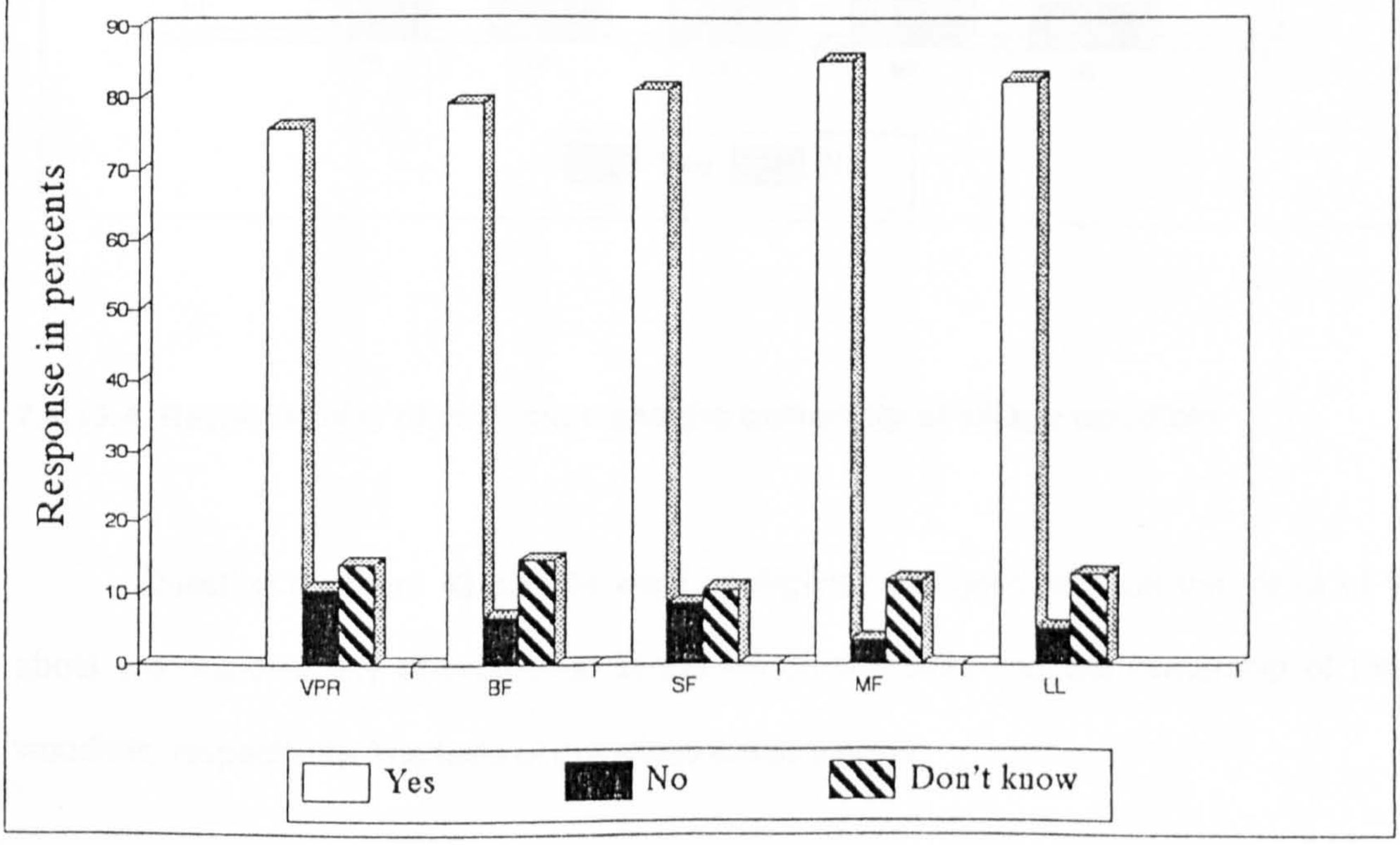
7.4.13.3. Role of the village woodlots and need for more village woodlots

Question 41 pursued the role of village woodlots in meeting the requirements of forest produce of the villagers. This was followed by question 42 inquiring about the need for more village woodlots in the village. The three options were yes, no and don't know in question 41, while there were only two options in question 42 as yes and no.

The computed values of X^2 being 4.553 (df=8) and 1.117 (df=4) for question 41 and 42, respectively do not reject the null hypothesis at 0.05 level. Once again this suggests insignificant differences in choices of different categories of respondents.

The respondent-wise response percents for question 41 are presented in figure 7.40.

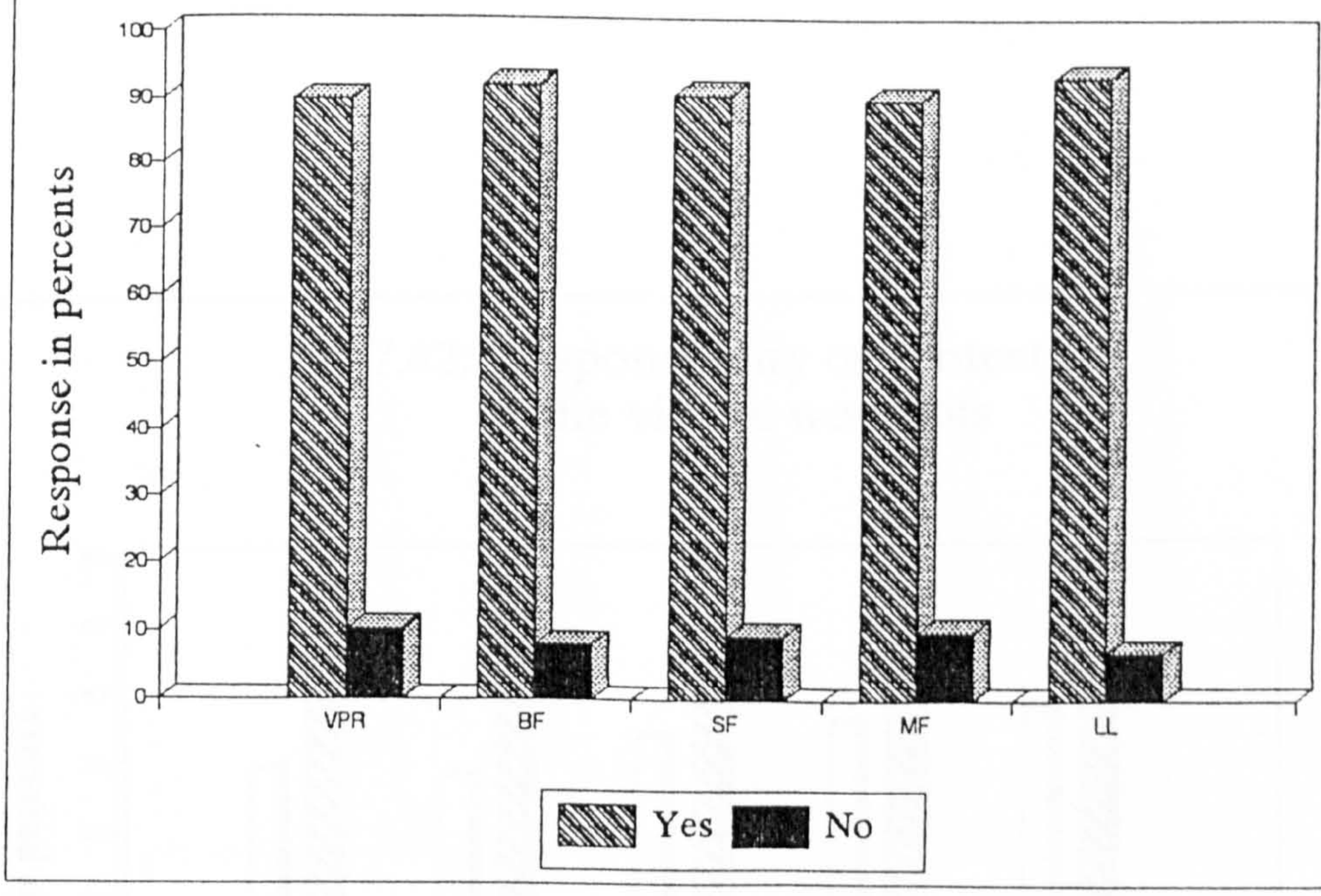
Fig 7.40: Role of village woodlots in meeting the demand of villagers



Most villagers (82 percent) felt that the village woodlots did play quite an important role in producing the forest produce for the use of the villagers. However, between 10 to 14 percent of the respondents were unaware of any role in their village.

On the whole, the majority (91 percent) wanted to have more village woodlots in their village (figure 7.41). At the same time, 13% respondents from Kachchh, Mahesana and Surendranagar districts did not favour more village woodlots for their villages.

Fig 7.41: Need for more village woodlots in the village



7.4.13.4. Responsibility of protection and the ownership of village woodlots

Question numbers 43 and 44 were intelligently designed to seek the views of villagers about the responsibility of protection in the village woodlots and the ownership of the village woodlots, respectively. The texts of questions are as follows,

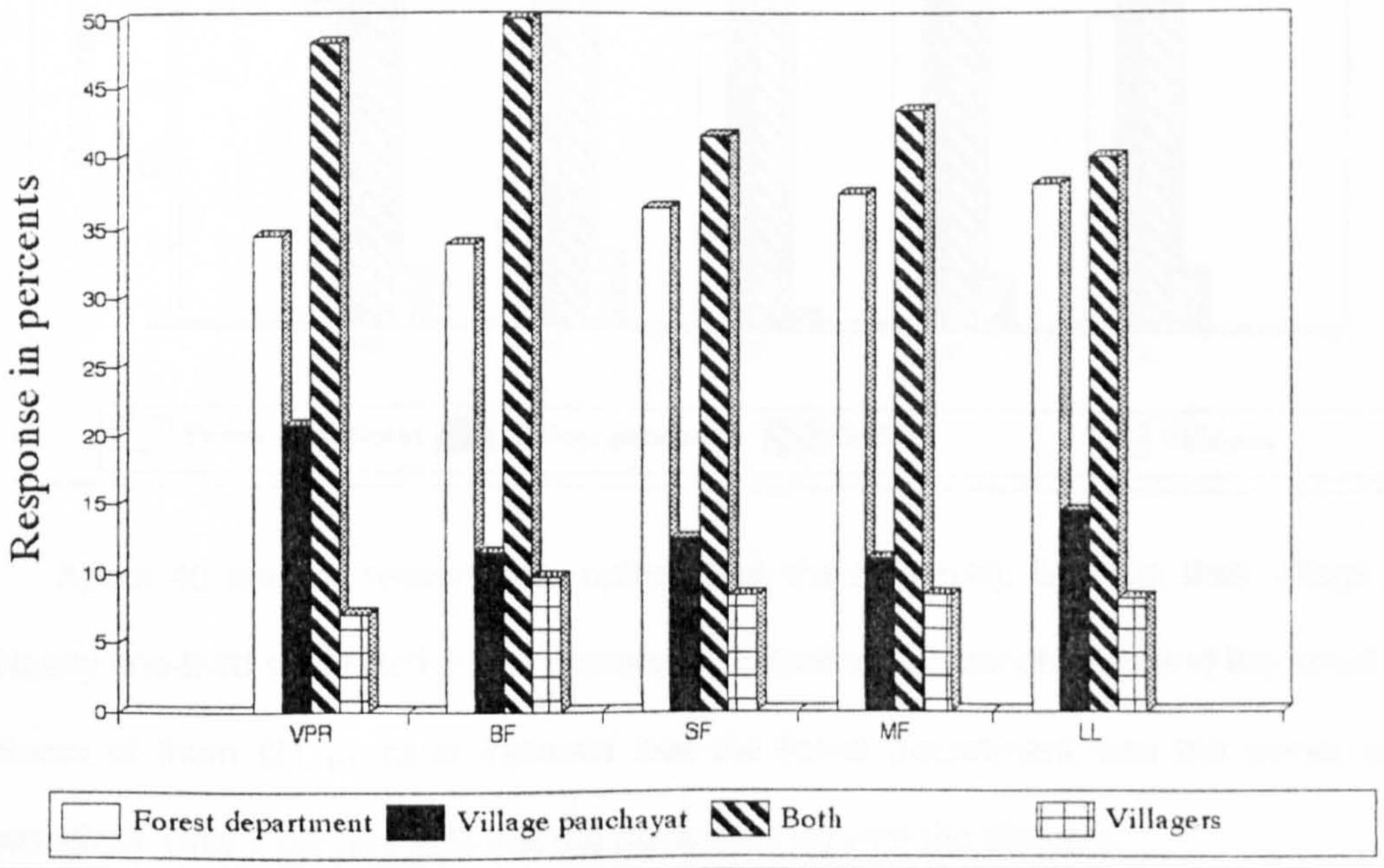
Question 43: Who is responsible for protection of the woodlots? The options were forest department, panchayat, both and villagers.

Question 44: Who is the owner of village woodlots? The given options were forest department, panchayat, both and villagers.

The computed values of X^2 for question 43 and 44 are 3.371 (df=12) and 5.930 (df=12), respectively, which do not reject the null hypothesis at the level of 0.05. The choices of different categories of respondents do not differ significantly. There seems to be an uniformity among the people regarding the protection responsibilities as well as the ownership of the village woodlots.

The overall results for question 43, respondent-wise are shown in figure 7.42.

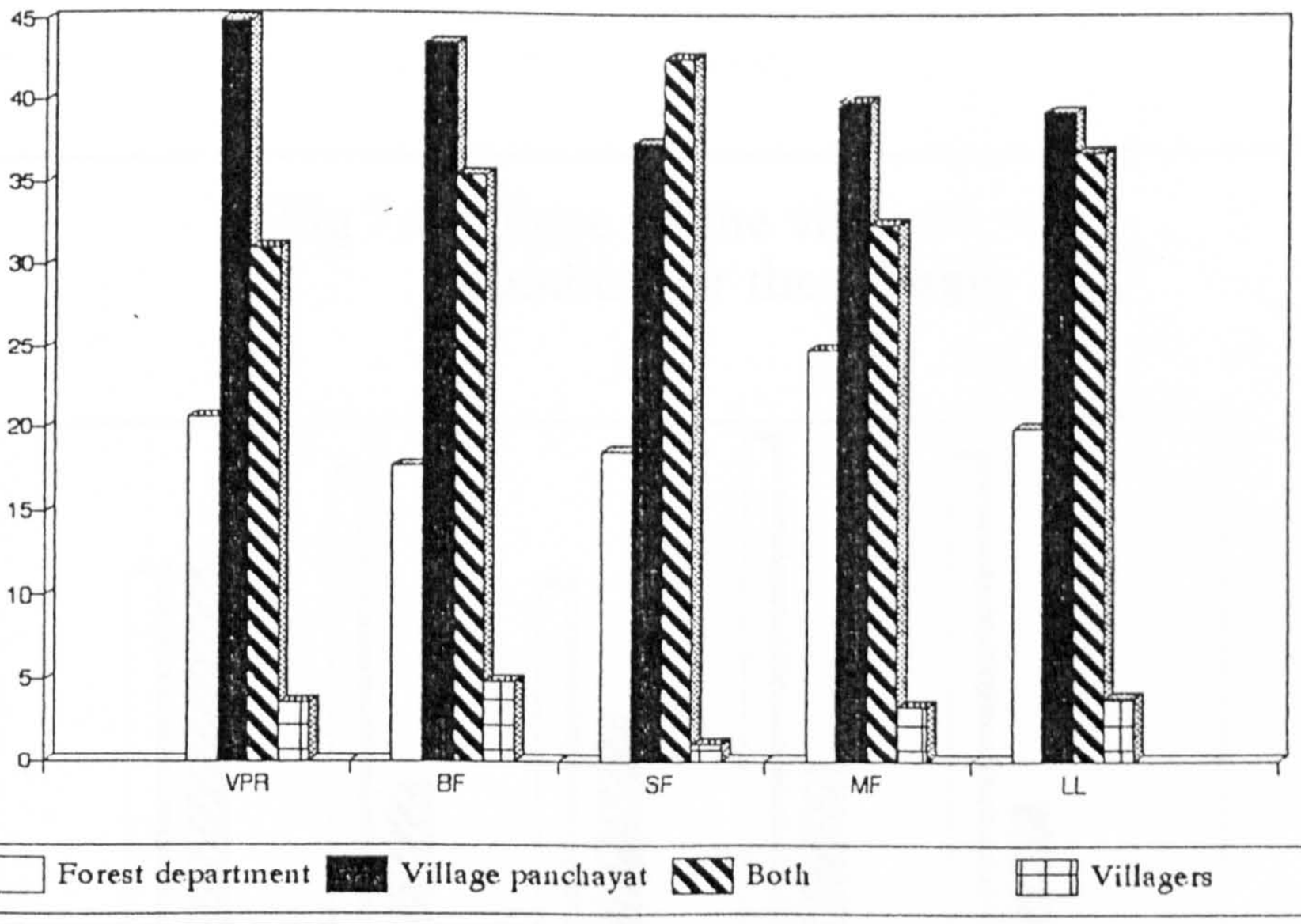
Fig 7.42: Responsibility of protection of the village woodlots



In general, the protection responsibility was being attached to the forest department alone in one-third of cases and slightly more respondents believed in joint responsibility of protection by the forest department and their village panchayats. Very few (8 percent, but up to 20 to 25 percent in Bharuch and Kheda districts) opined that it was their own responsibility. None of the villagers from Junagadh and Surendranagar districts wanted to make the villagers responsible for protection of village woodlots.

Figure 7.43 shows the responses of people about the ownership of village woodlots (question 44).

Fig 7.43: Ownership of the village woodlots



About 40 percent respondents opined that the ownership lies with their village panchayats. Nearly one-third supported a joint ownership of their village panchayats and the forest department. Some of them (21 percent) believed that the forest department was the owner of the village woodlots. Only 3 percent said that the ownership lay with the villagers.

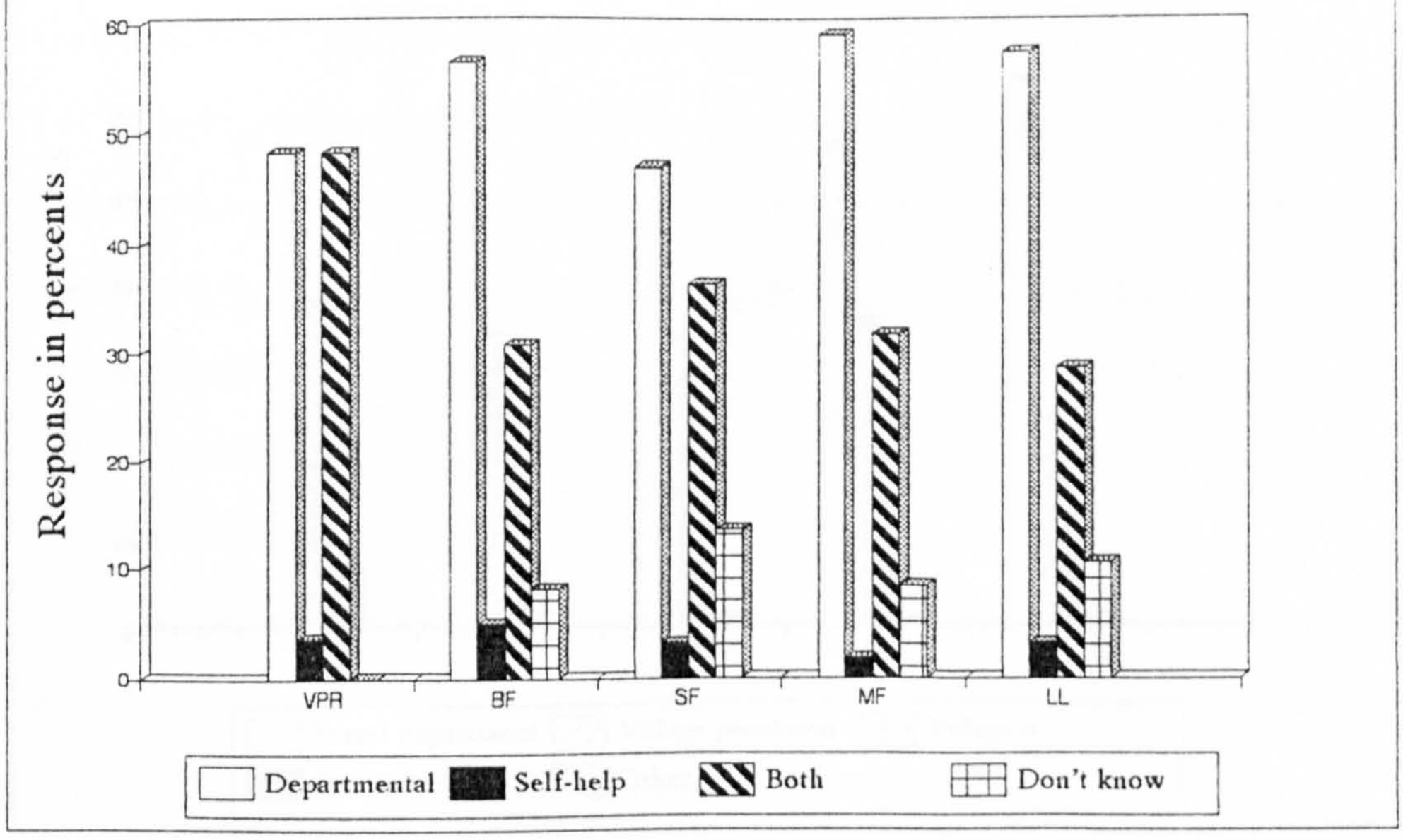
7.4.13.5. Type of village woodlots for the village

Question number 45 dealt with the villagers' preference for the type of village woodlots for their village. The respondents were given four options, namely departmental, self-help, both and don't know.

The computed value of X^2 is 11.734 (df=12) confirms the uniformity in the choices of respondents because the value does not reject the null hypothesis at 0.05 level. The preference of villagers is more or less the same throughout Gujarat.

The overall respondent-wise result (figure 7.44) clearly indicates that more than half of the respondents felt that their village should prefer the departmental village woodlots. Only 3 percent showed their preference for self-help village woodlots.

Fig 7.44: Type of the village woodlot for the village



This might have resulted from the government's decision to give 100 percent benefits to the village panchayats from the departmentally raised woodlots. So, the villagers did not see any point in investing their time for the cause of a village woodlot. However, nearly one-third of them wanted to have both types of village woodlots, i.e. the departmental and self-help village woodlots.

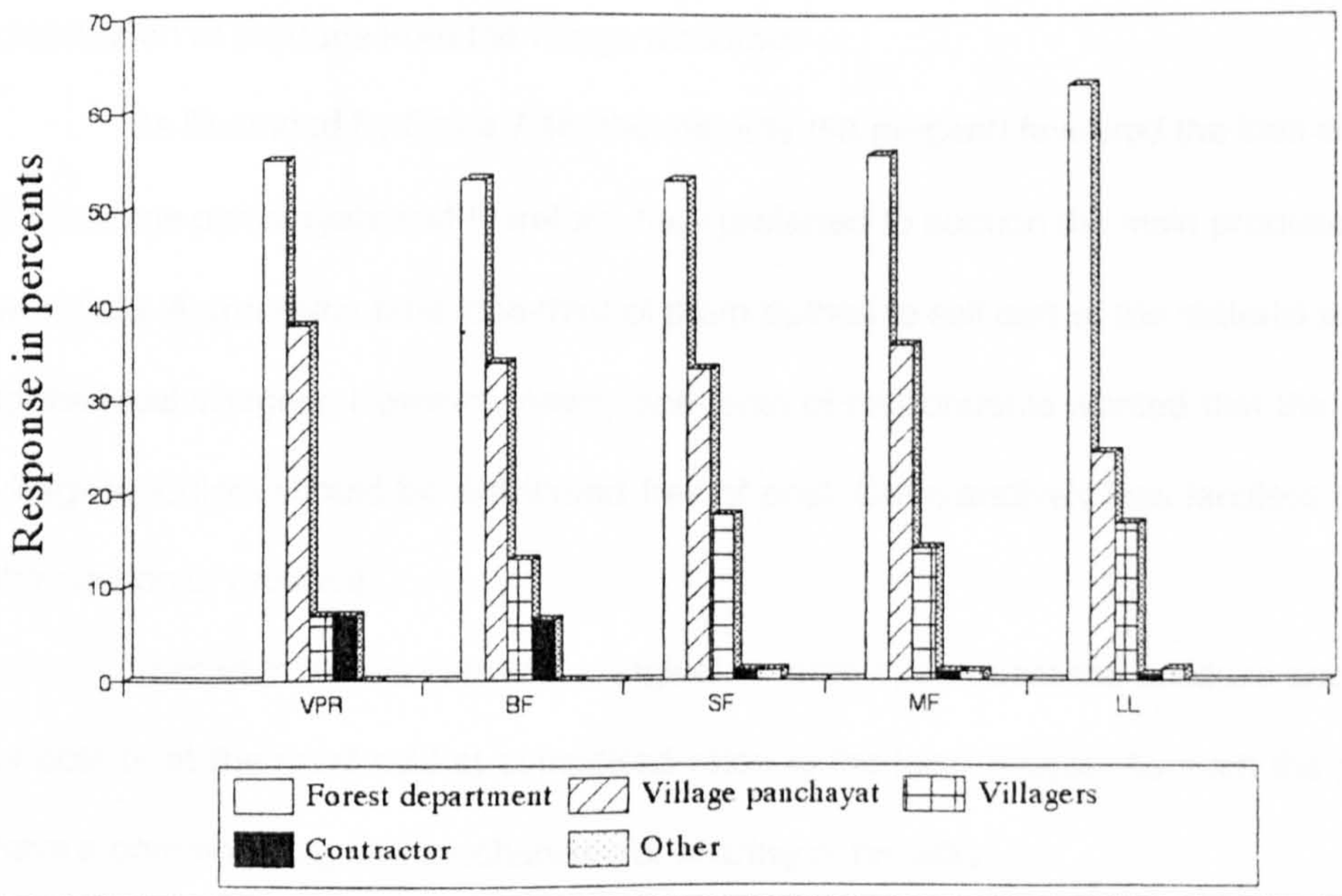
7.4.13.6. Organisation of harvesting of village woodlots

The respondents were pursued by the question number 46 to name the agency which should organise the harvesting activity in their village woodlots. There were five options as forest department, panchayat, villagers, contractor and other.

The computed X^2 value is 21.651 (df=16) which is not significant at 0.05 level, indicating similarity in the choices of different categories of respondents for the harvesting agency.

Figure 7.45 shows the respondent-wise details.

Fig 7.45: Organisation of harvesting in the village woodlot



It is seen that 57 percent villagers favoured the forest department's role in organising the harvest of their village woodlots. But, the feeling to harvest the produce by the village panchayats was seen in some villages as elicited by 31 percent of the respondents. Comparatively fewer numbers (but up to half in Kachchh district) were in favour of entrusting the job to the villagers. Nearly one-sixth of small and marginal farmers and the landless villagers wanted to organise the harvesting activity on their own, while only 7 percent of the panchayat members supported this idea.

7.4.13.7. Distribution of produce from the village woodlots

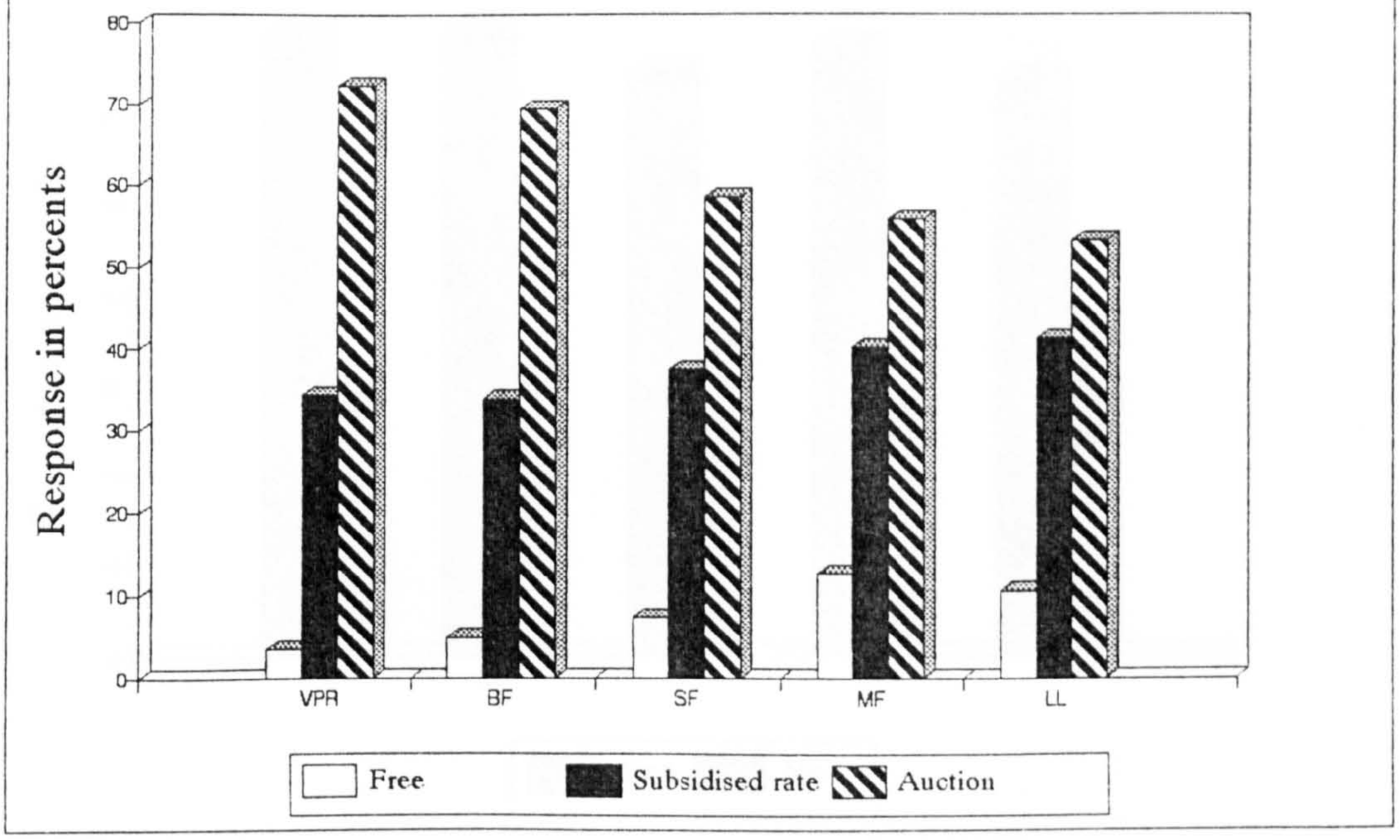
Question number 47 was put to the respondents with an intention of knowing the opinion of villagers in the distribution of produce from the village woodlots. The three options were free, subsidised rate and auction.

At 0.05 level, the expected value of X^2 15.507 is higher than the computed X^2 value of 8.129 (df=8). The null hypothesis is, therefore, accepted. This shows that the choices of respondents do not differ significantly. The different groups of people have similar feelings about distribution of produce from the village woodlots.

As illustrated by figure 7.46, the majority (58 percent) favoured the idea of more income for their village panchayats and therefore, they preferred to auction the main produce from their village woodlots. At the same time, one-third of them opined to sell part of the material at subsidised rates to the local villagers. However, nearly one-tenth of respondents wanted that the produce from the village woodlots should be distributed free of cost. Comparatively less landless people supported the auction of produce.

Instead more landless and marginal farmers opined that the produce should be given free of cost or at the most sold at subsidised rates to the local people. As such the people wanted to have a commonly agreed mechanism for sharing of benefits.

Fig 7.46: Distribution of produce from the village woodlot



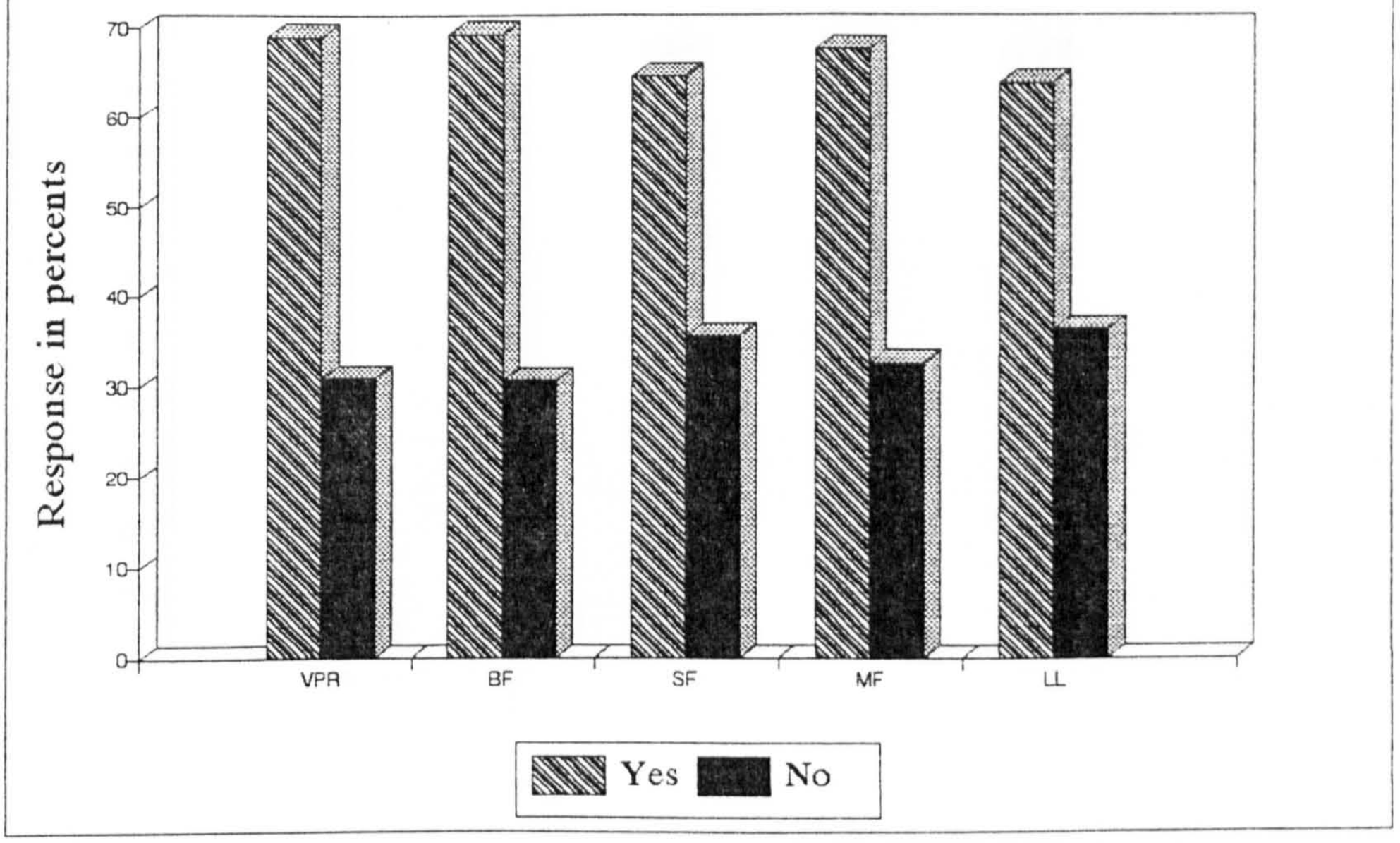
7.4.13.8. Selling of the produce at the market price

Question number 48 sought the opinion of villagers about the sale of produce at the market price. The options were yes and no.

The computed value of X^2 is 0.991 (df=4) which is insignificant at 0.05 level. This means that the choices of different categories of respondents do not differ significantly, suggesting uniformity in people's options for selling of the produce of village woodlots.

The overall responses (figure 7.47) suggest that two-thirds of the people supported the sale of produce at the market rates in order to realise maximum income for their village panchayats. The support was seen little less among the landless people.

Fig 7.47: Selling of the produce from village woodlot at market price

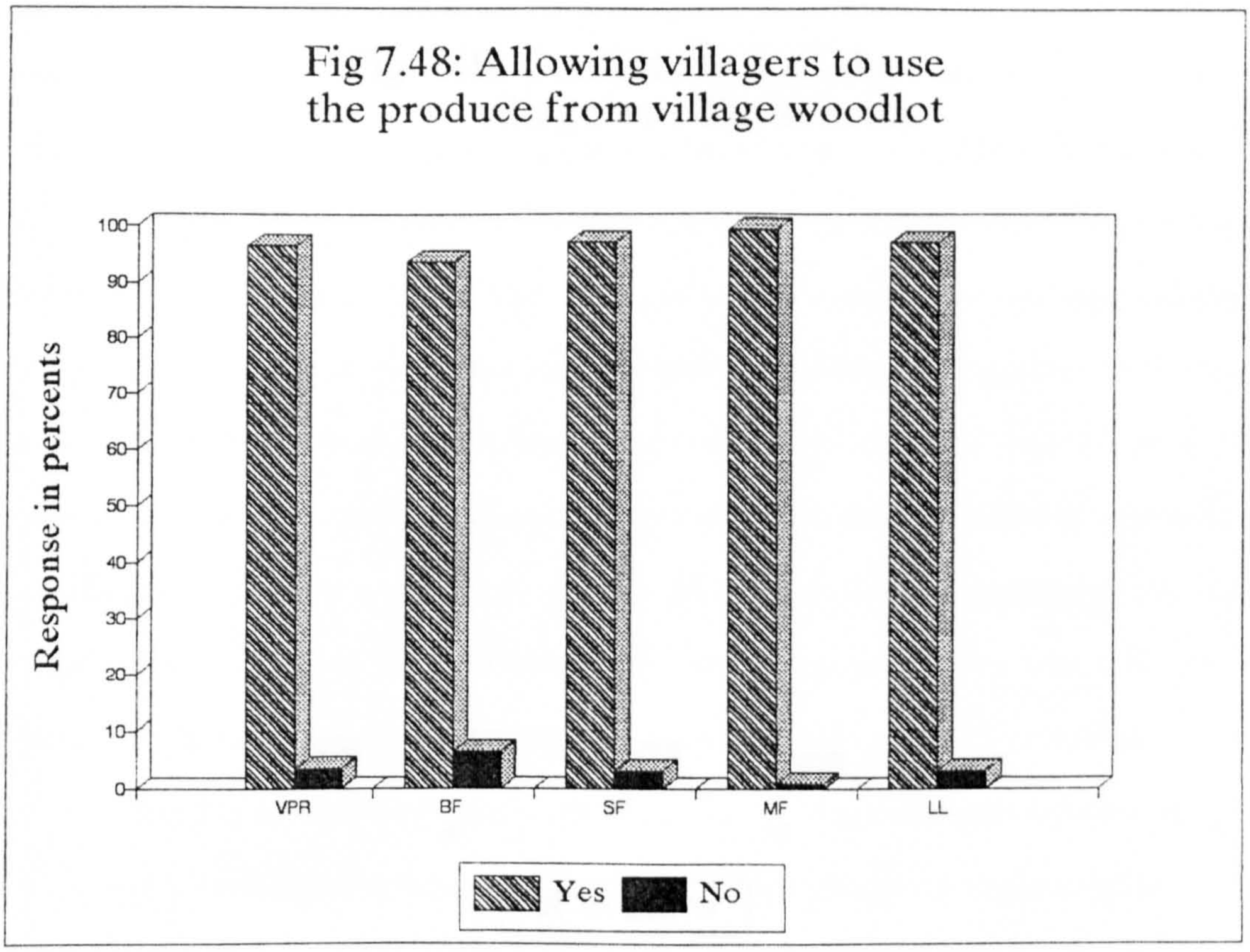


7.4.13.9. Allowing villagers to use the produce

In the question number 49, the respondents were asked whether the villagers should be allowed to use the forest produce from village woodlots. Here again, the options were yes and no.

Here again the uniformity in people's choices is visible because the computed value of X^2 being 4.511 (df=4) is not significant at 0.05 level.

The respondent-wise details given in figure 7.48 suggests that about 97 percent of the respondents wanted that the villagers should be allowed to use the forest produce. The responses were hundred percent in Bharuch, Kachchh and Kheda districts. But one-sixth of the villagers in Junagadh district felt that the villagers should not be allowed to use the produce from the village woodlots.



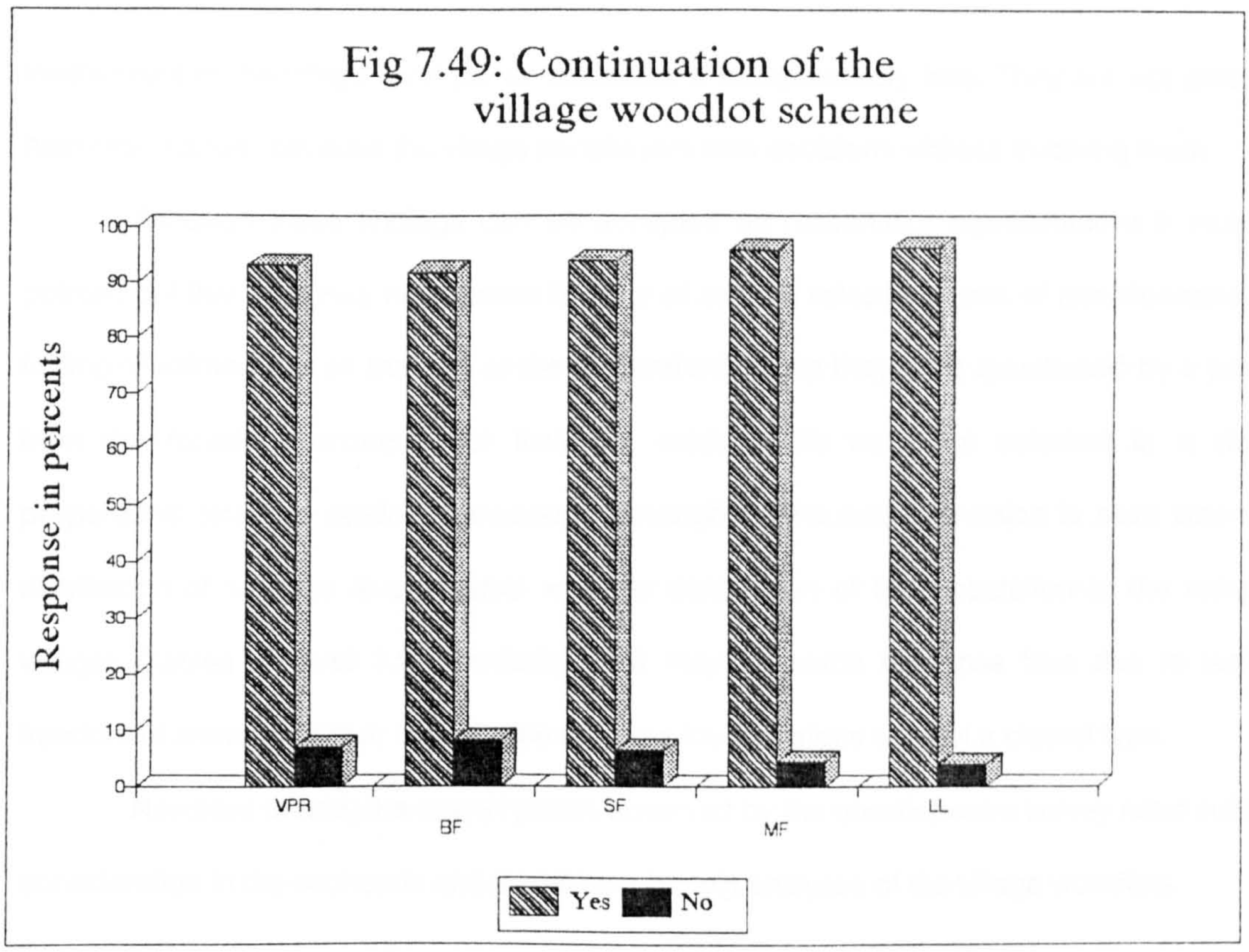
7.4.13.10. Continuation of village woodlot scheme

Lastly, question number 50 was put to the respondents to find out whether they wanted to continue the village woodlot scheme in their villages. Obviously the given options were yes and no.

The computed value of X^2 as 2.381 (df=4) is smaller than the expected value in the chi-squared table at 0.05 level. This means that the choices of different categories of respondents do not differ in a significant way.

As illustrated in figure 7.49, almost all villagers supported the continuation of the village woodlot scheme in their villages except one village in Kheda district where there was shortage of common land. The idea of continuing the scheme received maximum support from the landless people.

Fig 7.49: Continuation of the village woodlot scheme



7.5. Summary

From the above stated results of the questionnaire survey, it is obvious that raising scheme of village woodlots has been a job of forest department without much concern for the views of the local villagers. The uniformity in awareness and opinion of people about different aspects of village woodlots suggests that the scheme is quite popular in the villages of Gujarat. The majority of the villagers do agree with the provisions of the scheme. For example, they agree with the choice of species, support the departmental village woodlots, favour the protection and management works by the forest department and also wish that their village panchayats should realise income from the sale of main produce.

However, the rural poor belonging to groups of small and marginal farmers and landless households do have some opposing views about the scheme. Particularly their involvement in the

involvement in the village-level policy decisions is comparatively less. They are not aware of many such issues because the village panchayats take decisions without involving them.

Although these findings can be accepted as reasonably representative it must be pointed out that bias may have arisen by way of sample selection, form of questionnaire and feeling of intimidation on the part of the respondents since they were questioned by a person from the forest department. For instance, respondents were not selected in a strictly proportional stratified random framework, although only a small diversion is seen when the distribution of samples is compared with the distribution of the population in the sampled villages (Tables 5.1 and 7.2). Similarly there may be some response bias due to lack of freedom of answers of their own choice because the questions were of a closed type.

Needless to add, the overall points observed by the questionnaire survey need suitable consideration in the economic and social cost-benefit analyses of the village woodlots.

Chapter Eight

Financial analysis of village woodlots

This chapter contains a step-wise description of the procedures involved in the financial analysis of village woodlots, and presentation of results. The computations are based on the actual details of costs and benefits for a total of 124 harvested village woodlots in Gujarat state. In order to provide a comparative picture, the results are grouped into district-wise and region-wise categories.

8.1. Financial cost-benefit analysis (FCBA)

In the financial CBA, the market prices are taken as the basis for computations of commercial (or financial) profitability of a project. The costs are represented by outflows of money, mainly paid out for goods and services purchased in the market. Similarly, the benefits are considered in terms of actual financial returns which result from the sale or rental of goods and services. However, due to long-term investments in the woodlots, one year's costs and benefits or even the totals of these do not suffice for the computation of profitability. It is, therefore, necessary that the costs and benefits of village woodlots are appropriately broken-down for each year in order to reflect a true and comparable picture of each item. Basically, the financial analysis (FAO, 1979) involves the following four steps:-

(i) identification of costs and benefits at market prices,

(ii) year-wise distribution of the above (adjusted to account for inflation),

(iii) combining the above information to show the values of total inputs and outputs by years to arrive at a net cash flow (outflow) line, and finally

(iv) the computation of the financial profitability using the net value figures.

8.2. Database for financial CBA

As stated in chapter six, individual details of the costs and benefits for 124 harvested village woodlots (including 113 rainfed woodlots and 11 irrigated woodlots) were obtained from the concerned offices of the forest department. The same secondary data have been taken up for the financial analysis. On scrutiny of this data, it is observed that the figures on the cost side provide only a total of the planting costs and a total of the harvest costs, separately for each woodlot. Both these costs do not include the indirect costs (staff, vehicle, equipment, overheads, etc.).

Similarly, on the benefit side, the incomes show the produce-wise total figures for each woodlot. Also, in the case of main produce, the disposal of produce includes subsidised sale of some timber and fuelwood at 60 percent of the market prices, respectively.

Thus the figures provided by the forest department do not represent a true picture of costs and benefits. It is, therefore, considered necessary to modify these figures in an appropriate manner before doing the computations of CBA. The following paragraphs describe the various steps of the financial analysis of the village woodlots.

8.3. Details of costs for village woodlots

8.3.1. Direct costs

8.3.1.1. Cost of land

The implementation of the village woodlot scheme is solely dependent upon the diversion of village common grazing land for tree planting. Therefore, the land (which is taken up for raising the village woodlot) should be valued at its actual cost or rent or the change of present use of such land. However, the village panchayats who are the owners of these lands do not charge any amount. So there are no direct costs involved for the land.

8.3.1.2. The planting costs

The establishment of a woodlot covers all the operations from advance work to the maintenance and protection till the year of final harvest. The direct costs for planting include expenditures for the land preparation, digging of pits, trenches and fencing, raising of seedlings, transport of seedlings, planting of seedlings, weeding and soil working, casualty replacements, irrigation, application of fertiliser and pesticides, watchman for protection, etc. These operations are carried out for three years in rainfed village woodlots and four years in irrigated village woodlots. After that, the woodlots are required to be transferred to the village panchayats for further management and protection purposes till the harvest year. So, there is no provision for further expenditures till harvest year.

8.3.1.3. Harvest costs

The harvest costs include the actual labour cost for felling and conversion of trees into proper sizes, the cost of transportation of the harvested material to the depot for auction and the cost of tools and implements used for felling. Since the size of village woodlots is around 4 hectares the felling operations are mostly completed in a short period of two to three months.

8.3.2. Indirect costs

The costs of supervision, overhead and other items represent the indirect costs for village woodlots. It is noted that the cost details (obtained from the forest department) represent only the direct costs, i.e. the total planting costs and the total harvest costs.

But it is not possible to find out the indirect costs for each of the woodlots, individually. To estimate the average level of indirect costs for the village woodlots, the item-wise details of

expenditure incurred on the overall social forestry projects in Gujarat (1980 to 1990) were obtained from the office of the forest department (annexure 8.1). Using these figures, the average percentages for direct and indirect costs have been computed in table 8.1 which shows that the indirect costs are nearly 36 percent. The same percentages of direct and indirect costs have been maintained in harvesting activities also.

Table 8.1: Proportion of direct costs and indirect costs in social forestry projects of Gujarat state
(in percents)

Details of items	Percentage
- direct costs	64.06
- indirect costs	35.94

However, it needs to be mentioned here that as per the forest department, the indirect costs are estimated to be about 20 percent only (Verma, 1988; Singh & Ballabh, 1989). In several evaluations, the evaluators have avoided the inclusion of indirect costs and they have computed the profitability of village woodlots without adding the indirect costs (Arnold, Bergman and Djurfeldt, 1987/8; Verma, 1988; Singh & Ballabh, 1989; GFD, 1984; World Bank, 1990a). But this practice does not seem justified. Arnold, Bergman and Djurfeldt (1987/8) have mentioned that indirect costs in Tamil Nadu state of India are up to 40 percent.

It is assumed that the overall percentages of the social forestry projects apply to the village woodlots. It is, therefore, important that the indirect costs of 36% are added to the direct costs (planting and harvesting activities both) to make the cost stream accurate.

8.4. Details of benefits

The village woodlots are meant to provide a variety of goods and services. The accrual of the benefits depends on the area, year of plantations, type of species and management practices undertaken. Usually, the village woodlots provide a number of intermediate products before the

final harvest. These are mainly the forage grass, fruits, leaf fodder, twigs for fuel, etc. which are mostly collected by the villagers free of cost. In fact, the village woodlots are often treated as an open access reserve for these values, particularly by the poorest local people. Sometimes the intermediate products are auctioned by the village panchayats to raise money.

Although a wide variety of forest products are available from the village woodlots, small timber, fuelwood and/or charcoal have remained as the main marketable items. The values of these products generally vary from place to place depending upon the demand of the local population. Furthermore, the combined values of the intermediate products may exceed the values of the main produce in selected local cases.

Thus it is possible to measure the direct benefits in a fairly accurate manner. The details of recorded benefits for individual village woodlots provide the quantities of the intermediate and main produce along with their monetary values. So the monetary values of the intermediate and main products can be considered for the financial analysis of village woodlots.

However, in many cases, the intermediate products were given free. A portion of main products were sold to the local people at 60% of the market price. So, the values of free and 40% subsidy given through concessional sale of main produce can not be considered in the FCBA of village woodlots. But they may be taken up in the sensitivity analysis to see the overall effects if all of the material was sold at market rates.

8.5. Year-wise distribution of costs

The Indian fiscal year covers the twelve month period starting from April, every year. The costs for any programme, therefore, refer to the same period. In the case of the social forestry plantations (including the village woodlots), the annual costs are taken up as the total amount spent from 1st April to 31st March in the respective years of operations, i.e. 1st April 1983 to 31st March 1984, usually written as 1983-84. The same practice has been maintained for allocation of year-wise costs and benefits in the financial analysis here.

8.5.1. Rainfed village woodlots

The establishment of rainfed village woodlots involves a total of four years' period for various operations. The financial provisions are suitably made for the same period. For the purpose of financial analysis, it is obligatory to segregate the total costs of village woodlots into different years of operations. On the basis of the actual data for 28 village woodlots (annexure 8.2), a computation was done to find out the average percentages for year-wise distribution of costs of village woodlots (table 8.2).

Table 8.2: Year-wise distribution of costs and type of works involved in the rainfed village woodlots

Year	Percent	Activities
0 year	27.86	70% of (Nursery, fencing, pits),
1 year	52.82	30% of above & planting, weeding & soil working, watchman, etc.,
2 year	12.52	casualty replacement, weeding & soil work, watchman,
3 year	6.36	casualty replacement, weeding & soil work, watchman,
4 year	0.44	watchman.

Note: Based on actual details of 28 village woodlots

For the purpose of segregating the year-wise costs, these percentages will be used in the financial analysis of rainfed village woodlots.

8.5.2. Irrigated village woodlots

Similarly, the establishment of irrigated village woodlots involves five years' period for various operations. The year-wise distribution of costs has been computed (table 8.3) on the basis of the estimates given in the project document of social forestry (World Bank, 1985).

Table 8.3: Year-wise distribution of costs and type of works involved in the irrigated village woodlots

Year	Percent	Activities
0	12.25	70% of (Nursery, fencing, land preparation, etc.),
1	34.32	30% of the above, transport of seedlings, planting, weeding & soil working, irrigation, application of fertiliser and pesticides, watchman, etc.,
2	19.31	casualty replacement, irrigation, application of fertiliser and pesticides, weeding & soil working, watchman, etc.,
3	17.38	casualty replacement, irrigation, application of fertiliser and pesticides, weeding & soil working, watchman, etc.,
4	16.05	irrigation, weeding & soil working, watchman, etc.,
5	0.69	watchman.

Source: World Bank (1985a).

These averages will be used for the financial analysis of irrigated village woodlots.

8.6. Year-wise distribution of benefits

As mentioned earlier, the data on benefits for the harvested village woodlots contain the total values (quantity and monetary values) of each of the intermediate produce and main produce, respectively. The values of the intermediate products are divided into the values of grass fodder and minor forest produce (mainly the fruits), respectively. Similarly, the values of the main products are segregated into the values of the fuelwood, charcoal (in a few cases) and timber, respectively.

Year-wise distribution of the monetary values of intermediate produce is, therefore, considered necessary. It is assumed that fodder grass is available from year two to year four when

the trees do not have much shade effect. The total values of the fodder grass have been divided by three to get the annual values. On the other hand, the values for fruits are taken from year five onwards till the year before harvest. Considering the rotation (which differs from woodlot to woodlot), the total values of fruits have been divided by the number of years from the fifth year to the year before harvest.

Since the harvest of woodlots pertains to a single year, the values of the main products have been shown in the respective years of the harvest of the individual village woodlots.

8.7. Adjustments for real costs and real benefits

As the tree planting involves several years of operations, the overall figures on costs and benefits for the village woodlots refer to different points in time. Therefore, it is essential to make the costs and benefits comparable at a particular point of time. The converted values, known as the real values, are computed by applying the suitable deflating factors to the market values of year-wise costs and benefits. This process accounts for the inflation over the years. So we need deflating factors for each year.

The deflating factors for each year have been derived from the Wholesale Price Index of India for all commodities with the common base-year shifted to 1990-91 (table 8.4). These deflating factors (year-wise) can be applied for converting the values of costs and benefits to the base-year prices of 1990-91. Thus the overall costs and benefits can be made comparable for the purpose of CBA.

It needs to be mentioned here that the segregation of year-wise values for grass and fruits can be done on the presumption of equal amounts every year. To convert these values into their real values, deflating factors referring to the mid years need to be applied.

Table 8.4. Index numbers of Wholesale Prices (India): all commodities

Fiscal Year	Base year 1981-82@	Base year 1990-91*	Deflating factors
1973-74	49.7	27.2	3.68
1974-75	62.2	34.0	2.94
1975-76	61.5	33.7	2.97
1976-77	62.8	34.4	2.91
1977-78	66.1	36.2	2.76
1978-79	66.1	36.2	2.76
1979-80	77.4	42.3	2.36
1980-81	91.1	49.9	2.00
1981-82	100.0	54.7	1.83
1982-83	104.9	57.4	1.74
1983-84	112.8	61.7	1.62
1984-85	120.1	65.7	1.52
1985-86	125.4	68.6	1.46
1986-87	132.7	72.6	1.38
1987-88	143.6	78.6	1.27
1988-89	154.3	84.5	1.18
1989-90	165.7	90.7	1.10
1990-91	182.7	100.0	1.00
1991-92	201.4	110.3	0.91

Source: @ = (GOI, 1991) * = computed figures

8.8. Choice of profitability criterion

For the purpose of FCBA of village woodlots, we need to choose the criterion of profitability. The three most suitable discounting criteria are IRR, NPV and BCR. For the purpose of FCBA of village woodlots, it is decided to compare and analyse the profitability of village woodlots by appropriate analysis of IRR and NPV. Accordingly the computations have been taken up in this study.

8.9. Choice of discount rate for NPV and BCR

The deflated average of market rate of interest for the respective years should be chosen as the discount rate in FCBA. However, it is very difficult to find out a single figure for the market rate of interest because of several reasons. In general, the evidences suggest that the most

commonly applicable market interest rate can be taken as 10 to 20% under the Indian conditions (Trivedi, 1987). Similalrly the inflation rates during eighties have been found to be between 5% to 12%.

Taking the market interest rate as 15% and the rate of inflation as 5%, a practical choice of discount rate for the financial NPV and BCR seems to be about 10% (as corrected for inflation). However, the effects of variation in discount rates (0% to 20%) will be analysed in the sensitivity analysis.

8.10. Computations of financial NPV, IRR and BCR

A distribution of all 124 village woodlots shows that there are 113 rainfed village woodlots (40 in south, 31 in central, 28 in north and 11 in Saurashtra region of Gujarat) and 11 irrigated village woodlots (regional distribution not considered because of small number).

Region-wise data entries for individual village woodlots have been done in Borland Quattro Pro (v4.0) for clarity and better comparisons. The calculations have been carried out by using this spreadsheet which enables the application of appropriate formulas, wherever necessary. Proper care has been taken to maintain the intactness of data because the same spreadsheet will be used for the computations of ECBA and SCBA with suitable adjustments of market prices.

It is decided to carry out the FCBA of village woodlots by considering the actual proportions of direct and indirect costs. Accordingly, the computations have been done in the following manner:-

(a) direct and indirect costs

- first of all, the planting costs and harvesting costs have been scaled up by 35.94% to account for the indirect costs,

(b) year-wise distribution of costs

- by multiplying the planting costs with year-wise proportions and deflating factors, the planting costs have been broken down into year-wise values for each of the woodlots,

- similarly the harvesting costs have been multiplied by the deflating factors of the respective years,

(c) year-wise distribution of benefits

- considering the yield of grass in the first three years only, the value has been divided by 3 and then multiplied by the deflating factors of the respective years,

- similarly considering the yield of minor forest produce from the third year to the year before harvest, the value has been divided by the number of years of accrual of these benefits and then multiplied by the deflating factors of the respective years,

- the value of main benefits has been considered in the year of harvest and has been multiplied by the deflating factor of that year,

- the values of free produce and 40% remaining amount of the concessional material have not been considered for the FCBA.

(d) cash-flow

- after having computed the year-wise costs and benefits, the year-wise cash-flow has been prepared by subtracting the costs from the benefits of the respective years,

(e) computations of profitability

- using the woodlot-wise cash-flows, the computations of NPV, IRR and BCR have been completed by applying the formulas of the Quattro Pro spreadsheet.

To illustrate the computational details in FCBA of village woodlots, an example of the spreadsheet is shown in appendix 8.1. The spreadsheet performs the analysis of individual village woodlots in their respective rows. It also gives a district-wise analysis and finally considers the totals of year-wise costs and year-wise benefits for the region-wise result.

8.11. Results of the financial CBA

8.11.1. Financial IRR

Table 8.5 presents a grouping of the number of all 124 village woodlots (region-wise for rainfed woodlots) on the basis of the results of financial IRR. It is observed that the values of IRR of as many as 60 woodlots are below zero. Out of the remaining woodlots, only 21 have more than 10% IRR, while only 3 woodlots have more than 14% IRR.

Table 8.5: Summary of financial IRR of the village woodlots
(no. of village woodlots)

FIRR range	Rainfed village woodlots				Irrigated woodlots	Total
	South	Central	North	Saurashtra		
Below 0%	13	18	10	10	9	60
>0%-<2%	1	1	1	3	0	6
>2%-<4%	4	1	2	1	0	8
>4%-<6%	4	3	5	0	1	13
>6%-<8%	7	2	3	0	0	12
>8%-<10%	1	2	1	0	0	4
>10%-<12%	5	0	2	0	1	8
>12%-<14%	4	2	4	0	0	10
>14%-<16%	1	1	0	0	0	2
>16%-<18%	0	0	0	0	0	0
>18%-<20%	0	0	0	0	0	0
>20%	0	1	0	0	0	1
N	40	31	28	14	11	124

Note: The indirect costs as 36% have been considered here.

Among the regions, the performance of south Gujarat is comparatively better. It may be mainly because of better agro-climatic conditions and type of main produce and their prevailing market prices.

8.11.2. Financial NPV

The region-wise results of financial NPV at discount rates of 10% are shown in table 8.6. Only 21 village woodlots out of 124 have got the positive NPV at 10% discount rate. As many as 10 village woodlots in south Gujarat have positive NPV, while all woodlots in Saurashtra region have failed to provide a positive NPV.

Table 8.6: Financial NPV at 10% discount rate

Region	N	no. of woodlots with NPV >0
South Gujarat	40	10
Central Gujarat	31	4
North Gujarat	28	6
Saurashtra	14	0
Irrigated	11	1
Total	124	21

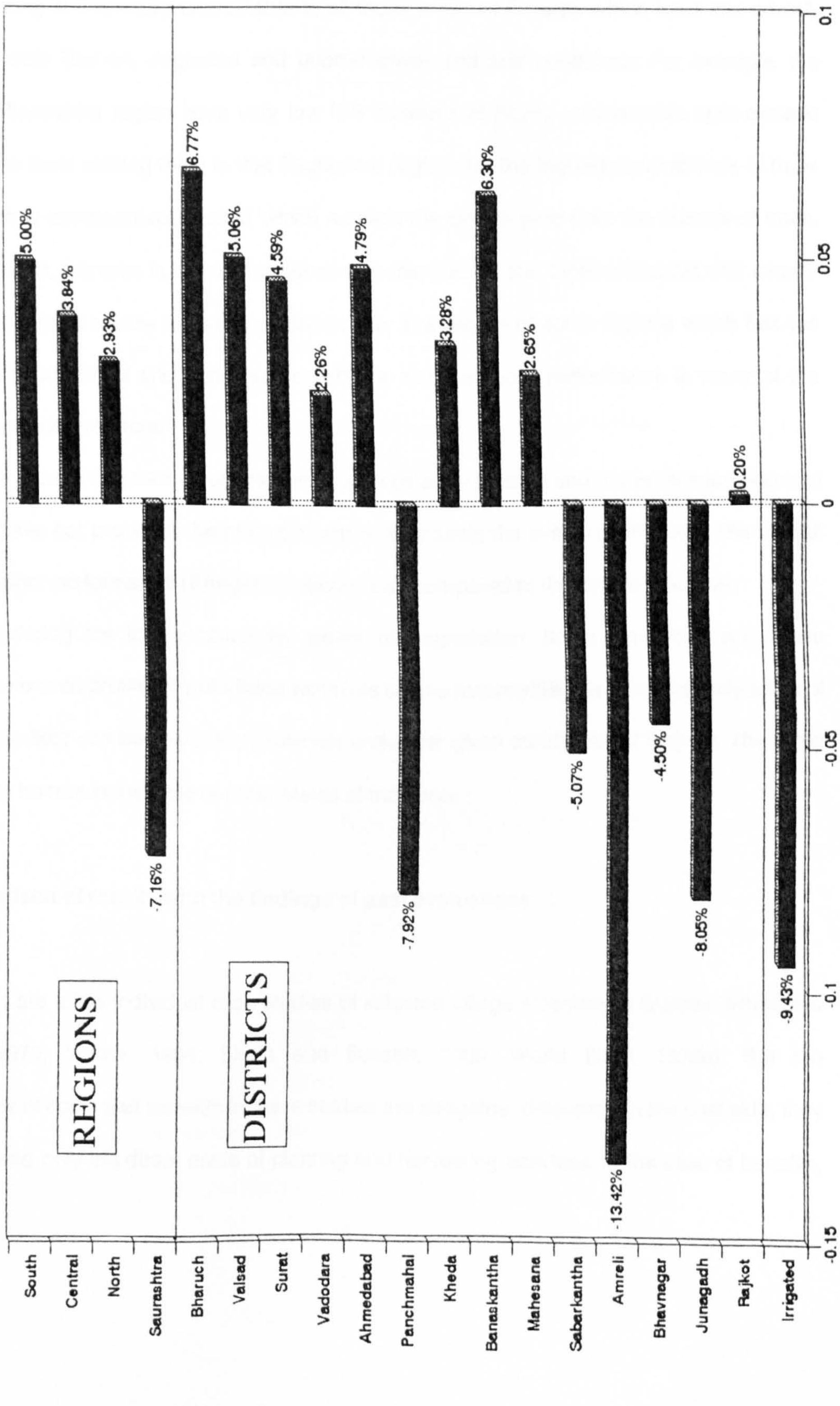
Note: The indirect costs as 36% have been considered here.

The results of financial NPV from the view-points of the forest department, village panchayat and the village people are tabulated in annexure 8.3. The NPV is negative for the forest department in all cases, whereas it is positive in 108 and 114 woodlots for the village panchayats and village people, respectively.

8.11.3. Region-wise and district-wise results of IRR

The overall results of financial IRR for regions and districts are presented in figure 8.1. It is seen that all regions have less than 5% IRR, while the maximum IRR in case of districts is 6.62%. As compared to the other regions of Gujarat, the south Gujarat has higher IRR. Saurashtra region has a negative IRR. The same is the case with irrigated woodlots. Among the districts, 5 districts out of 14 have negative IRR. The IRR is maximum in Bharuch district of south Gujarat.

Fig 8.1: Region-wise and district-wise results of financial IRR



8.11.4. Analysis of results

The findings of the FCBA indicate that the regional variations are quite conspicuous. In fact, tree planting is financially unprofitable in all those areas of Gujarat, which have low rainfall, unproductive soils (barren, degraded and unproductive) and arid conditions. For example, the woodlots of Saurashtra region have very low IRR because of highly unfavourable agro-climatic conditions. The most striking thing is that Saurashtra region has the highest survival rates of trees but the growth is comparatively limited which restricts the overall yield from the harvest of trees. On the other hand, this area is heavily burdened with the grazing and biotic pressures and usually suffers on account of severe drought conditions too. The region of south Gujarat which has the advantage of good rainfall and better soil conditions also has poor performance in many of the villages due to various factors.

In the case of irrigated woodlots, the heavy costs of irrigation and intensive manuring and soil working have not proved to be of much help in increasing the overall profitability. The overall results show poor performance of irrigated woodlots as compared to the rainfed woodlots.

Considering the low productivity, extent of degradation, harsh conditions and biotic pressures, the overall profitability of village woodlots seems reasonable. It is clear that only a few of the village woodlots can be financially profitable under the given constraints of Gujarat. The same can be said to be true in the case of other states of India too.

8.12. Comparison of results with the findings of past evaluations

There are a few individual case studies of selected village woodlots in Gujarat (Srivastava and Pant, 1979; Verma, 1988; Singh and Ballabh, 1989; World Bank, 1990a). But the considerations of costs and benefits in these studies are altogether different. On the cost side, they have considered only the direct costs of planting and harvesting activities. In the case of benefits,

they have included the market value of free and subsidised material also. The findings for village woodlots of Gujarat are summarised in table 8.7.

Table 8.7: Financial IRRs of village woodlots in the past appraisals/evaluations

Reference	Results of financial IRR
Ex-ante appraisals	
GFD (1984)	19.3% (rainfed)
--do--	36.2% (irrigated)
Ex-post evaluations	
Srivastava & Pant (1979)	13 to 18%
Verma (1988)	35%
Singh and Ballabh (1989)	39 to 43%
World Bank (1990a)	15%

From the above results, it is observed that the computed values of IRR are very high for the village woodlots of Gujarat. But they have not considered the indirect costs which are quite substantial in the case of social forestry projects. So these figures seem non-comparable to the overall findings of this study which is based on the actual direct and indirect costs of village woodlots.

However, even with 36% indirect costs, the IRRs of some of the selected village woodlots are quite comparable with these figures (table 8.8).

Table 8.8: Financial IRR of selected village woodlots

Village	District	Region	Financial IRR
Gadhwada	Kheda	Central	23.89%
Dhanori	Valsad	South	17.82%
Khanpur	Ahmedabad	Central	15.34%
Dehgam	-do-	-do-	15.97%
Manad	Bharuch	South	13.81%
Sankhari	Mahesana	North	13.53%
Bachar-II	Vadoadara	South	13.19%
Jadeswar	Bharuch	-do-	12.54%
Padardi	Banaskantha	North	12.17%

Note: The indirect costs as 36% have been considered here.

It is quite encouraging that some of the selected village woodlots have shown comparatively higher financial IRR than those of the past evaluations. In fact, the profitability of village woodlots is directly dependent on the productivity of the land and some other favourable conditions, particularly the rainfall, market facility, type of produce, proportion of auctioned material, etc.

8.13. Sensitivity analysis

A detailed sensitivity analysis has been undertaken to see the effects of discount rates, reduction in indirect costs and inclusion of market values of free and concessional materials.

8.13.1. Effect of changes in the discount rates

The computations of financial NPV have been undertaken at different discount rates to compare the effects on financial NPV of the village woodlots. The region-wise results of financial NPV at various discount rates (between 0% and 20%) are shown in table 8.9.

Table 8.9: Summary of financial NPV of the village woodlots at various discount rates
(no. of village woodlots with NPV > 0)

Discount rate	Rainfed village woodlots				Irrigated woodlots	Total
	South	Central	North	Saurashtra		
0%	27	13	18	4	2	64
4%	22	11	15	0	2	50
8%	11	6	7	0	1	25
10%	10	4	6	0	1	21
12%	5	4	4	0	0	13
15%	1	2	0	0	0	3
18%	0	1	0	0	0	1
20%	0	1	0	0	0	1
N	40	31	28	14	11	124

Note: The indirect costs as 36% have been considered here.

From the results, it is seen that at 4% discount rate as many as 50 woodlots have positive NPVs. At 15% discount rate, only 3 village woodlots have positive NPV, while at 20% discount rate, the NPV is positive in only one village woodlot of central Gujarat.

8.13.2. Effects of reduction in indirect costs

In the social forestry project appraisals and also in the estimates of the forest department, the indirect costs are approximately taken as 20% only. It seems, therefore, appropriate to use this figure to see the effects on the overall profitability of village woodlots.

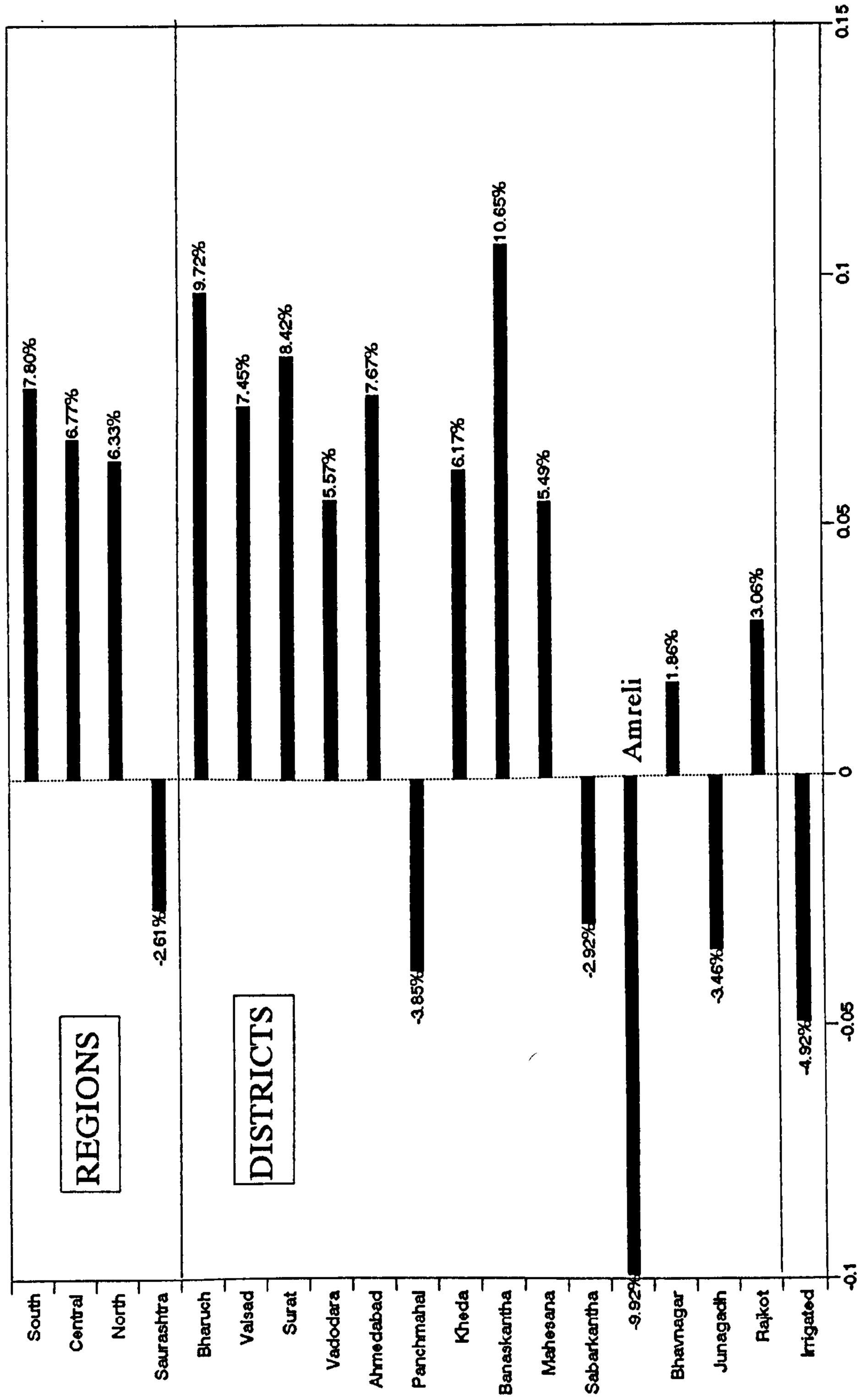
The region-wise and district-wise results are presented in figure 8.2. The results indicate some improvement over the previous figures. The village woodlots of Saurashtra region have negative IRR. The same is the case with irrigated woodlots. Among the district, still four districts have negative IRR, while the maximum IRR is 10.65% for Banaskantha district of north Gujarat, followed by Bharuch, Ahmedabad and Valsad districts.

Considering the indirect costs as 20%, the computation of NPV at 10% and 15% discount rates shows that in all, 32 and 14 woodlots have positive values (table 8.10), respectively. So there are some improvements in the overall financial profitability of village woodlots. The improvements are noticeable especially in the case of north Gujarat.

Table 8.10: Financial NPV at 20% indirect costs
(no. of woodlots with NPV >0)

Region/district	N	Financial NPV at discount rates of 10%	15%
South Gujarat	40	14	4
Central Gujarat	31	7	4
North Gujarat	28	10	5
Saurashtra	14	0	0
Irrigated	11	1	1
Total	124	32	14

Fig 8.3.2: Region-wise and district-wise results of financial IRR



In yet another sensitivity analysis, if we take the indirect costs as 0% (as is the practice usually followed by many evaluators), the results can further be improved (table 8.11).

Table 8.11: Financial NPV at 0% indirect costs
(no. of woodlots with NPV >0)

Region/district	N	Financial NPV at discount rates of 10%	15%
South Gujarat	40	22	9
Central Gujarat	31	11	5
North Gujarat	28	16	8
Saurashtra	14	1	0
Irrigated	11	2	1
Total	124	52	23

8.13.3. Effects of including the full market value of free and concessional material

The benefit details of village woodlots show that the bulk of intermediate products were given free to the local people. Their market value is quite substantial in selected cases. Similarly, a portion of main products, namely fuelwood and timber, were sold to the villagers at a concessional rate (at 60 percent of the market rate). It implies that monetary values do not represent a true picture of the total benefits from the woodlots.

For the purpose of sensitivity analysis here, the market value of free material and scaling of concessional material by 40% have, therefore, been considered to see the effects on profitability of village woodlots. The computed results are summarised in table 8.12.

It is seen that the overall profitability of village woodlots has increased to a great extent in the village woodlots of south and north Gujarat, where the proportions of intermediate products as well as concessional material have been considerable. So the suitable species which can provide higher amounts of intermediate produce need to be planted in the village wooldots.

Table 8.12: Financial NPV with full market values of intermediate and concessional materials
(no. of woodlots with NPV >0)

Region/district		20% indirect cost		36% indirect cost	
		Discount rate as		Discount rate as	
	N	10%	15%	10%	15%
South Gujarat	40	21	12	14	3
Central Gujarat	31	9	6	6	4
North Gujarat	28	13	8	9	3
Saurashtra	14	1	0	0	0
Irrigated	11	3	2	2	0
Total	124	47	28	31	10

8.14. Summary

The financial CBA of village woodlots in Gujarat provides many important indications. The common grazing lands which are generally barren and devoid of any green material do not sustain any useful material. But the diversion of a small portion of these lands for tree planting can bring some positive improvements in the overall profitability for the village community. From the financial analysis of 124 harvested village woodlots, it is obvious that over 80% of village common lands are incapable of producing marketable material in sufficient quantities to make the FCBA attractive.

However, some of the village woodlots have proved to be able to generate substantial income. Because the village panchayats are interested in enhancing their incomes, the scheme of village woodlot can be seen as a means to provide additional income for them. But the overall profitability is likely to vary from region to region because of many site-specific conditions.

Chapter Nine

Economic analysis of village woodlots

The procedural details involved in the economic analysis of village woodlots and the results are described in this chapter. Before dealing with the computations, the economic aspects of village woodlots have been enumerated with an idea to appraise the overall impact of the scheme.

9.1. Economic aspects of village woodlots

The establishment of village woodlots is a means of creating an important asset for the rural people. The scheme deals directly with fuelwood scarcity at the village level and defers further degradation of village common lands while it is perhaps an ideal way to generate employment in rural areas, especially for the poor families. Increase in forest produce provides benefits to the whole society in the state, but enhanced employment opportunities as well as the free fodder, fruit, other minor forest produce and some fuelwood has favoured the rural poor in a direct manner. There has been some notable economic impact due to tree planting in village common lands. Particularly during the years of severe droughts, the village woodlots have served as a buffer zone for drought relief.

The people have been benefited in an indirect manner by some improvements in wood balances, as well as from environmental improvements. The environmental outputs are more wide-spread and include the preservation of the productive capacity of common grazing lands. In the long run, the major environmental impacts of the scheme will be the improvements in soil and water conservation, reduced land degradation, and betterment in the soil productivity. The scheme has been seen as an important tool in land reclamation and rehabilitation works. In arid and semi-arid areas of Gujarat, the woodlots have helped in arresting the wind erosion and desertification.

The stabilisation of soil and accumulation of leaf litter is replenishing the degraded soils. The protection of soil from grazing and trampling has improved water percolation of the soil. Tree planting on the degraded common land is directly related to the conservation of nearby forests. In addition, the agricultural productivity is known to improve as a result of the shelter-belt effect and diversion of animal dung and agricultural wastes to the fields.

The overall landscape of the state has improved considerably due to a massive tree planting programme. The demonstration effects in all areas of economic activity have been quite significant. The establishment of woodlots throughout the state has created a tremendous amount of awareness in the community, particularly among the farmers who have taken up tree planting on a massive scale. The scheme is also helpful in mending the socio-ecological environment including aesthetic, shade, improved health, time savings by the rural people, particularly women, resulting from vastly improved access to nearby woodlots for their fuel and fodder collection needs.

By and large, the selection of species has been carefully done to accommodate to the local agro-climate as well as the preferences of the community. Many of these species have the ability to fix atmospheric nitrogen. By and large the choice of species matches the preferences of the people in different parts of the state.

There are some negative aspects of woodlots too. For instance, the shade effects on agricultural crops in the neighbouring fields and menace of pests, birds and wildlife (especially monkeys, deer and antelopes) are sometimes brought to the notice of the forest department. But these negative effects are very localised ones on a limited scale. There is also a fear among people about the negative roles of eucalyptus trees, especially over-drawing of water, suppression of undergrowth, likely diversion of produce for industrial use, etc. For instance, a study by Kohli, Singh and Verma (1990) indicates that Eucalyptus belts around small farms have a negative impact on the overall economic yield.

It has been, however, possible to quantify and give a monetary value to only a few of the direct benefits from the village woodlots. All of the indirect benefits and some of the direct benefits

are difficult to measure in monetary terms. But the overwhelming positive responses of people (in the questionnaire survey) demonstrate that throughout the state the perception of these benefits has been quite significant indeed.

At this stage, it is not possible to quantify many of the benefits being realised free of cost by the local villagers. The economic analysis of village woodlots has, therefore, been attempted on the basis of the monetary values of the recorded forest products only.

9.2. The economic analysis: a brief introduction

The aim of economic analysis is to examine the project in terms of its contribution to the general objectives of economic growth for the society as a whole. Considering the efficient allocation of capital, the socio-economic loss and gains of policy alternatives are quantified in one unit of measurement.

In the economic analysis, the distortions in the market values of costs and benefits are appropriately adjusted on several points to reflect the withdrawal and addition of products, land, labour, capital, etc. to the society as a whole. The adjusted prices are known as accounting prices (or shadow prices or efficiency prices). The economic costs represent the opportunity costs (value of opportunities forgone by the society) because the resources are being used in the project rather than in their best alternative use. Similarly, the economic benefits represent the increase in goods and services for the use of society as a whole.

This analysis is concerned with real resource flows. In addition to the direct inputs and outputs, indirect effects (on others in society) which are not directly traded in a market are also considered. In many cases, it is quite difficult to quantify and/or value indirect effects. As far as possible, any effect of a project should be identified and measured on the basis of the difference in a given situation "with and without" the project. For example, if the scheme of village woodlot was not introduced, the situation without the project would eventually lead to further deterioration of common grazing lands and also valuable forests. The estimate of benefits in this case should

include the difference between no production and the level achieved with the project. It is important to measure carefully the actual opportunity forgone, taking into account the various constraints or policies that exist.

The economic analysis requires three important modifications to the approach followed in the financial analysis:-

- putting a value on the use of resources for the project and their outputs which, though not priced in any market, nevertheless have real productive value, e.g. the land, non-market benefits, free and subsidised produce, etc.;
- adjusting the prices of inputs and outputs, wherever necessary to reflect their true values to the economy; and
- eliminating all transfer payments which do not represent the use of real resources, I.e. payments made for which no goods or services are received in return (FAO, 1979).

Once the above-mentioned points as well as the shadow prices have been decided, the financial inputs and outputs are appropriately converted to arrive at total economic costs and benefits. Thereafter, using this information, the economic efficiency or economic worth is calculated. It is useful to test the results for uncertainty by varying values of key relationships/parameters in a sensitivity analysis. A given project is considered efficient in economic terms if:

- Its benefits costs,
- benefits are at least equal to costs for each separable component of the project,
- there is no lower cost means actually available (given existing constraints) to achieve the same project effects (or benefits) (FAO, 1979)

The prime concern of economic analysis is, therefore, to find out the losses and gains to the society from any project. A project is acceptable if those who gain from a project can compensate those who lose. But actual compensation is not necessary according to this criterion. Moreover, it does not tell anything about the distribution of benefits and costs among the different groups of society. In other words, it assumes that the existing distribution of income is correct from society's point of view, i.e. the marginal utility of income is equal for all income levels.

9.3. Shadow pricing in general

The market prices can be taken as true economic worth of resources only under the existence of a perfectly competitive market. But due to imperfections, market prices in the developing countries do not reflect the true economic worth of inputs and outputs in terms of gains to the national economy. The main reasons are the existing deficiencies in market prices due to inherent imperfections of the market mechanism, irrational government interventions by way of foreign trade controls, industrial licensing, various forms of price controls, etc. The market prices are, therefore, not appropriate for economic and social appraisal of projects in developing countries. Hence the technique of shadow pricing was invented to overcome the deficiencies of the market prices. According to Squire and van der Tak (1975), shadow prices represent "the value of the contribution to the country's basic socio-economic objectives made by any marginal change in the availability of a good or a factor of production".

In the shadow pricing, the concept of opportunity cost becomes relevant because from the society's point of view the cost of inputs is their opportunity cost i.e. the output these inputs would have generated for the society in the absence of the project. So the market values of inputs and outputs are translated in terms of their opportunity costs. Thus the shadow (economic or social) prices are the imputed prices which reflect the real costs of inputs and value of outputs to the society. At the same time, they are taken as internationally competitive prices.

The shadow prices are derived in a very systematic and logical manner. They depend on the fundamental objectives as well as the economic environment of the society. In nutshell, the main idea is to find the costs and benefits in terms of their value to the society as a whole. The shadow prices may be larger or smaller than the financial ones.

The application of shadow prices for inputs and outputs is a crucial step in translating the financial analysis into economic or social one. This method is widely used by many multi-lateral development institutions (FAO and the World Bank) and by several bi-lateral funding agencies (USAID, ODA, etc.). In many countries including India, shadow prices for many items have been worked out by institutions like the Planning Commission (Lal, 1980; ICAI, 1983).

9.4. Selection of numeraire

As mentioned in chapter four, the numeraire in UNIDO method is domestic currency available for consumption to an average individual whereas in the Little and Mirrlees method, the convertible foreign exchange available to the government for investment is taken as numeraire. Whatever is the choice, it is important that the selection of numeraire is done with due regard to the nature of the costs and benefits of the project and the outlook of the different entities involved.

The social forestry projects in India mostly use non-traded goods and surplus unemployed labour for producing the forest products which are exclusively meant for local consumption, i.e. non-traded outputs. If one chooses the convertible foreign exchange as the numeraire, trivial calculations will be required while doing the analysis. On the other hand, to express all values at domestic prices will be comparatively easier and practical. For the purpose of the economic analysis of village woodlots, the domestic currency "Indian rupee" has, therefore, been selected as the numeraire.

9.5. Computations for economic analysis of village woodlots

9.5.1. Break-down of costs

To facilitate the required adjustments during the shadow pricing in ECBA, there is a need to find out the item-wise costs for planting and harvesting activities. But it is difficult to trace the actual proportions of each item, separately for individual village woodlots. For this purpose, the item-wise cost norms for rainfed and irrigated village woodlots obtained from the forest department can be used.

Accordingly the item-wise rates for 1987-88, 1988-89 and 1989-90 were obtained from the forest department (annexure 9.1). Using these rates, the planting and harvesting costs were broken down into scarce labour, surplus labour and material costs. In the case of irrigated village woodlots, the water charges have been segregated from the material costs.

Similarly, we need to break down the indirect costs by keeping the proportion of indirect costs intact. The overall percentages of social forestry in Gujarat from 1980-81 to 1989-90 have been applied to divide the indirect cost into staff, vehicle & equipment and overhead costs (see annexure 8.1).

The average percentages for each item involved in raising of the rainfed village woodlots and irrigated village woodlots, respectively are given in the table 9.1. It is observed that material costs are higher in irrigated village woodlots in comparison to the rainfed village woodlots. This is largely because of high inputs in terms of extra irrigation, fertiliser application, soil working and weeding activities. On the other hand, the proportion of scarce labour is much less because most of the works (watering, weeding and soil working, etc.) are carried out in the lean season when the labour is not scarce.

Like other states of India, in Gujarat too, the harvesting of trees is carried out manually by employing the local labourers, particularly in the slack season. So the total labour in the harvesting activities is drawn from the surplus labour.

Table 9.1: Break-down of costs by different items

(in percents)

Details of items	Rainfed	Irrigated
Plantation costs		
- direct costs		
- scarce labour	28.24	7.39
- surplus labour	26.83	31.43
- material	8.99	13.10
- water charges	0.00	12.14
- indirect costs		
- staff	29.32	29.32
- vehicle & equipments	2.88	2.88
- overhead costs	3.74	3.74
Harvesting costs		
- direct costs		
- scarce labour	00.00	00.00
- surplus labour	51.25	51.25
- material	12.81	12.81
- indirect costs		
- staff	29.32	29.32
- vehicle & equipments	2.88	2.88
- overhead costs	3.74	3.74

Note: The direct costs are based on the item-wise rates of 1987-88 to 1989-90 and the indirect costs are based on the details of expenditures on social forestry during 1980-81 to 1989-90.

9.5.2. Computation of economic prices

The establishment of village woodlots utilises land, labour and capital in different amounts for producing a number of forest products and services for the society. This entails a cost for the society which is reflected in the loss of output the society suffers when the factors are withdrawn from other sectors towards the project. Elimination of transfer payments represented by taxes which is nominal in ECBA, has been ignored here, as the taxes are very small. The economic prices of land, labour, water (in irrigated woodlots) and outputs have been discussed in the following paragraphs.

9.5.2.1. Shadow pricing of land

The cost of the land varies with the level of productivity, location and existing use. According to Price (1989), it is not necessary to use shadow price for land in forestry projects. It is further stressed that CBA should simply assess the net social benefit of alternative land use. The preferred use may be taken as the one which produces the highest net benefit.

The use of land for raising of village woodlots involves diversion of a portion of common grazing land. It may be valued at land cost or rent. However, the cost depends on its productivity in its existing use. The less productive it is, the lower its cost. In the economic analysis the shadow price of land may be taken as the same as the opportunity cost of land, i.e. value forgone to the community who use it. But the main problem is to find a correct equivalent value for this.

According to the study carried out by Jodha (1990), the rural poor obtain the bulk of their fuel supplies (up to 66%) and fodder (82%) from common lands in Gujarat. The collection of plant produce from these lands is an important source of employment (196 man-days) and income (Rs 774 per year per household), especially during the periods when other opportunities are almost non-existent. According to him, this income contributed as much as 18% of the total household's income. He further adds that owing to their degradation and reduced productivity, the common grazing lands at present do not offer high returns to their users. This has also been ascertained through the questionnaire survey as most people said that these lands were lying barren and degraded. In most of the villages, there were no incomes from such lands. Due to this reason, it can be assumed that such lands would have provided very limited alternative economic use for the period of the woodlots.

In view of the foregoing facts, the opportunity cost of land may not be zero. However, due to the shortage of time and resources, an exact estimation of the opportunity costs of these lands in the sampled villages was not possible. But the village common lands are very poor, highly over-grazed and marginal lands with virtually no displacement of produce. Accordingly, the question about putting a price to the land used for village woodlots has been evaded.

9.5.2.2. Shadow wage rate (SWR) of labour

9.5.2.2.1. A few important points

Shadow wage rate (SWR) of labour measures the opportunity cost of unskilled labour, i.e. the marginal output or the net economic value of labour forgone elsewhere because of its use in the activities of the project. In the developing countries, the actual wages paid to the labour do not represent the actual cost because of heavy unemployment and underemployment. There is no opportunity cost for using the unemployed labour. As a result, the SWR of the labour is often lower than the actual market wage. In case of severe unemployment, the SWR is taken as zero.

In Gujarat state, only 18% of the total labour has regular employment (GOG, 1989). The self-employed and casual labour have to face intermittent spells of unemployment during the year and sometimes, even during the peak season, they remain unemployed.

Here, the economic CBA is concerned with the loss of goods and services caused by diverting the labour for planting and harvesting operations of village woodlots. The overall loss depends on the skills required, the location of the project and the time when labour is needed. The skilled workers (staff) are normally in short supply and their actual wages reflect the opportunity costs. On the other hand, the unskilled labour is dependent on the seasonal employment opportunities. Hence, there is a need to apply appropriate shadow wage rate of unskilled labour.

In order to assess the implications of diverting the labour from agricultural peak seasons (when opportunity cost may rise), it is essential to find out the periodic requirements of labour for the village woodlots. For instance, the labour used during the rainy season is taken as the scarce one, while the labour used in slack season is taken as surplus labour. The proportions of scarce and surplus labour can be found simply by looking at the figures of periodical employments in the village woodlots.

By and large, much of the works (fencing, trenching, digging of pits, nursery raising, etc.) in the village woodlots are undertaken in the slack season when the labour is not scarce. The scheme of village woodlot, therefore, makes use of the surplus labour force, who otherwise contribute nothing to the economy. However, the planting operation is carried out in the rainy season when the labour becomes scarce. It is mainly because of the short season which coincides with the agricultural peak season when the employment opportunities are anyway available (ILO/ARTEP, 1988). Therefore, the opportunity cost of the labour used during the rainy season is not zero. The agricultural wages (as fixed by the government) can be taken as a measure of the opportunity cost of scarce labour (Hanson, 1986). But it is better to use the productivity and time criteria of unemployment for estimating the SWR of labour (Sharma and McGregor, 1991).

However, the study carried out by the NCAER (1988) concludes that forestry activities do not overlap with the crop cultivation activities, instead they are complementary to each other and forestry performs the role of providing fuller employment to the rural work force. The study did not find any clear evidence of large diversion of labour from other economic activities to the social forestry because peak social forestry activities were found to be taken up in the slack season of crop cultivation. Under such circumstances, the SWR may be taken as zero.

In Gujarat state, the Labour Commissioner regulates the wages of labour. The employment in afforestation programme is equated with the industrial labour and not the agricultural labour under the Minimum Wages Act (USAID, 1988). The wage rates are revised by the government from time to time. During the planting season, the labour rate tallies the minimum wage rate fixed by the government due to scarcity of labour. However, during other times of the year (agricultural off season), wages may be lower by about two-thirds (Kant and Mehta, 1993). The World Bank had applied the off-season rates as 55% and 62% of the peak season wage rates for the economic appraisals of social forestry projects in Gujarat.

One can find widely varying estimates of SWR for labour in different states of India arrived at by various authors, using the above-mentioned principles. For instance, Lal (1980) has estimated SWR for various states of India. Trivedi (1987) took only 44% as SWR in Bihar state on

the basis of scarce and surplus labour and Kumar (1988) estimated SWR as 47% for Karnataka state, while Sharma and McGregor (1991) reached to an estimate of 33% for Orissa state. On the other hand, the World Bank has applied 70% as SWR for appraisal of the national social forestry project of Gujarat.

9.5.2.2.2. Computation of SWR of labour

9.5.2.2.2.1. SWR on the basis of scarce and surplus labour

The first step is to classify the work-force in an appropriate manner, as discussed above, i.e. staff, scarce labour and surplus labour. The computed values (table 9.1) show that the proportion of staff (skilled labour) is 29.32% in planting and harvesting operations. On the other hand, the proportions of labour in planting activities of rainfed and irrigated woodlots are 55.07% and 38.82%, respectively, while the proportion of labour in harvesting work is 51.25% in both type of woodlots. Now the component of labour needs to be further broken down into scarce and surplus labour. Using the item-wise cost norms of 1987-88 to 1989-90, it is seen that use of labour in peak season is 51% and 19% of the total labour for rainfed and irrigated village woodlots, respectively. These percentages have been applied for computations of the scarce and surplus labour (already given in table 9.1). So, this is taken as the first set of SWR for economic analysis of village woodlots in this study, denoted as SWR "A".

9.5.2.2.2.2. SWR on the basis of peak and off-season wages

The World Bank has used this criterion for deriving SWR of labour in appraising the national social forestry project. In this method, the year-wise wage rates and quantum of employment in peak season and off season, respectively are required to compute the SWR. On the basis of the details of planting costs in rainfed and irrigated woodlots and the overall employment

generation through social forestry in Gujarat (1980-81 and 1989-90), the estimates of employment in peak season are given in table 9.2.

Table 9.2: Estimates of employment in peak season

Activity	Basis of estimates	peak season %
All	Employment data (1980-81 to 1989-90)	22.78
Planting	item-wise rates for 1987-88 to 1989-90	
- rainfed		51.28
- irrigated		19.03
Harvesting	taken up in off season	0.00
All	World bank (1979)	30.00
-do-	--do-- (1985)	25.00

Note: The peak season is taken as the period between July and September, i.e. the monsoon season.

Now the following assumptions are necessary for a proper allocation of the prevailing wages of labour to different activities of the woodlots,

- the planting and maintenance activities in the rainfed village woodlots were completed between 1973 and 1983,
- the planting and maintenance activities in the irrigated village woodlots were completed between 1980 and 1986, and
- the harvesting activities in both cases were taken up between 1983 and 1991.

The year-wise figures of daily wage rate in Gujarat were obtained from the forest department. Using the estimates of peak season employment (as mentioned in table 9.2) and the averages of daily wage rates for different years (annexure 9.2), the shadow wage rates of labour have been computed in table 9.3. This is taken as SWR "B".

The procedural details of computation for SWR of labour for planting works in rainfed village woodlots are shown in the following example:

- it is assumed that in rainfed woodlots, the planting and maintenance works were completed between 1973 and 1983,

- it is also estimated that 51.28% of the labour was employed in the peak season,

- the averages for peak season and off season wage rate for 1973 to 1983 are Rs 5.92 and Rs 3.49, respectively,

- so the SWR will be

= (5.92 * 0.5128 + 3.49 * 0.4872) / 5.92

= (3.04 + 1.70) / 5.92

= 4.74 / 5.92

= 0.80

So, the SWR = 80% (SWR "B").

Table 9.3: Estimates of shadow wage rate of labour

Activity	Average wage*	Peak season	Off-season	Weighted average	SWR %
All	11.21	11.21	6.85	7.84	70
Planting					
- rainfed	5.92	5.92	3.49	4.74	80
- irrigated	11.51	11.51	7.14	7.97	69
Harvesting	17.73	17.73	10.99	10.99	62

Note: * = average wage rates refer to the averages of the wages in the respective years as assumed for planting and harvesting activities.

Using this method, the World Bank had estimated 68% and 70% for appraising the first phase (1980-85) and second phase (1985-90) of the social forestry projects of Gujarat, respectively (World Bank, 1979; 1985a). The SWR is comparatively less in the case of harvesting activities because the total work of harvesting is undertaken during the off-season only, while it is high in the

planting works of rainfed village woodlots because the works are carried out in the monsoon period only.

9.5.2.2.2.3. SWR on the basis of marginal productivity of labour in Gujarat

A third SWR of labour can be derived by estimating the marginal productivity (opportunity cost) of labour, based on the productivity and time criteria of unemployment. The marginal product forgone is the proportion in which the labour is drawn from different sectors of the rural population.

At the all-India level, the NSSO's report has classified the rural work force by activity status into main workers (who were employed for more than 3.5 days in the reference week) and subsidiary (marginal) workers (who were either employed for 3.5 days or less than 3.5 days or did not get any job at all in the reference week). The estimates of rural work force by activity status for India are given in table 9.4. This shows that marginal labour remained unemployed for 3.20 days, while main labour was unemployed for 0.125 days only.

Table 9.4: Distribution of rural work force by activity status, all India (1977-78)

(average no. per week)

Status	Employed	Unemployed
Marginal	1.94	3.201
Main	6.56	0.125
All	5.98	0.511

Source: Kumar (1988) based on NSSO (1981).

Now the occupational status of labour in Gujarat state (1981 census), shows that the working population comprises 32.2% main workers and 5.1% marginal workers (GOG, 1989). It is assumed that the labourers for working in the village woodlots were drawn in proportion to the total labour days of unemployment in each category.

Therefore, marginal worker days / main worker days

= (5.1 * 3.20) / (32.2 * 0.125)

= 16.32 / 4.025

= 4.05

Thus if the total labour days needed in village woodlots were 5.05, then 4.05 labour days went to the marginal workers and the remaining 1 labour day went to the main workers. In that case, the proportion of labour days can be computed as under,

main worker = 1.00 / 5.05 = 19.8%

marginal worker = 4.03 / 5.05 = 80.1%

The estimates show that on an average, the main worker was employed for 6.56 days, while the marginal worker was employed for 1.94 days. If the daily wage rate for rural labour is taken as w, the marginal products for workers in Gujarat will be as under,

main worker = 6.56 / 7.00 = 0.937w

marginal worker = 1.94 / 7.00 = 0.277w

This implies that the alternative product forgone upon employing a marginal worker is only 0.296 times that forgone in the case of a main worker.

Further, by employing one labourer for the village woodlots in Gujarat, the weighted value of marginal product forgone by society (per worker day) would be,

= (1.0 * 0.937w + 4.05 * 0.277w) / 5.05

= (0.937w + 1.12w) / 5.05

= 2.057 / 5.05

= 0.41w

So the SWR of labour for Gujarat is 0.41w which is comparable to the previous estimates of SWR for some other states of India, as mentioned earlier. This is treated as SWR "C".

9.5.2.3. Choice of SWR of labour for ECBA of village woodlots

On the basis of the foregoing estimates, the SWR for Gujarat are given in table 9.5. The most important question still remains undecided because we have three different estimates of shadow wage rates of labour, which are quite different from one another. It is decided that in this study all of the three SWRs and also a zero shadow wage rate (SWR "D" = 0) will be applied to see the variation in ECBA of village woodlots.

Table 9.5: Estimates of SWR of labour

Basis of estimates	Rainfed woodlots		Irrigated woodlots		SWR sign*
	Planting	Harvest	Planting	Harvest	
Scarce and Surplus labour	0.51	0.00	0.19	0.00	"A"
Peak season & off season	0.80	0.62	0.69	0.62	"B"
Marginal productivity	0.41	0.41	0.41	0.41	"C"

* = notions used in the study to differentiate the SWRs. A fourth variation is SWR "D" = 0.

9.5.2.4. Shadow pricing of water charges in irrigated village woodlots

In deciding the shadow price of water for irrigated woodlots, the opportunity cost of water needs to be considered, i.e. the likely contribution to agricultural production elsewhere (Price, 1989). In Gujarat, the agriculture gets preference for use of water over any other activity. Here, it is assumed that the water for irrigating the woodlots is purchased from the tube-well owners (rich farmers). Usually a farmer sells the surplus water only when he has irrigated his own crops. That

means the water for irrigating the woodlots is used at a time when the water is surplus. Under such a situation, the shadow price of water may be taken as zero, as is the case with surplus labour.

9.5.2.5. Shadow pricing of outputs

The woodlots in general comprise a mixture of fuelwood, fruit and fodder producing species. Most species are fast-growing, coppicing and of multi-purpose uses. They have the ability to produce fruits in early stages and can be lopped for intermediate fuel and fodder products, as well. The main outputs from the woodlots at the harvest include mainly fuelwood and small timber, including poles for rural constructions. Some other products are bamboo, fodder leaves, grass fodder, fruits and some other minor forest products.

In addition to the marketable outputs, the economic analysis also deals with the non-market benefits and dis-benefits. It is, therefore, pertinent to consider such values which might add to a comparatively higher return as compared to the direct marketable ones. This is especially true in the case of those village woodlots where the rural people have been able to obtain higher quantities of intermediate produce at the early stages of plantations.

As revealed by the questionnaire survey, the main use of common grazing lands has been grazing of cattle. But the respondents have mentioned about very meagre grass yields from such lands because of heavy biotic pressure and complete absence of protection facilities. It is, therefore, assumed that the forgone benefits have been a very low level of grass production. However, according to the estimates of the World Bank (1979), in irrigated areas, "without project" grass output may be as high as 25 metric tonnes per ha. But in this analysis, the incremental benefit (forgone benefits from existing fodder or fuelwood production) has been taken as nil in both types of woodlots.

The shadow pricing of outputs may be made more realistic if we are able to measure the effects in an appropriate manner. For instance, in case of fuelwood, the shadow price can be taken as equivalent to the value of the foreign exchange component in the imported fuels (Hoekstra,

1989). Similarly, the tree fodder (leaves & pods) is a potential livestock feed, especially in drier months in semi-arid parts of Gujarat. If the value of tree fodder for different species and their nutritional values under different conditions can be estimated, the economic analysis can provide more realistic results. Similarly, the valuation of leaf litter and nitrogen-fixing capacity of some species (Acacia spp., Casuarina equisetifolia, Prosopis juliflora, etc.) which help improve the soil productivity by adding organic matter and nutrients may also be considered. But the main question is the proper valuation mechanism which remains unsolved.

As the overall outputs from the woodlots are in the form of fuelwood, poles, small timber and minor forest produce which are meant exclusively for the local consumption, they are considered as non-traded goods at the margin. Accordingly, the market values of intermediate and main produce have been taken as their economic value for the purpose of economic analysis of village woodlots.

9.6. Choice of economic discount rate

The marginal product of capital (q) in the public sector measures the opportunity cost of capital, reflecting the rate of return to the government investment funds. Therefore, if the funds come from the investment funds the economic accounting rate of interest (EARI) is equal to q. But the market interest rate varies considerably and it is impossible to find a single rate of interest.

The economic discount rate can be derived by using any of the following methods:-

- the growth model;
- dynamic production function;
- projected output capital ratio (IOCR);
- investigation into long-term investment rates prevailing in the market; and
- national plan objectives.

However, none of them provide the best possible discount rate for the economic analysis (Trivedi, 1987). But a dynamic production function is considered a comparatively more appropriate and acceptable method (Scott, 1976).

In developing countries, the economic discount rate is taken in the range of 8% to 12% in real terms (ODA, 1988) and a common choice in most cases may be 12% (Gittinger, 1982). However, Sharma and McGregor (1989; 1991) have estimated economic discount rates for social forestry in India as 14.2% and 11% by using the growth model and by developing a dynamic production function, respectively. Similarly, Phillips (1986) and Adhikari (1987) have derived economic discount rates for Nepal as 14% and 9% using the production function method and IOCR method, respectively. Some of the recent estimates for India have been tabulated in table 9.6.

Table 9.6: Recent estimates of the economic discount rate for India

Reference	Method	EDR %
Trivedi (1987)	production function	14.52
Trivedi (1987)	IOCR method	14.79
Sharma & McGregor (1989)	Growth model	14.20
Sharma & McGregor (1991)	production function	11.00*

* = for social forestry projects in India.

The discount rates applied by the World Bank during appraisals of social forestry projects in Gujarat were 10% and 12% for first phase (1980-85) and second phase (1985-90), respectively (World Bank, 1979; 1985a).

Thus the figure of about 14% as the economic discount rate for carrying out the economic analyses of village woodlots seems appropriate. The sensitivity analysis will be carried out at 11% and 17% to see the further effects on ECBA of village woodlots.

9.7. Computations in the economic CBA of village woodlots

The most important thing in computation of ECBA of village woodlots is the correct application of SWR to the labour portions of planting and harvesting activities. In the case of the irrigated village woodlots, the shadow pricing of water is also needed. There are no shadow prices for other items of costs as well as all types of outputs. However, the rupee worths of the free intermediate products enjoyed by the villagers and also an equivalent value for the 40% subsidy (on account of the concessional sale of main products) have been added in the overall benefits of the village woodlots.

In view of this, the computational details of ECBA are described below.

- like the financial analyses, here again the indirect costs have been considered as 36%,
- using the spreadsheets developed for the financial CBA, the planting costs and harvesting costs have been broken down in a proportional manner by multiplying with the percentages of each item (as given in table 9.1),
- the labour cost has been further broken down into scarce and surplus labour,
- in the case of the irrigated woodlots, the water charges have been segregated from the material costs,
- the scarce labour, surplus labour and water charges have been multiplied by their respective shadow prices,
- a provision in the spreadsheet has been made to choose only one of the SWRs (A, B, C or D),
- values of free products and 40% subsidy of concessional material have been added to the benefit side, and finally
- after having completed the shadow pricing on cost sides and a proper accounting of the benefits, the economic CBA has been carried out at 14% discount rate.

In order to accommodate the computational requirements of ECBA (as stated above), the spreadsheet (developed for FCBA) has been suitably modified as shown in the appendix 9.1. But the intactness of the original data has been maintained here.

9.8. Results of the economic analysis

9.8.1. Overall results

The region-wise results of economic NPVs at 14% discount rate are summarised in table 9.7. As expected, the overall results appear quite high at SWR "D", while SWR "A" and SWR "C" are quite comparable. However, the results are poor at SWR "B" (which is based on the peak season and off season wage rates). Among the regions, the performance of village woodlots in south Gujarat and north Gujarat is comparatively better than those in other regions. However, the result of irrigated village woodlots is still unpromising.

Table 9.7: Region-wise overall results of economic NPV at 14% discount rate

(no. with NPV > 0)

Region	N	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	40	15	9	16	28
Central Gujarat	31	7	6	7	13
North Gujarat	28	12	7	11	20
Saurashtra	14	1	0	1	3
Irrigated	11	3	2	2	3
Total	124	38	24	37	67

Table 9.8 summarises the results of region-wise and district-wise economic IRR under the same presumptions. Economic IRR is maximum in north Gujarat, followed by south and central Gujarat. Similarly among the districts, the economic IRR is maximum in Sabarkantha district of

north Gujarat, followed by Surat district of south Gujarat, whereas Amreli district has negative IRR at all SWRs.

Table 9.8: Region-wise and district-wise results of economic IRR at all four SWRs

Region/district	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	12.81	9.60	13.19	19.10
Central Gujarat	11.04	7.84	10.99	16.06
North Gujarat	14.89	10.64	15.12	23.07
Saurashtra	2.03	-2.76	1.25	7.63
Bharuch	13.08	10.01	13.43	18.84
Valsad	12.74	9.85	13.43	19.50
Surat	17.59	13.27	17.78	25.31
Vadodara	8.62	5.08	8.25	13.28
Ahmedabad	12.22	9.06	12.16	17.19
Panchmahal	-0.23	-4.64	-1.07	4.64
Kheda	9.34	6.32	9.60	14.79
Banaskantha	15.52	10.74	14.81	21.46
Mahesana	10.27	7.22	10.50	15.74
Sabarkantha	36.32	26.48	41.00	70.88
Amreli	-6.03	-9.68	-6.47	-1.33
Bhavnagar	8.89	2.79	7.59	15.25
Junagadh	0.73	-4.08	-0.15	6.05
Rajkot	5.73	2.87	5.98	10.79
Irrigated	5.51	-1.11	2.07	8.18

Table 9.9 summarises the results of region-wise and district-wise economic BCR. At 14% discount rate, the economic BCR is equal to one or more than one in the case of the south Gujarat, central Gujarat and north Gujarat at SWR "D", while it is so only in case of north Gujarat at SWR "A" and "C". Only three of the districts (Surat, Banaskantha and Sabarkantha) have BCR >1 at SWR "A", while nine out of fourteen districts show BCR >1 at SWR "D".

Though the results of ECBA show a little improvement over the results of FCBA, the overall performance of different regions and districts does not present a satisfactory picture. Particularly, some districts (with extremely adverse conditions for tree planting) have shown much lower economic returns.

Table 9.9: Region-wise and district-wise results of economic BCR at 14% discount rate

Region/district	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	0.92	0.73	0.94	1.41
Central Gujarat	0.78	0.61	0.79	1.18
North Gujarat	1.05	0.83	1.06	1.58
Saurashtra	0.43	0.34	0.44	0.66
Bharuch	0.93	0.74	0.96	1.43
Valsad	0.91	0.74	0.96	1.44
Surat	1.24	0.96	1.23	1.82
Vadodara	0.63	0.49	0.63	0.94
Ahmedabad	0.86	0.67	0.86	1.29
Panchmahal	0.32	0.25	0.33	0.49
Kheda	0.68	0.55	0.71	1.06
Banaskantha	1.10	0.83	1.05	1.55
Mahesana	0.74	0.59	0.76	1.14
Sabarkantha	1.74	1.42	1.87	2.80
Amreli	0.18	0.14	0.19	0.28
Bhavnagar	0.74	0.57	0.72	1.07
Junagadh	0.37	0.30	0.38	0.57
Rajkot	0.48	0.39	0.51	0.76
Irrigated	0.67	0.49	0.57	0.77

9.8.2. Sensitivity analysis

9.8.2.1. Effect of changes in discount rates

Keeping the intactness of four different SWRs, the sensitivity analysis has been carried out at two different discount rates, i.e. 11% and 17% to see the effects on Economic NPV of village woodlots. Region-wise results are computed in tables 9.10 and 9.11, respectively.

It is observed that there is considerable increase in the number of woodlots in south and north Gujarat at 11% discount rate. As compared to the results of ECBA at 14%, altogether, there is over 40% improvement at 11% discount rate. However, at 17% discount rate, the overall results are quite low at SWR "B", whereas at other SWRs, the results seem to be moderate. Thus a proper choice of economic discount rate is necessary.

Table 9.10 Region-wise overall results of economic NPV at 11% discount rate

(no. with NPV > 0)

Region	N	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	40	22	16	21	31
Central Gujarat	31	10	7	10	16
North Gujarat	28	17	10	16	22
Saurashtra	14	2	0	2	4
Irrigated	11	3	3	3	4
Total	124	54	36	52	77

Table 9.11: Region-wise overall results of economic NPV at 17% discount rate

(no. with NPV > 0)

Region	N	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	40	11	3	11	21
Central Gujarat	31	6	3	6	10
North Gujarat	28	9	2	9	16
Saurashtra	14	0	0	0	2
Irrigated	11	2	1	2	3
Total	124	28	9	28	52

9.8.2.2. Effect of reduction in indirect costs

When the indirect cost is taken as 20%, there is marked improvement in the overall results of NPV at all SWRs (table 9.12). As many as 96 woodlots become positive at SWR "D". Even the irrigated woodlots show a good performance. At the SWRs "A" and "B", there is almost 75% improvement in the results of ECBA as compared to the indirect costs of 36%.

Similarly if the indirect cost is taken as 0%, the overall result becomes quite impressive with 121 woodlots having positive NPV at SWR "D" (table 9.13). Even at SWR "A" and SWR "C" there are 86 and 89 woodlots with positive NPV, respectively.

So the reduction in indirect costs can be one of the possible options for raising the level of economic profitability of woodlots.

Table 9.12: Region-wise overall results of economic NPV at 14% discount rate with indirect cost as 20%

(no. with NPV > 0)

Region	N	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	40	25	16	28	37
Central Gujarat	31	13	7	13	17
North Gujarat	28	19	12	20	25
Saurashtra	14	3	1	3	8
Irrigated	11	7	3	3	9
Total	124	67	39	67	96

Table 9.13: Region-wise overall results of economic NPV at 14% discount rate with indirect cost as 0%

(no. with NPV > 0)

Region	N	SWR "A"	SWR "B"	SWR "C"	SWR "D"
South Gujarat	40	33	25	34	40
Central Gujarat	31	16	10	16	29
North Gujarat	28	22	18	23	28
Saurashtra	14	5	2	7	13
Irrigated	11	10	5	9	11
Total	124	86	60	89	121

9.9. Summary

The results of economic CBA of village woodlots exhibit quite clearly an improvement over the results of financial CBA. This is mainly because in many of the villages, the rural people have received additional benefits in terms of the intermediate and main products. Also the employment

the employment creation has been helpful in improving the overall rural economy. The shadow pricing of labour component has a considerable impact on the ECBA of village woodlots.

The overall economic benefits can be further upgraded if we are able to attach monetary values to many other indirect and non-marketable benefits. In fact, the raising of trees on common lands (which are practically barren) can be made more effectual if the rural people are motivated to take up the responsibilities of management and protection. A concerted effort is needed to see that the local people are able to obtain more intermediate produce from the village woodlots.

The shortage of time and resources did not allow investigation into the shadow value of various products obtained from the village woodlots. Particularly, the effect of replacement of cow dung on soil fertility, the effect of increase in supply of timber on marginal values, the time saving by villagers to collect free fodder and other produce, etc. could have been considered here had time and resources allowed it.

Chapter Ten

Social cost-benefit analysis of village woodlots

This chapter makes a comprehensive attempt to discuss and analyse the aspects of income-distribution from the village woodlot scheme. First of all, it describes the social importance of village woodlots in the rural economy. Further, it contains the details of computations for deriving the income weights and finally presents the results of social cost-benefit analysis under various assumptions.

10.1. Social aspects of village woodlots

10.1.1. Social aspects in general

The social importance of village common lands has always been endless in the economy of Indian villages which thrive basically on a biomass-based subsistence economy. While the private land owners derive much of their needs from their own farm lands the poorer people are solely dependent on the village common lands. In fact, a reasonably well-vegetated common land can be compared with any of the modern and multi-purpose 'Superstores' of the western world. One can easily imagine the social hue and cry if the managers of the superstores did not re-fill the shelves with the needful products. Unfortunately, the natural superstores of Indian villages are now devoid of any useful green material and have failed to sustain the livelihood of the people. Moreover, the owners of the common lands have not paid any attention to maintaining the productivity and sustainability for a continuous supply of rural needs.

In Gujarat, about two-third of villages have no forest land at all and the village common lands are used to meet the needs of forest produce, especially by the landless poor and small and

marginal farmers. Without any doubt, the village common lands are lying mostly over-grazed, highly degraded and barren. They hardly sustain any fodder grass or fuelwood shrubs/trees.

As early as 1974, the initiative of the state government of Gujarat was a positive step to regenerate the village common lands. Since the scheme of village woodlot involves the villagers, village community and the government, the social aspects of village woodlots depend on a number of socio-economic factors. All of the three entities have different objectives, resource constraints and time preference. The villagers and the village community accord to set aside a part of their common grazing land for tree growing. On the other hand, the forest department incurs the costs of planting and harvesting of trees. At the same time, the benefits are shared by all three. But the extent of the share from the village woodlots depends on many other factors (climatic and/or biotic) and may vary for all the three entities.

As the village woodlots have occupied a portion of the village common lands which are supposed to be a source of free grazing and free collection of meagre plant products, the whole scheme is tormented with a very complex situation. Many conflicts between private and social gains, coupled with satisfying the present and future needs of people, pose a number of problems in the management as well as in the distribution of benefits. The rural poor, especially the graziers and landless families, feel difficulties to get any place for grazing their livestock and for meeting the fuelwood requirements. Several inter-personal and inter-temporal issues arise during the life of the village woodlots. Many a time, the villagers seek advice from the forest department to sort out those issues.

10.1.2. People's perception about the benefits

As revealed from the questionnaire survey, the expected benefits from the woodlots are directly related to the composition of people's needs. The people are more interested in obtaining the forest produce for their own use while the village panchayats have always looked for the total

income from sale of those produce. At the same time, the main aim of the government remains the conservation and augmentation of the overall forest resources in the country.

No doubt, any realistic allocation of the overall gains and losses from village woodlots among the villagers, village panchayats and the government is quite complex. A wide variation is seen in the distribution of produce from village to village, mainly on account of the type of products, their quantities, values and the dominance of the village panchayats. However, a reasonable level of satisfaction of all the three entities is quite essential for the success of the scheme. In the few selected cases, some appropriate actions have been taken for an effective participation of people to secure a compromising level of distribution. The whole idea is to ensure a desirable level of protection and maintenance in the village woodlots. During its course of implementation, the scheme has rendered some people worse off, perhaps because the loss of their access to customary grazing land. Unfortunately, they have not received full compensation. But the scheme has offered them free grass, fodder and fruits.

10.1.3. Social benefits

10.1.3.1. Forest produce

In sum, the social benefits include the value of various products enjoyed free of cost by the villagers, the gains in the form of concessional material, the gains in village panchayat's income from sale of products, employment opportunities, environmental benefits, etc. But it should be kept in mind that in the rural areas, the demand for forest products is highly inelastic and is often not easily discernible from the market dealings alone. The social analysis takes into account a number of other benefits in addition to revenues from marketable products and also the distribution of benefits resulting in increased consumers' surplus.

10.1.3.2. Employment aspects

The social CBA is also concerned with transfer of money resulting from the employment of labour. The rural areas have very limited opportunities to provide any gainful employment to the rural labour during most part of the year. The village woodlot scheme operating exclusively in the rural corners offers a very good employment opportunity. The implementation of the scheme is an important source of income to the rural poor. The data on employment through social forestry clearly suggests that there has been more or less uniform impact on the employment opportunities of rural poor throughout Gujarat. The increase in level of rural employment certainly has a direct impact on the migration of rural labour towards the urban areas. Thus the employment generation itself has a very important social impact on the rural economy. It is certainly a special governmental provision to provide the means of survival to the unemployed people.

It needs to be mentioned here that the main concern of the World Bank and International Labour Organisation is to ensure the welfare of poor through increased employment opportunities (Little & Scott, 1976). As an income generation strategy, the employment aspect of social forestry is certainly an output in the rural context, adding to the regional dimensions of production and investment possibilities. However, the scheme's overall impact can become more commendable if it helps in enhancing the total earnings of people beyond those of the labour.

10.1.4. Distributional aspects in village woodlots

The intermediate products (with few exceptions) from the harvested village woodlots were distributed broadly, with free collection of fodder, fruits, fallen wood and other minor forest products by the local villagers while the main produce (small timber, fuelwood/charcoal) was shared between the village panchayats and forest department. While the village panchayats have received the net benefit the share of forest department equalled the direct planting and harvesting costs only (that too without any interest and/or allowance for inflation) with an idea of cost

recovery purposes. In a few villages, the cost recovery did not leave any surplus amount for the village panchayats.

It is true that the majority of consumers in rural parts of India are unable to pay for their consumption of forest produce because of severe poverty. In view of this, the deliberate inclusion of direct distributive objectives in the schemes of social forestry (especially the communal woodlots) is intended to favour the transfer of benefits towards the poorer section of the village in order to develop a subsistence economic base (Chatterjee, 1985). The decision to sell the main produce at 60% of the market price does not help the poor villagers. As a result, the main products are mainly auctioned.

The scheme envisages to provide benefits to the people and the village panchayat while the forest department recovers the direct cost of planting and harvesting. In the majority of villages, the people have enjoyed most of the intermediate products and part of main products free of cost. They also have got some benefit from the subsidised sale of the main products. On the other hand, the village panchayats have received the net benefits from the sale of main products.

A compilation of the region-wise details of benefit-sharing (table 10.1) shows that the gross benefit (at 1990-91 prices) from 124 village woodlots was to the extent of Rs 6.80 million.

Table 10.1: Distribution of gross income from the harvest of village woodlots

(Rs in thousands)

Regions	Gross income	Village people		Village panchayat	Forest dept.
		Free	Concessional		
South Gujarat	1,767	239	11	1,060	457
Central	1,873	199	11	1,071	592
North	1,294	275	0	615	4,04
Saurashtra	672	33	13	239	3,88
Irrigated	1,197	134	25	257	781
Gujarat	6,803	880	50	3,242	2,622
%	100%	12.9%	0.7%	47.6%	38.5%

Note: It is not possible to find out the profit earned by the urban contractors through the sale of produce in the urban areas.

The overall share comes to 38% for the forest department, 48% for the village panchayat and remaining 14% for the villagers. But there are wide variations among the regions and districts. Wherever the plantations have failed to recover even the direct costs, the share of village panchayat has decreased drastically. However, in almost all villages, at least the rural poor have been able to get some share because of the free supply of intermediate products. For example, the share of people in north Gujarat is about one-fifth of the total benefits.

Further, as per the guide-lines, one-fourth of the village panchayats' share is reserved for future plantations, leaving three-fourths of the amount for rural development works in the village. The village panchayats were thus able to get as much as Rs 3.24 million for such works. The average share per village panchayat is Rs 26,145 which is nearly three times their average income from other sources of about Rs 8,000.

Similarly, if we assume that the free material was collected by the poor people and the concessional material was purchased by the comparatively rich people, the share comes to Rs 0.88 million for the poor people and only Rs 0.005 million for the rich people. On the other hand, the forest department was able to recover its costs to the extent of Rs 2.62 million.

Thus, the diversion of a small portion of the village common lands for tree planting has shown some positive improvements in the rural economy as a whole. It is obvious that the village woodlots have been able to transfer substantial amounts to the village panchayats and the villagers. Of course, the forest department has not been able to make any profits because of its liberal policies. This is due to the fact that the forest department is benefiting only to the extent of the recoveries of the direct costs.

10.2. Social CBA in general

SCBA makes an attempt to consider the aspects of efficiency and re-distribution of income together. It narrates the attractiveness of any project from a societal point of view and compared to

FCBA and ECBA, it is more subjective in nature. The effects of project implementation on the people in terms of improvements in consumption and savings are the main criteria in SCBA. It is, therefore, necessary to incorporate a value judgement about the distribution of benefits into the investment criteria (Marglin, 1967). Here, the actual expenditures and receipts are suitably adjusted to get the streams of social costs and social benefits, respectively in order to reflect the net social gain.

The distributional aspects in SCBA look into two dimensions of income distribution,

(a) the intra-temporal dimension (to compare the incomes of different groups with different consumption levels at a point in time), and

(b) inter-temporal dimension (to compare the relative weighting of present and future consumptions (or present savings) at the same consumption level).

In the case of developing countries, depending on the location of projects, a third dimension relates to the inter-regional distribution of income. This can help in making the regional disparities comparable. It might be possible if we use the local income data. But the chances of getting any region-specific data are quite dismal.

From the distributional point of view, a project makes some people or some sectors better off at the cost of some others. SCBA seeks to measure and to weight the change in welfare as indexed by willingness to pay for benefits or willingness to accept compensation for costs (Price, 1987). Social shadow pricing attempts to integrate all aspects of income distribution to derive weights which could be suitably applied to the cash flows. The weights reflect the marginal utility of income in the case of consumers and the value of investible income in the case of government funds. Usually, investment (including savings) is given higher value than consumption because it is assumed that investment is the main element in the direction of economic growth. The factor for derivation of the present discounted value of the future consumption stream generated by the

investment of forgone present consumption is known as 'investment premium' in UNIDO method and 'value of public income' in Little and Mirrlees method.

In the developing countries, the government is the main investing agency. The broad strategy of national development and growth in India is determined by the Perspective and Five-Year Plans which allocate the scarce resources among different sectors. But the five year plans have not addressed the issues relating to distribution of incomes at all (Chakravarty, 1987). Only recently, many projects (including social forestry projects) have been designed and implemented with the explicit objectives of re-distributing the income (consumption opportunities) from the richer to the poorer members of society.

The savings are considered as an additional income which is not consumed immediately. They can be used for reinvestment. In order to integrate the savings premium into SCBA, the total income is divided into uncommitted government income and other types. Then only the appropriate weights can be applied to the incremental private savings and also to the incremental uncommitted government income (ODA, 1988).

While the whole philosophy of SCBA appears to be conceptually sound, the methodological advancements are not at a stage where they can be applied realistically in practice in most cases. It is mainly due to the lack of generally acceptable income weights for different groups in society (FAO, 1979). In particular, it is quite difficult to attach any equivalent price to countless non-market benefits (especially the social, environmental and ecological) of forestry projects in many developing countries.

10.3. Selection of numeraire

In making the income/consumption changes commensurable, we need an appropriate numeraire for SCBA because the absolute size of the weights depends on the numeraire. The choice is between the numeraire suggested by Little and Mirrlees (uncommitted social income expressed in foreign exchange) and that suggested by UNIDO (aggregate consumption).

For this study, the numeraire is taken as the mean consumption measured in domestic accounting rupees. It is mainly because the products generated by the village woodlots are non-traded and the consumers' willingness to pay can be taken as a proper measure. Moreover this appears to be a more sensible approach in selection of the numeraire, which may reduce the complexities of unnecessary computations.

10.4. Shadow pricing in SCBA

10.4.1. Weights for change in income

SCBA explicitly evaluates distribution of income. The effects of benefits distribution on incomes of the people can be seen by applying the weights. Accrual of income to certain groups/regions may be comparatively more valuable than that accruing to the others in the society from the point of view of income distribution.

The social prices deal with the aspects of income distribution between consumption and investment; and distribution of income between the rich and poor (Squire and van der Tak, 1975). It is believed that a rupee does not have the same value for all groups. However, it is difficult to compare the changes in consumers' surplus and income without applying weights. The weights are, therefore, quite crucial in SCBA because they reflect relative values attached to different groups of the society in a realistic manner. Any change in income can be valued by applying appropriate weights to the monetary values (Price, 1989).

Generally the government's money is considered more valuable than money in the hands of the people. But it is assumed that money is worth more to poor than to rich consumers. The willingness to pay is, therefore, weighted accordingly. In other words, an extra unit in the hands of the poor is given greater importance by applying higher weights. Given the existing inequalities in consumption in India, the SCBA can be used to effect the re-distribution of income through appropriate weights to the consumption changes of different groups (Lal, 1980).

The benefits are quite sensitive to weights given to the shares accruing to the different groups involved in the project (Little & Scott, 1976). According to Little & Mirrlees (1974), the consumption of rich may be given a zero weight in CBA. But the UNIDO's methodology advocates a general income-distribution analysis for all the entities involved (project authority, the government, the private sector, workers, consumers and the external sector).

Categorisation of beneficiaries is possible on the basis of income/consumption level, propensity to save/consume, public/private sector, national/foreign, gender, etc (ODA, 1988). Subjectively, the weights can be derived by simple dictation by the government or through the past preferences noted in the government decisions while deciding the projects. The befitting weights can be derived by using the details of changes in the consumption level for different groups of the society, resulting due to the project activities (Price, 1989).

After having decided the weights for various groups, the income of each group is adjusted separately in relation to the numeraire to reflect the differential social values before adding up the net benefits to arrive at the social NPV, taking income distribution into account (UNIDO, 1978). The financial or economic cashflows are used to make adjustments for the weighted savings impact and the weighted income-distribution impact of all the groups.

10.4.2. Social shadow wage rate

As the skilled labour may have a matching income in the alternative employment there will be no incremental consumption from the income flow. In the case of unskilled labour, the incremental consumption and savings premium are used to determine the social shadow wage rate.

The social shadow wage rate can be derived by adding the social cost to the economic wage rate, where the social cost is the difference in value between future consumption forgone and the additional present consumption due to the employment of labour. In the case of high unemployment, the value of social shadow wage rate may even become negative, suggesting a

social benefit (Bruce & Kimaro, 1978). Based on this principle and the numeraire, one can find several variations in the formulas to compute the social shadow wage rates for different kinds of situations (Lal, 1972; Irvin, 1978; UNIDO, 1978; ODA, 1988; Brent, 1990).

Alternatively, the social shadow wage rate can be obtained by applying the consumption weights to the scarce and surplus labour. This method has been applied in this study for computation of social shadow wage rate of labour.

10.5. Social discount rate (SDR)

Discounting affects all aspects of forestry projects and also influences the weights given to various income groups. As compared to EDR, the SDR is more complex because it considers the value of public income and the distribution of social income. It is usually indicated by the consumption rate of interest (CRI), at which the value of one unit of average consumption falls over time. In other words, the discount rate of SCBA indicates the rate of decline in value of the numeraire over time. It shows an optimal level of investment and therewith an optimal saving as well as the growth of income.

As the numeraire for this study is concerned with the consumption by a consumer of mean income, CRI can be estimated by using the elasticity of the marginal utility of consumption. In terms of the marginal utility of income/consumption relationship, the discount rate is measured as follows,

$$r = n * g + p \qquad (10.1)$$

where r = discount rate,
n = the elasticity of marginal utility of income or consumption,
g = growth rate of mean income (per capita consumption), and
p = pure time preference rate.

The pure time preference is a percentage measure of the premium people attach to enjoying things today instead of a year from now, even if their income stays the same. Under normal circumstances, the probability of extinction of society being negligible, putting a value to p seems inappropriate (Trivedi, 1987). So it can be avoided.

It is generally assumed that n and g are constant over time because the CRI depends on n and g and any change in their values affects the value of CRI. This means a decline in the value of additional income.

Depending on the time, weights to different income groups and predicted futures, the SDR may vary from 0% to 30% (Price, 1989). Furthermore, if the resources become scarce and technological advancements are inadequate in future, the SDR may be zero or even negative. Application of mean growth rates to derive a nation-wide consumption rate of interest is not enough to account for many of these variations (Price and Nair, 1985). The estimates of SDR for a few selected countries are tabulated in table 10.2.

Table 10.2: Estimates of social discount rates for selected countries

- UK	2.42%	(Scott, 1977) for 1946-58
- UK	3.20%	(Scott, 1977) for 1959-74
- India	1.97%	(Trivedi, 1987)
- Canada	4.40%	(Kula, 1988)
- USA	4.30%	(Kula, 1988)
- UK	1.50%	(Kula, 1988)
- India	2.05%	(Sharma & McGregor, 1989)
- India	1.52 to 3.56%	(Kumar, 1988)
- India	2.00%	(Sharma, Mc Gregor & Blyth, 1991)

10.6. The need of national parameters

It is seen that the derivation of weights and SDR need some important national level parameters. Before dealing with the computation of weights, it is considered necessary to explain the characteristics of these parameters.

10.6.1. Elasticity of marginal utility of income (-n)

UNIDO (1978) defines the elasticity of marginal utility of income (-n) as the rate at which the utility of an additional or marginal unit of income declines with increase in the level of income. It is the percentage increase in the marginal social value of consumption for a small change in the level of consumption (ODA, 1988). It reflects public or social judgements and is considered vital for the entire SCBA. It is an important link between consumption rate of interest (CRI), premium on savings and the income-distribution weights. Its application permits greater consistency in deciding the consumption weights during appraisals.

The value of n can be derived by the following methods:-

- looking at responses to risks which involve a large range of possible incomes,
- examining trade-offs made between time and money by people at different income levels,
- comparing the price and income elasticities of demand, the relationship implying elasticity of marginal utility of income (Price, 1989).

Various estimates of n are tabulated in the table 10.3 in order to give an idea of the range of n applied in different countries.

Table 10.3: Estimates of elasticity of marginal utility (-n)

Reference	Value of -n	Country
Byron (1968)	-2.1	Australia
Hoa (1968)	-1.7 to -4.3	-do-
Lal (1972)	-2.3	India
Lal (1980)	-3.0	India
Kula (1984)	-1.89	U.S.A.
Kula (1985)	-0.71	Canada
Trivedi (1987)	-2.07	India
Kumar (1988)	-2.00 to +0.5	India
Sharma (1989)	-1.40	India

Thus the value of n lies somewhere between 0 to 3 (with negative signs). Its value is high if the government's main concern is to re-distribute income through project selection to the maximum extent possible (ODA, 1988). Any change in the value of n has a big effect on the computation of weights and the CRI. It may be mentioned here that the World Bank uses n=0 in its appraisals (Bruce and Kimaro, 1978).

10.6.2. Growth rate of consumption (g)

The growth rate of per capita real consumption (g) is needed to compute the value of CRI. It can be derived by applying the following formula to national income data,

$$\ln C = a + g * T \qquad (10.2)$$

where C = per capita consumption expressed in real terms,
a = constant,
T = time variable (Trivedi, 1987).

Recent estimates of g for India are 0.95% (Trivedi, 1987) and 1.00% (Kumar, 1988). However, Lal (1980) recommends to use a value of 2.00% for project appraisal in India.

10.6.3. Marginal productivity of capital (q)

As per the UNIDO (1978), if all investment alternatives are ranked in descending order according to their economic profitability the return of the last unit of investment undertaken would indicate the marginal productivity of capital (q). Its value is equal to the opportunity cost of capital which is the return on assets forgone elsewhere by committing assets to the present project. The estimates of q for India are 14.52% (Trivedi, 1987), 11 to 14% (Kumar, 1988) and 14.2% (Sharma & McGregor, 1989). However, Lal (1980) has suggested to use 10.75 to 11% for appraisals in India.

10.6.4. Value of marginal propensity to save (s)

The marginal propensity to save is the percentage of incremental income saved. Its value can be derived by using the year-wise national income statistics of gross national product, consumption and savings. The year-wise values of s are represented as the ratios of difference between GNP for consecutive years and the difference between savings for those years (Bruce, 1976).

Alternatively, s can be determined by applying a regression coefficient through linear regression using GNP (Y) as the independent variable and savings (S) as the dependent variable, i.e.,

$$S = a + s * Y \qquad (10.3)$$

Using both of these techniques, Trivedi (1987) has derived the values of s for India as 0.23 and 0.22, respectively.

According to Chakravarty (1987), the estimates of marginal savings in the Indian economy have been found as 20% (1950-60), 18.2% (1960-70), 26.3% (1970-80), and 21.4% (1980-84). The estimates of Trivedi (1987) and Kumar (1988) are 0.22 and 0.15, respectively for India.

10.6.5. Social value of investment funds (v)

The social value of investment funds (v) measures the aggregate of discounted consumption generated by a unit of investment. When savings become as valuable as consumption after a finite period, i.e. the r=q, the following formula can be used to calculate the social value of investment funds,

$$v = [(1-s)\ q\ /\ (r-sq)] * [1 - ((1+sq)\ /\ (1+r))^{T}] \qquad (10.4)$$

where s = marginal propensity to save,
q = marginal productivity of capital,
r = consumption rate of interest, and
T = the year at which savings will be optimal.

Trivedi (1987) has used this formula for calculating the v for India by assuming that savings will become optimal after 50 years. Lal (1980) also recommends T as 50 years. However, this may be taken as infinity if savings are expected to remain sub-optimal indefinitely.

10.6.6. Income-distribution weights through changes in the distribution of consumption

By and large, the main aim of any economic activity is to increase the level of consumption which can be assessed from an income viewpoint. Therefore, the changes in consumption are taken as the basis for appraisal of projects.

The average level of consumption in a given year is estimated from the total consumption as estimated in national accounts statistics. In India, this can be obtained from the nationwide consumer expenditure surveys conducted by the NSSO. Using per capita average monthly consumption for different decile groups, the marginal and non-marginal utility for each group can be computed by applying the following formulas (Trivedi, 1987),

$$d_C = (C/C_r)^{-n} \qquad (10.5)$$

$$d_C = [C_2^{(1-n)} - C_1^{(1-n)}]/[(1-n)C_r - n(C_2 - C_1)] \qquad 10.6)$$

where d_C = weight for the marginal consumption,
C = per capita consumption at consumption level C,
C_r = per capita consumption at reference level Cr, and
-n = elasticity of marginal utility.
C_1 = per capita consumption without project
C_2 = per capita consumption with project

By using the above formulas, Trivedi (1987) arrived at the values of 1.618 for society, 0.531 for the top 50% of income earners, 2.705 for the bottom 50% and 3.559 for the bottom 30% of the population. Sharma & McGregor (1989) have estimated the intra-temporal consumption weights as 6.77 for society, 0.573 for main workers and 2.204 for the subsidiary workers in Orissa state of India.

Income weights can also be established ex-post through the analysis of past choices made by the decision-makers between projects offering alternative distribution of benefits. However, it is quite difficult because past decisions may not have been consistent (ODA, 1988).

10.7. Choice of parameters for SCBA of village woodlots

In view of the foregoing sections of this chapter and also the chosen numeraire, we need to translate all costs and all benefits into terms of average consumption equivalents. It is thus obvious that the computations in SCBA will require a substantially greater amount of data (as compared to FCBA or ECBA) on various aspects of social and economic nature at the national or regional levels for deriving the weights to arrive at the shadow prices of inputs and outputs.

It is quite difficult to generate any independent set of data for these computations. However, it is convenient to trace out the published estimates of the national level parameters which can be used for appraisals to maintain the consistency in the findings of SCBA. Lal (1980) has estimated many of the important national parameters for appraisal of projects in India. He believes that values derived by him are quite consistent and are not likely to be too sensitive to any realistic variations in the assumptions. In the recent years, Trivedi (1987) and Kumar (1988) have also derived these national level parameters, already mentioned in the respective sections.

In order to choose realistic values of n, g, s and q, we need to examine the importance of the village woodlot scheme once again. Apart from having labour intensive activities, the main objective of the village woodlot scheme is to raise trees for use by the low income rural people, especially the landless poor. The government's resolution of benefit-sharing is also clearly intended

to direct the benefits towards the weaker sections, suggesting a highly egalitarian view in re-distribution of income. Moreover, the wages through labour have mostly gone to the poor people. In addition, the shadow price depends on the extent of reinvestment of benefits too. The net income going to the village panchayat is meant to be used for rural developmental activities, including the raising of village woodlots. So it is also a kind of revenue for the society as a whole.

Logically, there is a need to apply efficacious weights to the distribution of costs and benefits in the scheme of village woodlot. Under these circumstances, using a higher value of n (say n = 2) seems justified for the SCBA of village woodlots. However, Lal (1980) has suggested to use n = 3 for appraisal of Indian projects.

10.8. Data requirements

From the foregoing paragraphs, it becomes clear that we have to derive three specific things to compute the social profitability. The first one is the distributional weight which will enable us to evaluate the inter-personal consumption changes in terms of their consumption equivalent social value. The second one is to provide current consumption equivalent of savings for measuring the inter-temporal consumption effects of village woodlots. The third thing is to estimate the weights for deriving the social shadow wage rates of labour.

Since the scheme of village woodlots is being implemented to increase consumption of forest products it is desirable to know the amount of increase in consumption due to availability of one more unit and also the decrease in consumption due to use of an extra unit. In this study, the effect on changes in consumption refers to the followings groups,

- the society as a whole due to use of funds for village woodlots leading to the indirect consumption loss,
- the society as a whole enjoying the indirect consumption gains due to recovery of planting and harvesting costs accruing to the government as an income (reduced for inflation),

- the labourers whose consumption changes due to the payment of wages as well as through the benefit sharing in the form of free produce,

- the rich people who have gained through the purchase of concessional material,

- the rich farmers who have gained by selling the water for irrigated village woodlots, and

- the village society as a whole whose indirect consumption increases due to the income of the village panchayat as a result of increased income accruing from the auction of the main produce.

The financial data provide the basic input to which adjustments are made for determining the social profitability of the project. The adjustments made in the economic analysis for deriving the economic shadow wage rates are also useful in derivation of social shadow wage rate. Further, the costs are segregated into different items and benefits are distinguished according to the type of beneficiaries. The changes in income attributed to specific groups are further divided into the savings and consumption for adjustments of market prices. Once relevant cost and benefit streams (positive or negative) of the village woodlots have been identified and allocated appropriately to each of the beneficiary groups, the next step is to derive individual weights for each group by applying the appropriate formulas, given in previous sections. Afterwards, we reach the adjusted social costs, adjusted social benefits and finally the adjusted cashflow which is used for deriving the social profitability of individual village woodlots.

10.9. Assumptions for SCBA of village woodlots

It has been established that the quantum of benefits from village woodlots has been shared among the villagers, village panchayat and forest department. In view of this, certain specific assumptions are necessary before taking up the computations of social CBA of village woodlots. The assumptions are as follows,

(a) the funds for raising of village woodlots have come from the investible income;

(a) the funds for harvesting of village woodlots have been drawn by reducing the consumption expenditure;

(c) the staff came from the upper 70% of the population;

(d) the labourers came from the lowest 30% of the population;

(e) the free produce has been consumed by the poor families coming from the lowest 30% of population;

(f) the concessional material has been purchased by the rich people (upper 70%) who have the purchasing power;

(g) the water for irrigated village woodlots has been purchased from the rich farmers (upper 70%),

(h) the income of forest department is taken as a government revenue (for reinvestments), and

(i) the income of village panchayat is also treated as a revenue for the village society (for rural development works).

In this study, it appears appropriate to make use of the previous estimates of national level parameters. Looking at the nature of the village woodlot scheme and its role in the rural economy of India, the values for n, g, s, q and T are taken as 2, 2.0%, 0.22, 0.14 and infinity, respectively. However, the sensitivity analysis will be used to show the effects of changes in the values of these parameters.

10.10. Computation of social value of investment funds (v)

The calculation of social value of investment funds can be done by using the formula 10.4. Different values of n have been used to compute v as given in table 10.4. These computed values will be used to derive the income weights for applying to the different items of cost and benefit streams in the SCBA.

Table 10.4: Social value of investment funds at different levels of n (India)

n	g	s	q	r	v
2.0	2.0	0.22	0.14	4.0	11.870
2.5	2.0	0.22	0.14	5.0	5.688
3.0	2.0	0.22	0.14	6.0	3.740

Note: T is taken as infinity in all cases. The computation is based on formula 10.4.

10.11. Computation of weights for intra-temporal distribution of consumption (d)

In order to assign weights to the additional consumption benefits and losses to each of the groups, we need to know the average marginal utility of consumption for each group. In other words, we need to find out the consumption level of each group.

Table 10.5 provides the figures for average monthly expenditure per capita for different decile groups of India at 1973-74 prices. We take the mean consumption as the reference level consumption, which corresponds to an average of Rs 61.17 at 1973-74 prices.

Table 10.5: Distribution of per capita monthly consumption (All-India at 1973-74 prices)

Population percent	Per capita monthly consumption (in Rs)
0-10	23.24
10-20	31.87
20-30	37.43
30-40	42.57
40-50	48.38
50-60	54.57
60-70	63.56
70-80	73.34
80-90	89.80
90-100	146.92
Mean consumption	61.17

Source: (Trivedi, 1987).

It is assumed that the consumption generated by the benefits of the scheme is distributed evenly among all the decile groups. The per capita marginal utility for incremental consumption for each decile group is calculated in table 10.6 by using the formula 10.5 at three different levels of n.

Table 10.6: Computed values of per capita marginal utility of incremental consumption at different levels of n (India)

Population %	n = 2	n = 2.5	n = 3
0-10	6.927	11.239	18.233
10-20	3.684	5.103	7.070
20-30	2.671	3.414	4.364
30-40	2.065	2.475	2.967
40-50	1.599	1.797	2.021
50-60	1.256	1.330	1.408
60-70	0.926	0.909	0.891
70-80	0.696	0.635	0.580
80-90	0.464	0.383	0.316
90-100	0.173	0.112	0.072

Note: Using the formula 10.5, the computation is based on the figures mentioned in table 10.5.

Concerning the distribution of benefits accruing from the village woodlot scheme, necessary assumptions have already been made earlier. Using the per capita marginal utility for incremental consumption for each decile group, appropriate average weights for different income groups have been derived in table 10.7.

Table 10.7: Computed values of per capita marginal utility weights at different levels of n (India)

Beneficiary group	n = 2	n = 2.5	n = 3
Society*	2.046	2.740	3.792
Poor people**	4.427	6.585	9.889
Rich people***	1.026	1.092	1.179

Note: The computation is based on the figures mentioned in table 10.6.
* = average for all ten groups,
** = average of three groups below 30%, and
*** = average of seven groups above 30%.

For the society, the utility weight is taken as the average of all groups and for the poor people, the utility weight is the average of the first 30% of the population. Similarly the utility weight for rich people is taken as the average of the remaining 70% of the population.

The labour cost is an extra item for which we need to find the utility weighted consumption gained through the wages. It has been assumed that the labourers for the village woodlots came from the three lowermost strata of population. As the per capita consumption increase due to wage earnings is marginal for the scarce labour, the utility weight of poor people as given in table 10.6 can be used. However, in the case of surplus labour, the per capita consumption increase due to wage earnings is non-marginal (Trivedi, 1987). So the formula 10.6 is used for the computation of the non-marginal utility weight for first three decile groups. The computed values of non-marginal utility weight are given in table 10.8.

Table 10.8: Computed values of per capita non-marginal utility weight of incremental consumption at different levels of n (India)

n	Computed value of per capita non-marginal utility weight
2.0	3.095
2.5	4.211
3.0	5.788

Note: Using the formula 10.6, the computation is based on the figures mentioned in table 10.5.

10.12. Computation of the social costs for planting and harvesting activities

Considering the chosen numeraire, it is necessary to express the costs in terms of utility-weighted forgone consumption which can be applied suitably to the different items in the cost stream. The break down of costs is already mentioned in the previous chapter (table 9.1). The necessary assumptions about use of funds and distribution of income have also been made in section (10.9).

First of all, the consumption losses are derived for each item of planting cost by multiplying the social value of investment funds (v) by the respective values of utility weights (d). Concerning the consumption gains, the cost of water (in irrigated woodlots) is also important. Since the water was purchased from the rich people, the utility weight (d) as computed for the rich can be used to represent the consumption gain for the item of water charges. In the case of the scarce and surplus labour, the appropriate values of utility weights (d) can be taken as the consumption gains to the society, respectively. This is because the labour charges accrue to the poor people as consumption gains. So we need to deduct the utility-weighted consumption gains to the labour class from the utility-weighted consumption losses to the society to translate the labour charges into their social counterpart.

On the basis of the above assumptions, the computed details of the consumption losses, consumption gains and net forgone consumption are given in table 10.9 for each item of the planting costs.

In the case of harvesting costs, the consumption losses are derived for each item, treating it like government revenue with components sV + (1-s). The appropriate values of utility weights (d) for the society as a whole are taken as the consumption losses to the society. By multiplying the weight on investment and the utility weight, the derived weights for the harvesting costs are shown in table 10.10 for each item.

To arrive at the social costs of village woodlots, we need to multiply each of the cost items in planting and harvesting activities by the values of the weights as computed in table 10.9 and 10.10, respectively. The spreadsheet has been suitably structured to deal with any changes in the values of various parameters involved in the computations of these weights.

Table 10.9: Computed values of consumption weights for different items of planting costs

g = 0.02, s = 0.22, q = 0.14 and T = infinity

Cost items	Symbols	n = 2	n = 2.5	n = 3.0
(a) Consumption losses (v X d)				
Scarce labour	I	24.286	15.582	14.182
Surplus labour	II	24.286	15.582	14.182
Material	III	24.286	15.582	14.182
Water charges	IV	24.286	15.582	14.182
Staff	V	24.286	15.582	14.182
Vehicle & equipment	VI	24.286	15.582	14.182
Overhead	VII	24.286	15.582	14.182
(b) Consumption gains (v X d)	v = 1			
Scarce labour	Ia	4.427	6.585	9.889
Surplus labour	IIa	3.095	4.211	5.788
Material	IIIa	0.000	0.000	0.000
Water charges	IVa	1.026	1.092	1.179
Staff	Va	1.026	1.092	1.179
Vehicle & equipment	VIa	0.000	0.000	0.000
Overhead	VIIa	0.000	0.000	0.000
(c) Net consumption weight (a - b)				
Scarce labour	I-Ia	19.858	8.997	4.293
Surplus labour	II-IIa	21.191	11.371	8.394
Material	III-IIIa	24.286	15.582	14.182
Water charges	IV-IVa	23.260	14.491	13.003
Staff	V-Va	23.260	14.491	13.003
Vehicle & equipment	VI-VIa	24.286	15.582	14.182
Overhead	VII-VIIa	24.286	15.582	14.182

Note: These computations are based on the values given in tables 10.4, 10.7 and 10.8.

Table 10.10: Computed values of weights for different items of harvesting costs

g = 0.02, s = 0.22, q = 0.14 and T = infinity

Cost items	n = 2	n = 2.5	n = 3.0
Scarce labour	6.939	5.565	6.078
Surplus labour	6.939	5.565	6.078
Material	6.939	5.565	6.078
Staff	6.939	5.565	6.078
Vehicle & equipment	6.939	5.565	6.078
Overhead	6.939	5.565	6.078

Note: These computations are based on the values given in tables 10.4 and 10.7.

10.13. Computation of social benefits

10.13.1. Social benefit due to income of the forest department

We have assumed that the income of the forest department is meant for further reinvestments. So the weights for income of the forest department can be computed by multiplying the social value of investment (v) with the utility weight for the society (d) as a whole, i.e. v*d. The computed values at different values of n are shown in table 10.11. These weights can be suitably multiplied by the income of the forest department for deriving the social benefit.

Table 10.11: Computed weights for the income of the forest department

n	g	s	q	r	v	d	weight
2.0	2.0	0.22	0.14	4.0	11.870	2.046	24.286
2.5	2.0	0.22	0.14	5.0	5.688	2.740	15.582
3.0	2.0	0.22	0.14	6.0	3.740	3.792	14.182

Note: T is taken as infinity. Value of v is taken from table 10.4, while value of d for the society comes from table 10.7.

10.13.2. Social benefit due to income of the village panchayats

We have assumed the income of the village panchayat is treated as a government revenue (part saved and part consumed). Assuming that s = 0.22, the weights for income of the village panchayats can be computed by using the following formula,

$$((sv + (1-s)) * d \qquad (10.7)$$

The computed values at different values of n are shown in table 10.12. These weights can be suitably multiplied by the income of the village panchayats for deriving the social benefits.

Table 10.12: Computed weights for the income of the village panchayats

n	g	s	q	r	v	d	weight
2.0	2.0	0.22	0.14	4.0	11.870	2.046	6.939
2.5	2.0	0.22	0.14	5.0	5.688	2.740	5.565
3.0	2.0	0.22	0.14	6.0	3.740	3.792	6.078

Note: T is taken as infinity. Value of v is taken from table 10.4, while value of d for the society comes from table 10.7.

10.13.3. Social benefit due to the income of people

We have noticed that poor people have received considerable benefits through the wages, free intermediate produce and free main produce. On the other hand, the rich people were able to get a share of income through 40% concession given in the sale of main produce and also by selling the water for irrigation (in irrigated woodlots only).

Considering the above facts and the assumptions made in section 10.8, the computed weights for income of poor and rich people at different level of n are given in table 10.13. The incomes of the poor people and rich people need to be multiplied by these weights in the social CBA to derive the social benefits for their incomes.

Table 10.13: Computed weights for the income of people

n	Poor people	Rich people
2.0	4.427	1.026
2.5	6.585	1.092
3.0	9.889	1.179

Note: The above weights are the averages of marginal utility weights for respective groups (see table 10.7).

10.14. Computation of social profitability

As stated earlier, the social CBA uses the same basic database which is processed during the financial and economic analyses. In addition, the benefits were allocated to different beneficiaries for application of appropriate weights.

Since the spreadsheet in Borland Quattro pro (v4.0) allows much flexibility in such computations the original spreadsheet (prepared for FCBA and ECBA) has been correspondingly modified to incorporate the requirements of social CBA. Respective portions of costs and benefits were segregated according to the beneficiaries of the scheme. While doing so special care has been taken to maintain the intactness of the original database.

The data on per capita monthly consumption for all decile groups of India (table 10.5) were also inserted into the spreadsheet. Similarly special cells for applying the effects of national parameters were created and linked with the spreadsheet. This allows greater flexibility in computations of CBA under various conditions.

Simply by changing the values of n, g, s, q, and T, the spreadsheet allows a direct computation of social discount rate and respective weights for the concerned beneficiaries in an effective manner. Thus the spreadsheet programme has been set in such a way that it considers all aspects of FCBA, ECBA and SCBA while computing the profitability from different viewpoints. After choosing the requisite values, the whole set of computations finally automatically transforms the results of the spreadsheet into social CBA (appendix 10.1).

10.15. Results of Social CBA

10.15.1. Overall results

Under the given set of parameters (n = 2, s = 0.22, q = 0.14, g = 2% and T = Infinity), the overall results of SCBA indicate that 38 out 124 village woodlots in Gujarat are socially profitable.

The region-wise summary of results indicates that the performance of village woodlots is best in north Gujarat (17 out of 28), followed by south Gujarat (12 out of 40) and central Gujarat (8 out of 31), respectively. The performance of woodlots in Saurashtra region has not improved (only one out of 14) as compared to the financial and economic results. Similarly the irrigated woodlots are still poor in terms of their performance because none of them have positive social NPV. This is mainly because of high charges for water and materials.

10.15.2. Region-wise and district-wise results

A summary of region-wise and district performance of SCBA of village woodlots is given in table 10.14.

Table 10.14: Region-wise and district-wise results of SCBA

(g = 0.02, s = 0.22, q = 0.14 and T = infinity)

NPV >0 = yes

Regions/districts	n=2	n=2.5	n=3
South Gujarat	no	no	yes
Central Gujarat	no	no	yes
North Gujarat	no	yes	yes
Saurashtra	no	no	no
- Bharuch	no	no	yes
- Surat	yes	yes	yes
- Valsad	no	no	yes
- Vadodara	no	no	no
- Ahmedabad	no	yes	yes
- Kheda	no	no	no
- Panchmahal	no	no	no
- Banaskantha	yes	yes	yes
- Mahesana	no	no	yes
- Sabarkantha	no	yes	yes
- Amreli	no	no	no
- Bhavnagar	no	no	no
- Junagadh	no	no	no
- Rajkot	no	no	no
- Irrigated	no	no	no

Note: All results are with indirect costs as 36%.

It is quite apparent that the overall social NPV is below zero in all four regions at n=2, while 3 regions (except Saurashtra) show positive NPV at n=3. Similarly among the districts, all districts of central Gujarat and Saurashtra have NPVs below zero at n=2. As many as 7 districts show positive NPVs at n=3. Irrigated woodlots on the whole have still remained socially unacceptable.

10.16. Sensitivity analysis

Sensitivity analysis is considered important because the application of various estimates of national parameters has a very marked effect on the results of SCBA. On the other hand, the effect of agro-climatic and local conditions on the performance of village woodlots is very significant. It has, therefore, been decided to carry out SCBA by applying changes in national parameters. At the same time, an effort is made to derive regional weights by comparing the amount of rainfall in a very simple manner.

10.16.1. Effects of changes in values of national parameters

A number of sensitivity analyses involving many changes in the values of some of the national parameters have been carried out to see the effects on the social CBA of village woodlots. The value of n is quite vital in deciding the weights for the changes in the consumption level, CRI and the social value of investment funds. With any increase in the value of n, v is reduced, whereas CRI and consumption weights are increased. Similarly with decreases in the value of s and q parameters, the value of v is reduced. As a result, the increase in the value of n and decreases in the values of s and q tend to provide a better result for village woodlots in the SCBA.

10.16.1.1. Effects of changes in n

The effects of n are summarised in table 10.15 which shows that higher values of n have positive impacts on the performance of village woodlots in all regions. At a value of n = 3, the overall performance increases to 60 village woodlots with positive NPVs as compared to only 38 at n = 2.

Table 10.15: Effect of changes in n on the results of SCBA

(g = 0.02, s = 0.22, q = 0.14 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	12	16	25
Central Gujarat	31	8	8	11
North Gujarat	28	17	18	19
Saurashtra	14	1	2	3
Irrigated	11	0	0	2
Gujarat	124	38	44	60

Note: All results are with indirect costs as 36%.

So with increase in the value of n, the social performance of the woodlots shows a positive improvement.

10.16.1.2. Effects of changes in n, s and q

With the changes in the value of n, s and q, there is further improvement in the result of social NPV (table 10.16). As many as 87 village woodlots exhibit positive NPV at n = 3, s = 0.15 and q = 0.11. So decreases in s and q, coupled with increase in n, show better results of village woodlots in all regions.

Table 10.16: Effect of changes in n, s and q on the results of SCBA

(g = 0.02, s = 0.15, q = 0.11 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	25	30	36
Central Gujarat	31	14	16	17
North Gujarat	28	19	22	24
Saurashtra	14	3	3	7
Irrigated	11	2	3	3
Gujarat	124	63	74	87

Note: All results are with indirect costs as 36%.

10.16.1.3. Effects of changes in T

On the other hand, if T is taken as 50 years, the overall performance of village woodlots increases to 64 woodlots having positive NPV at n = 2, s = 0.22 and q = 0.14, while it increases to 79 woodlots at n = 2, s = 0.15 and q = 0.11 (tables 10.17 and 10.18).

Table 10.17: Effect of changes in T on the results of SCBA
(g = 0.02, s = 0.22, q = 0.14 and T = 50)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	26	28	29
Central Gujarat	31	14	15	16
North Gujarat	28	19	21	22
Saurashtra	14	3	3	3
Irrigated	11	2	2	3
Gujarat	124	64	69	73

Note: All results are with indirect costs as 36%.

The effects of changes in s and q (table 10.18) indicate improvements in the results. As many as 93 village woodlots become socially profitable at n = 3, s = 0.15 and q = 0.11. Similarly,

a region-wise and district-wise summary of results (table 10.19) under the variation of T = 50, s = 0.15 and q = 0.11 presents that 10 districts have positive NPVs at all levels of n.

Table 10.18: Effect of changes in T, n, s and q

(g = 0.02, s = 0.15, q = 0.11 and T = 50)

		No. of village woodlots with NPV >0		
Regions	N	n=2	n=2.5	n=3
South Gujarat	40	33	35	37
Central Gujarat	31	17	17	18
North Gujarat	28	22	24	26
Saurashtra	14	4	7	9
Irrigated	11	3	3	3
Gujarat	124	79	86	93

Note: All results are with indirect costs as 36%.

Table 10.19: Effects of changes in s and q on the region-wise and district-wise results of SCBA

(g = 0.02, s = 0.15, q = 0.11 and T = 50)

NPV >0 = yes

Regions/districts	n=2	n=2.5	n=3
South Gujarat	yes	yes	yes
Central Gujarat	yes	yes	yes
North Gujarat	yes	yes	yes
Saurashtra	no	no	yes
- Bharuch	yes	yes	yes
- Surat	yes	yes	yes
- Valsad	yes	yes	yes
- Vadodara	yes	yes	yes
- Ahmedabad	yes	yes	yes
- Kheda	yes	yes	yes
- Panchmahal	no	no	no
- Banaskantha	yes	yes	yes
- Mahesana	yes	yes	yes
- Sabarkantha	yes	yes	yes
- Amreli	no	no	no
- Bhavnagar	yes	yes	yes
- Junagadh	no	no	no
- Rajkot	no	yes	yes
- Irrigated	no	no	no

Note: All results are with indirect costs as 36%.

10.16.2. Effect of inter-regional weights

The disparities in agro-climatic and socio-economic factors in different regions of Gujarat have a very high impact on the performance of village woodlots, specially in terms of survival and growth of trees. One may consider a combination of these factors to derive the inter-regional weights for SCBA.

The total amount and distribution of rainfall is considered an important factor in growth of plants. The whole of Gujarat state except south Gujarat is situated in a low rainfall zone of India, facing continuous droughts almost every alternate year. This has a highly negative effect on the growth and survival of trees in any plantation, including the village woodlots. In view of this, it does not seem justified to apply the same rules to the SCBA of village woodlots in different regions of Gujarat.

An attempt is made here to derive the regional weights on the basis of annual rainfall which is certainly a critical factor in Gujarat. If we treat the best part of Gujarat i.e. south Gujarat as 1, the regional weights can be derived in the following manner:

Regions	Annual rainfall (mm)	Regional weight if 1237 mm = 1
South Gujarat	1237	1237/1237 = 1.000
Central Gujarat	919	1237/919 = 1.345
North Gujarat	737	1237/737 = 1.677
Saurashtra	668	1237/668 = 1.850
Kachchh	367	1237/367 = 3.369
Gujarat	786	1237/786 = 1.574

Note: The annual rainfall is the average rainfall of the concerned districts recorded during 1971 to 1982, as given in GFD (1984).

By multiplying the benefit stream with the above-mentioned regional weights, the SCBA of village woodlots has been carried out under different assumptions.

Using the parameters as g = 0.02, s = 0.22, q = 0.14 and T = Infinity, the results of SCBA for the regions are summarised in table 10.20 which indicates that 59 village woodlots have positive NPV as compared to only 38 woodlots without applying the regional weights.

Table 10.20: Effect of regional weights on SCBA

(g = 0.02, s = 0.22, q = 0.14 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	12	16	25
Central Gujarat	31	13	15	16
North Gujarat	28	20	22	23
Saurashtra	14	10	11	11
Irrigated	11	4	6	6
Gujarat	124	59	70	81

Note: All results are with indirect costs as 36%. Regional weights have not been applied to irrigated woodlots.

At the values of s = 0.15 and q = 0.11, there is further increase in the performance of village woodlots as shown in table 10.21. On the whole there are 84 village woodlots with positive NPV at n = 2.

Table 10.21: Effect of regional weights and changes in s and q on SCBA

(g = 0.02, s = 0.15, q = 0.11 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	25	30	36
Central Gujarat	31	17	18	19
North Gujarat	28	24	26	26
Saurashtra	14	11	12	13
Irrigated	11	7	7	8
Gujarat	124	84	93	92

Note: All results are with indirect costs as 36%. Regional weights have not been applied to irrigated woodlots.

10.16.3. Effect of reduction in indirect costs

The reduction in indirect costs (which is taken as 20% only) also has some positive effect on the social CBA of village woodlots (table 10.22) as compared to the results of table 10.14 (with indirect costs as 36%).

Table 10.22: Effect of reduction in indirect costs on SCBA
(g = 0.02, s = 0.22, q = 0.14 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	20	29	32
Central Gujarat	31	11	15	16
North Gujarat	28	19	19	22
Saurashtra	14	3	3	3
Irrigated	11	1	2	3
Gujarat	124	54	68	76

Note: All results are with indirect costs as 20%.

The overall performance at higher values of n and under the variations of s and q presents further increase in the results of SCBA (table 10.23). As many as 104 woodlots of woodlots become socially acceptable at n = 3.

Table 10.23: Effect of reduction in indirect costs, s and q on SCBA
(g = 0.02, s = 0.15, q = 0.11 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	32	37	37
Central Gujarat	31	17	19	22
North Gujarat	28	22	26	26
Saurashtra	14	5	10	12
Irrigated	11	4	6	7
Gujarat	124	80	98	104

Note: All results are with indirect costs as 20%.

Given the regional weights, as many as 119 village woodlots become socially profitable at 20% indirect costs when n = 3, s = 0.15, q = 0.11 and g = 0.02 (table 10.24).

Thus the reduction in indirect costs, coupled with reduction in the values of s and q has a positive impact on the social performance of the village woodlots

Table 10.24: Effect of reduction in indirect costs, s and q along with the application of regional weights on the results of SCBA

(g = 0.02, s = 0.15, q = 0.11 and T = infinity)
No. of village woodlots with NPV >0

Regions	N	n=2	n=2.5	n=3
South Gujarat	40	32	37	37
Central Gujarat	31	19	21	29
North Gujarat	28	26	28	28
Saurashtra	14	13	13	14
Irrigated	11	10	11	11
Gujarat	124	100	110	119

Note: All results are with indirect costs as 20%.

10.17. Summary

The social CBA of village woodlots indicates the social importance of tree planting in the rural economy of Gujarat. As the net income (share of village panchayat) generated from the harvest of village woodlots is meant for rural developmental activities, its overall social value increases for the village community as a whole. At the same time, the proportionate share of poor villagers in the form of free products adds to the social benefits for the village.

The changes in the values of national parameters have a remarkable impact on the results of SCBA. With any upward change in value of n, the result improves. It also improves with decrease in the values of s and q. It is, therefore, very important that correct values of these parameters are chosen at the time of appraisal or evaluation of projects, because the results may

alter the entire decision-making outcome while dealing with any such scheme or project. The realistic combination of parameters for the social CBA of village woodlots appears to be n = -2, s = 0.22, q = 0.15, g = 2% and T = infinity (38 out of 124 woodlots with positive NPVs).

Many village woodlots still have NPVs below zero because of various reasons; the most important one being the agro-climatic and biotic conditions of the area, which restrict the growth of plants. Under these circumstances, performance would be better if we understand the ecological and environmental role of tree planting in difficult areas. Probably we need to evaluate the indirect benefits of such plantations. A simple application of the regional weights (derived on the basis of regional rainfall data), shows an increase in the overall social profitability of village woodlots as compared to the normal situation.

Lastly we may conclude that the village woodlot scheme appears to be a social welfare scheme and is justified because of its social values to the rural community.

Chapter Eleven

A critical analysis of the results

It is observed that the overall achievements of the village woodlots in Gujarat have been quite substantial. But the economic and social aspects of village woodlots can not be detached from the overall rural environment. One has to realise that any improvement in the scheme of village woodlots is inextricably linked up with a whole gamut of socio-economic problems of the villages of India. The findings of this study may, therefore, be seen in the overall perspective of the prevailing socio-economic and political environment in the rural economy of Gujarat.

11.1. Village woodlot scheme: positive and negative aspects

The prime objective of the scheme was to raise trees on village common land to meet the demands of the local villagers. But in reality it seems that this has been only partially achieved because the secondary objectives of the scheme have clouded the prime objective of the scheme.

However, the raising of trees on highly degraded village common lands has helped to further the rural economy for the benefit of the villagers and their panchayats. The main achievements of the scheme comprise a great deal of employment generation within the reach of the rural poor, a significant upgrading of forestry knowledge of the people, and a turnabout in the long-standing degradation of common grazing lands. In fact, the people have noted the improvements in their village common lands and have started realising that these lands, if properly managed, can provide a substantial amount of benefits for themselves and their panchayats.

Amongst the failures, the most important things are the lack of management and protection by the people and their panchayats and the non-fulfilment of the expectations of local villagers due to either a low yield and/or the faulty disposal mechanism, involving the auction of main produce. Though the visual impact of the programme is highly appreciable, the social side of

providing the material needs to the local villagers remains ineffective as the bulk of produce is being used by the comparatively rich people (who can buy it), mostly in the urban areas.

But there are several reasons (agro-climatic, socio-economic and socio-political) behind these failures. For instance, the regional disparities due to agro-climate has had its effects on the total yield of grass, fruits, leaves, pods, etc., leading to a wide variation in accrual of intermediate produce to the villagers, as well as in the yield of main produce, affecting the total income for the village panchayats. In addition, regional variation in marketability and the prevailing market prices have resulted in different levels of income realisation by the panchayats. The chosen species and faulty management practices have also restricted the flow of some preferred types of produce. Moreover, the benefits have not always been linked up with the needs of a particular village community. For example, growing fuelwood species in those villages where *Prosopis juliflora* is naturally available in abundance, has no meaning for the local people.

Whatever be the deficiencies in the social forestry programme, the objective of planting more trees has been principally achieved in Gujarat. The millions of standing trees are the proof of this success. It is not difficult to find exceptionally fine plantations on private and common lands.

11.2. The village woodlots through the eyes of villagers

The findings of the questionnaire survey of village woodlots provide a clear reflection of certain important trends and issues in the villagers' perception. It is quite praiseworthy that the level of awareness about the tree planting programme among the people is quite high in all parts of Gujarat. The large-scale similarities in their responses indicate the remarkably good efforts of the social forestry programme in the state.

Since the forest department is acting on behalf of the society the problem is that not all villagers agree with the proposed plans. Even then most villagers prefer the involvement of forest department. By and large, the choice of species has been in accordance with the preferences of

the people. But there may be some site-specific variations due to agro-climatic conditions of the regions and people may have a liking for better species of trees instead of thorny species.

However, the unconcerned feelings of people about the management, protection and harvest of village woodlots can hardly be overlooked. Particularly the landless and poor people are unaware of the policy decisions by their village panchayats (i.e. panchayat's resolution, agreement and benefit-sharing mechanism). This has a direct adverse effect on the success of village woodlots. The main protection problems have been mentioned as grazing and damage by people. In fodder scarce areas, the grazing communities are opposed to the tree planting on their grazing lands.

Lack of local initiatives to raise and manage the village woodlots seems to be a common deficiency. In many cases, the forest department is approached to resolve any local issues. In general, the villagers attach the protection responsibility to the forest department and/or the village panchayat. Very few of them feel that it should be their own responsibility. The indifferent attitude of villagers and their panchayats has been the major hurdle in promotion of self-help village woodlots.

The villagers consider the scheme as merely a government scheme although it is meant for furtherance of their own essential needs. In fact the people want to enjoy benefits without making any efforts. They have a strong feeling that principally it is the government's responsibility to raise trees for improving the village common lands. They want that the forest department should continue to implement and manage the woodlots in their villages in future. The government has taken full advantage of this feeling by presuming that the villagers are incapable of judging for themselves what is required for their own good. The preponderance of departmental village woodlots clearly suggests the low involvement of the villagers and their panchayats.

11.3. The overall economics of village woodlots

As the scheme is burdened with a number of objectives for producing multiple goods and services, it is difficult to reflect all kinds of costs and benefits for the individual woodlots because of

lack of proper measuring mechanisms. This study is, however, based on the actual details of the direct costs (planting and harvesting) for individual woodlots and an estimated percentage of the indirect costs for the social forestry programme in Gujarat state. The benefits represent the monetary values of the recorded intermediate and final produce. However, the intermediate produce enjoyed by the villagers is likely to be under-estimated because many of them remain unnoticed and many have no prices to influence the overall profitability.

11.3.1. Results of FCBA

The table 11.1 provides the effects of changes in the discount rates, reduction in indirect costs and inclusion of the free and concessional material on the financial NPV of the village woodlots, respectively.

Table 11.1: FCBA: effects on financial NPV

(No. of woodlots with NPV >0)

Particulars	Discount rates @10%	Discount rates @15%
Without free and concessional material		
at 36% indirect cost	21	3
at 20% indirect cost	32	14
at 0% indirect cost	52	23
With free and concessional material		
at 36% indirect cost	31	10
at 20% indirect cost	47	28
at 0% indirect cost	63	36

Note: Total no. of woodlots = 124

The result is quite self-explanatory: any decrease in either discount rate or indirect costs or both has a very positive impact on the overall financial profitability of village woodlots. On the other

hand, the inclusion of free and concessional material has also a considerable impact on the results of the FCBA.

The overall situation of FCBA can be quite gloomy with unfavourable selection of discount rate and/or high indirect costs or both. Similarly, the non-accounting of free and concessional material has an adverse effect on the results.

11.3.2. Results of ECBA

In the case of ECBA, the choice of shadow wage rates of labour and/or discount rates is quite important (table 11.2).

Table 11.2: ECBA: effects of variation in the indirect costs, shadow wage rate of labour and discount rates

(No. of woodlots with NPV >0)

Indirect costs	Discount rate	SWR "A"	SWR "B"	SWR "C"	SWR "D"
36%	11	54	36	52	77
36%	14	38	24	37	67
36%	17	28	9	28	52
20%	11	80	54	75	102
20%	14	67	39	67	96
20%	17	47	28	48	88
0%	11	94	74	97	123
0%	14	86	60	89	121
0%	17	75	43	79	112

Note: Total no. of woodlots = 124.

The differences in the technique of derivation of shadow wage rate of labour have a marked effect on the outcome of ECBA. However, the use of SWRs "A" (based on scarce and surplus labour) and "C" (based on marginal product and time criteria) have provided quite comparable results. As compared to the financial results, the economic results seem quite encouraging and establish the economic importance of the scheme in the rural economy. If we

consider the high level of unemployment (which is not a very unrealistic situation to think about for many parts of India) and a low economic discount rate (i.e. 11%), 77 out of 124 village woodlots become justifiable in terms of economic CBA. Once again, the reduction in cost enhances the overall performance of village woodlots.

11.3.3. Results of SCBA

Now we move to the results of SCBA (table 11.3). It is observed that any changes in the value of T, n, s, q and/or g have visible effects on the overall results of SCBA. This is mainly because these parameters govern the overall assigning of income weights to different groups of society, social value of investment funds (v) and the social discount rate (CRI). For example, with increase in value of n, there is an increase in the income weights, particularly for the poor. The value of T has influence over the value of v. Taking the indirect costs as 36% and 20%, respectively, the SCBA has been carried out at three levels of n and two different levels of T, s and q.

It is important to mention here that raising the value of n enhances the social discount rate. Even then the overall performance of woodlots shows an improvement because of substantial changes in weighting.

Table 11.3: SCBA: effects of variation in the national parameters and indirect costs

(No. of woodlots with NPV >0)

Indirect costs	T	s=0.22, q=0.14			s=0.15, q=0.11		
		n=2 r=4	n=2.5 r=5	n=3 r=6	n=2 r=4	n=2.5 r=5	n=3 r=6
36%	Infinity	38	44	60	63	74	87
36%	50	64	69	73	79	86	93
20%	Infinity	54	68	76	80	98	104

Note: g = 2% in all cases.
Total no. of woodlots = 124.

Thus the selection of national level parameters has a direct impact on the results of SCBA. One has to be very careful while deciding these parameters. The same project can be become profitable or non-profitable. However, for the purpose of this evaluation, the overall results at n = 2, s = 0.22, q = 0.15 and T = infinity suggest that 38 woodlots (out of 124) are socially justified in terms of SCBA.

The results of ECBA (at 14% discount rate and SWR "A" or "C") are quite comparable with the results of SCBA (at the above-mentioned parameters).

11.4. Important observations about the village woodlots

During the course of this study, many important points have been noted, which need special attention to make the programme more explicit for meeting the objectives.

11.4.1. The objectives of the scheme

It appears that the village panchayats have been persuaded to part with their land on the plea of the enhancement of their income (this is true for farm forestry also). So the expectations of the village panchayats have been raised to a different level. After having realised the hidden potential of the barren and degraded village common lands, they are now unwilling to allow their own people to enjoy the fruits of woodlots in a free manner; they do not even support the selling of the produce at subsidised rates.

In fact, this is the main reason why some of the village panchayats prefer commercial species in their village woodlots. They look forward to plant high value timber tree species like *Tectona grandis*, *Gmelina arborea*, etc. At first, their aspirations may look innovative, but the underlying issues which alienate the poor villagers are left unaddressed. Everyone starts praising the proposal of the panchayats without realising its ill-effects on the local people.

The other side of the issue is, what is the harm if the village panchayats look for more money by proper use of their own resources? Perhaps in terms of pure financial considerations, they are right because everyone else also wants to increase his income. So the selling of the produce at higher prices through auction seems fully justified.

Since the overall computed weight for the society is high as compared to the weights of villagers (poor or rich), the distribution of the total produce to the poor as free is not helpful in raising the level of social NPV. Similarly, if the material is sold at concessional rate, the performance of woodlots further goes down because of a lower weight for the rich people. The results given in table 11.4 indicate the effects of changes in the distribution of benefits. If the entire produce is allowed to be auctioned, the net benefits to the village panchayats will increase.

Table 11.4: Effect of changes in distribution of benefits on SCBA of village woodlots

n=2, s=0.22, q=0.15, g=2% and T=infinity

Regions	N	No change	If all is given free	If all is sold on concessional basis	If all is auctioned
South	40	12	6	1	13
Central	31	8	7	3	8
North	28	17	15	7	18
Saurashtra	14	1	0	0	1
Irrigated	11	0	0	0	0
Total	124	38	28	11	40

Note: Indirect costs are taken as 36% in all cases.

11.4.2. Involvement of the people and their panchayats

The participation of villagers and their panchayats is vital for the success and continuity of the scheme. In fact, the village woodlots can be transformed into real community assets if one is

able to increase the participation of local villagers and village panchayats. But the socio-economic rules which permit the participatory kind of development are quite complex in the rural areas.

In general, the personal initiatives of the villagers have remained dormant because of various reasons; the main one seems to be the uncertainty in the flow of benefits. Most villagers see the woodlot as a property of the panchayat, meant for income generation. If the realisation of income is the main aim of the village panchayats how can the poor villagers be involved in the activities of the village woodlot? As a result, the whole idea of people's participation becomes purposeless. When the villagers do not see any direct benefit for their own household, their participation remains in the doldrums. Moreover the village panchayats do not wish to take over the management because they are sure of getting 100% net benefits without any expenditure.

It needs a very harmonious and organised approach of government and non-government organisations to raise the participation of the people to a required level of self-motivation. Barring few exceptional cases, this may be certainly a difficult task to strike through. But it needs to be taken up with the villagers and their panchayats, as it concerns restoring the delicate balance of ecology and environment in the national and international perspective. Further, the problem of protection can also be minimised to a great extent by involving the poor families who may be given a share in the net income.

11.4.3. Management aspects

The level of output from village woodlots is interlinked with many factors, i.e. soil, climate, moisture, choice of species, protection, management technique, etc. Particularly, looking at the objectives and interests of the people, the management aspects are very important. The present method of clear-felling does not seem appropriate in the interest of the people. However, it serves the interest of the village panchayat and also the forest department. In fact, the volume of wood (branches and twigs) can be increased up to ten times or more than that of stem volume by simple

adoption of proper pollarding, thinning and coppicing mechanisms (Spears, 1983). In addition, the leaves, pods, fruits, etc. can provide substantial amount of produce to the local people.

Choice of species for village woodlots is also very important from the output viewpoint. The species which can supplement the variety and total quantity of intermediate produce at the early stages of the woodlot may increase the overall net benefit. The planting of some shrubs/grasses which can provide additional fruits, leaves, twigs, fodder, etc. can help to diversify the benefits from the village woodlots. But this needs a lot of persuasion and motivation of the villagers and their panchayats because it concerns the interests of both.

A simple implementation of the scheme as per its action plan has no meaning for the people. It needs to be translated into a well-accepted operational plan, acceptable to all villagers. The most important thing is co-ordination and a proper understanding among the forest department, village panchayats and different groups of people residing in the villages.

11.4.4. Distributional issues

The existing government order outlining the mechanism of benefit sharing is not helpful in diverting the outputs towards the village poor. In fact, the panchayat's aspiration to gain maximum income from the outputs of the village woodlots (also from the strip plantations because the government has decided to give the net benefits for the panchayats) is a major hurdle in the flow of benefits towards the poor. The provision of free produce favouring the rural poor is in direct conflict with the interests of the village panchayats who visualise the woodlots as the main income-generating asset for the village as a whole. In fact, the village panchayats do not want to leave any opportunity of realising more income through the auction of even the intermediate products.

As the results of CBA of the village woodlots depend on the people's participation, the scheme has to be attractive for them too. It is necessary to determine the need for and the kind of incentives to ensure their full participation. The village woodlot scheme can be used to enhance the community goodwill, which may ultimately result in higher profits for the villagers. The villagers

can increase their share of benefits by gathering more of intermediate produce. The village panchayats can enhance their income by direct and voluntary involvement of their own people by creating a friendly atmosphere.

11.4.5. Use of income from village woodlots

As far as the income from woodlots is concerned, it is feared that it may have little less impact on the living standards of the local people because the panchayats have utilised the income for payment of electricity bills, salary of watchman, repairs of the panchayat buildings, etc. So the question arises about the proper use of the income by the village panchayats in the interest of the rural development activities in an effective manner.

11.4.6. Village woodlots and CBA

It is desirable that any assessment of benefits and costs for every significant group in the village must yield a positive NPV. But within the village, the benefits and costs are not likely to be distributed equally among all members of a village. Even if all are net gainers, the disparities in gain among them may be quite large. The promotion of immediate social objectives tends to reduce the level of monetary gains. For instance, if the total produce from village woodlots is given free to villagers it reduces the overall societal gains for the village community because of lower weight (table 11.4). The idea of selling the produce at concessional rates is not at all laudable on the framework of cost-benefit analysis because only rich people are able to buy the produce and poor villagers may not get any share.

Further, the overall profitability of woodlots is marred by the high level of indirect costs. The costs can be reduced by efficient organisational arrangements. If the village panchayats can implement and manage the woodlots on their own, they can save the indirect costs. They will also

get some extra share of benefits which otherwise goes to the forest department. At the same time they may be able to enjoy certain subsidies of the government.

However, the value of output depends not only on the total yield but also on the demand and supply position of the products plus the existing marketing infrastructure. The overall performance of CBA can be significantly improved if the villagers are able to obtain more of the intermediate produce (as seen in the results of FCBA: table 11.1). If we take out the free and concessional values of produce from the SCBA too, the overall performance of the woodlots decreases from 38 woodlots to 34 woodlots. So, the provision of free supply of intermediate produce from village woodlots needs more publicity among the villagers.

11.4.7. Regional diversity in agro-climate and degradation of village common lands

The regional performance of village woodlots seem to be directly related to the prevailing agro-climatic conditions and the degradation of village common lands. Even in the agro-climatically superior region (e.g. south Gujarat), sometimes, the condition of village common lands may be very refractory for tree planting activities. For a moment, if we forget about the location of the village common lands, we may be able to classify them according to the level of their degradation as follows,

(a) permanent barren and unculturable lands (which have always been unfit for any tree planting programme),

(b) totally degraded lands (which have become unfit for tree planting, but can support grasses, shrubs and bushes),

(c) totally degraded lands (which have a little capability to support some tree planting),

(d) partially degraded lands (whose productivity level can be restored through tree planting), and

(e) comparatively less degraded lands (which have the capability to support some good tree planting).

It establishes the idea of site-specific programmes with specific objectives. It is impossible to get a positive result of CBA in all of the above situations. As such the worst lands will need more investments, but may yield very low quantities of marketable products. So one has to accept that the environmental and ecological role of vegetation (non-market benefits) in such cases provides the only possible justification for investment.

11.4.8. The departmental approach

No doubt, the village woodlots on the village common lands have become a centre of attraction for the local people. But it is very unfortunate that most people do not feel responsible to maintain a minimum level of protection and management of the resources which are meant for them. They feel reluctant in making any voluntary investment of money or labour either.

Moreover, by promoting the departmental village woodlots, perhaps the government has increased the dependency of the villagers and their panchayats on the government-administered programmes. Even the so-called self-help village woodlots have been raised and managed by the forest department. Since this is a multi-disciplinary and diverse activity no single agency can handle it all by itself. At the same time, it is also necessary to maintain the stability and continuity of the scheme. Under the present circumstances, the government's intervention seems unavoidable for preventing the mis-management of village common lands. But this should not be used to suppress the local initiatives. In the long run, it may be possible for the people to cooperate for well-defined benefits.

11.4.9. The sustainability of the village woodlot scheme

The sustainability (continuity) of the village woodlot scheme over time depends on the government support, costs and returns of alternative land-use of the village common land, availability of labour, etc. The present practice of clear-felling of trees makes the sustainability of

woodlots a little doubtful. Even in those villages where excellent woodlots have been raised, after the clear-felling of trees, the overall social impact may vanish if the village panchayats opt out of the programme (e.g. the village panchayat may like to use the reclaimed land for agriculture or some other purpose). But there is no doubt that the fuelwood and fodder are essential commodities for the livelihood of the rural people, especially the landless poor. Even if the village woodlots yield less profits in terms of money, they need to be continued in the interest of the rural economy to help maintain the balance of socio-cultural and socio-economic environment of Indian villages.

11.5. Social forestry programme and the poor people

When we compare the different schemes of social forestry we may conclude that the programme is highly unsocial because it promotes the idea of enhancing income by the land owners. As far as the landless poor are concerned, the majority have been deprived of obtaining their benefits from the strip lands, government common lands and village common lands. Because the areas have been fenced for tree planting, the watch and ward and policing has been increased by the managers of woodlots. In other words, the piece of land which was freely accessible to the poor man (even though it did not offer any useful material), is now under the control of the forest department who applies all its government rules, regulations and legal provisions to maintain the desired level of protection in the newly planted areas. Over and above this, the official collection of the dry, dead and fallen material (for auction) has also been depriving the people of their benefits. Similar is the case with some fruits and minor forest produce which are regularly leased out to the contractors who do not allow local people to enjoy them freely. This brings the forest department to a direct confrontation with the people.

Also the idea of disposing the main products through auction is designed to earn more profit in financial terms. It ultimately affects the interests of the local villagers, particularly the poor ones, who do not get an ample chance to enjoy the main benefits of the village woodlots. The

planners had visualised fuelwood (for the local villagers) as a main produce of tree planting, while it has not been so. Now it is very much essential that the planners and managers take necessary steps to safeguard the interests of the poor people. The government should promote the socially acceptable re-distribution of benefits for the furtherance of social welfare into the rural pockets of the country. The villagers should be motivated to act together to reach a mutually agreeable way of distributing the benefits of the woodlots.

11.6. Relevance of the study

Like Gujarat, the village common lands in other states of India and in many developing countries are treated as no man's properties, leading to over-use without any proper management and protection. The people derive a number of benefits without feeling any responsibility towards the regeneration of these lands. They take their cattle for grazing without making any endeavour to improve the fodder production.

In view of this, the respective governments have taken up large-scale social forestry and community forestry projects for maintaining a required level of vegetation cover on such common lands. In the past 15-20 years, vast amounts of funds have been diverted for such projects. For instance, in India alone, a total of 0.6 million hectares of village common lands have been brought under the umbrella of the social forestry programme in the past 10-15 years. This accounts for about 20% of the total achievements of the social forestry programme in the country.

Most of the social forestry projects were taken up on an urgent basis without carrying out any realistic appraisals. In fact, they relied on the estimated figures on costs and benefits. Now it is reported that the costs have been under-estimated, while the benefits were over-estimated. Also these appraisals have not looked into the distributional aspects of social forestry programme, in general. It is believed that because of its realistic approach, this study may find some direct relevance and usefulness in many parts of India as well as some of the developing countries.

11.7. Conclusion

We have seen that the results of CBA depend on many parameters. The selection of appropriate parameters is, therefore, crucial for assessing the costs and benefits of village woodlots. It is also evident that any favour in the flow of benefits (free) towards the poorer section of the society has an adverse effect on the results of SCBA. This seems contrary to the idea that SCBA should favour the poor. The reason is the high weight given to reinvested panchayat revenues, which will be of benefit to the poor in the long term.

Looking at the regional disparities in agro-climate and site-specific variations, the application of uniform rules does not seem proper for comparing only the marketable products of woodlots in different regions. There is a need to recognise the environmental and ecological role of tree planting. It may not be always possible to tell each and every panchayat that if you allow tree planting on the panchayat land you will get additional income. As such many of the village common lands have very low capacity to support any profitable tree growth (in financial terms).

The realistic approach in estimation of intermediate products as well as the cost-effectiveness of the forest department will go a long way in the enhancement of the total benefits from the village woodlots. It should be possible to increase the social benefits by the involvement of the villagers and their panchayats.

Since the whole idea behind the scheme of village woodlots is to maximise the economic and social well-being of local villagers it is important to understand the unity between planning and cost-benefit analysis, especially the SCBA. In the light of the findings of this study and the foregoing discussions, it can be finally concluded that the befitting criteria for judging the efficacy of village woodlots must be the overall economic and social gains (both market and non-market benefits) instead of purely financial ones.

ANNEXURES

Annexure 1.1: Details of population of India and Gujarat
A = India and B = Gujarat

Census year	Total population (million)		Population growth rate (decennial %)		Population density (per sq km)		Literacy rate in percent	
	A	**B**	**A**	**B**	**A**	**B**	**A**	**B**
1901	238.3	9.1	-	-	77	46	5.4	7.3
1911	252.0	9.8	+5.8	+7.8	82	50	5.9	9.1
1921	251.2	10.2	-0.3	+3.8	81	52	7.1	10.8
1931	278.9	11.5	+11.0	+12.9	90	59	9.5	12.0
1941	318.5	13.7	+14.2	+19.3	103	70	N.A.	N.A.
1951	361.0	16.3	+13.3	+18.7	117	83	19.7	21.7
1961	439.1	20.6	+21.6	+26.9	142	105	24.0	30.5
1971	547.9	26.7	+24.8	+29.4	178	136	29.5	35.8
1981	685.2	34.1	+25.0	+27.7	216	174	36.2	43.7
1991*	843.9	41.2	+23.5	+20.8	267	210	52.1	60.9

Source: GOG (1989) * - GOI (1992).

Annexure 1.2: Indian villages and their population

Poulation size	Number of villages	Percent
<200	120,073	21.6
200-499	150,722	27.0
500-999	135,928	24.4
1,000-1,999	94,486	17.0
2,000-4,999	46,892	8.4
5,000-9,999	7,202	1.3
>10,000	1,834	0.3

Source: Agarwal and Narain (1989).

Annexure 1.3: Rural and urban population in Gujarat

Population size	Number of villages	Population size	Number of towns
<200	1,386	<5,000	13
200-499	3,472	5,000-9,999	61
500-999	4,956	10,000-19,999	86
1,000-1,999	5,108	20,000-49,999	57
2,000-4,999	2,725	50,000-99,999	27
5,000-9,999	418	>100,000	11
>10,000	49		

Source: GOG (1989).

Annexure 1.4 Population percentages according to religions

Main religions	India	Gujarat
Hindu	82.60	89.53
Muslim	11.40	8.53
Others	6.00	1.94

Source: 1981 census.

Annexure 1.5: Livestock population of India and Gujarat
(in millions)

Particulars	Total livestock	Cattle	Buffaloes	Shhep & goats
1972 census				
- India	343.3	178.4	57.4	107.5
- Gujarat	14.7	6.5	3.5	4.7
- %	4.2	3.6	6.0	4.6
1977 census				
- India	369.0	180.0	62.0	116.2
- Gujarat	14.4	6.0	3.5	4.7
- %	3.9	3.3	5.6	4.0
1982 census				
- India	419.6	192.5	69.8	144.0
- Gujarat	18.4	7.0	4.4	4.6
- %	4.4	3.6	6.4	3.9
1988 census				
- India	N.A.	N.A.	N.A.	
N.A.				
- Gujarat	17.4	6.3	4.5	5.2

Source: Various reports of GOI and GOG.

Annexure 1.6: Details of Agro-climatic zones in Gujarat

Zone No.	Sub-zone	Name	Rainfall mm	Area in m.ha.	% of total
XIII	(A)	Heavy rainfall zone of South Gujarat	>1,500-2,500		
	(A-I)	Hilly areas		0.63	3.43
	(A-II)	Plain areas		0.27	1.50
XIII	(B)	Moderate to heavy rainfall zone of South Gujarat	>1,000-<1,500	1.03	5.61

Zone No.	Sub-zone	Name	Rainfall mm	Area in m.ha.	%
XIII	(C)	Moderate rainfall zone of Central Gujarat	>800-1,000	2.23	12.16
XIII	(D)	Dry zone of North Gujarat	625-875	2.30	12.53
XIII	(E)	Arid zone of North-west Gujarat	250-500	5.75	31.32
XIII	(F)	Arid-cum-dry zone of North Saurashtra	400-700	3.50	19.06
XIII	(G)	South Saurashtra zone	750-1000	1.67	9.13
XIII	(H)	Bhal and coastal areas zone	625-1000	0.97	5.27

Source: compiled from details given in GFD (1990).

Annexure 1.7: Land-use pattern of India and Gujarat

Type of land use	India M.Ha	India %	Gujarat M.Ha	Gujarat %
- Net area sown	140.3	42.67	9.40	50.28
- Forests	67.4	20.50	1.88	10.02
- Barren & Unculturable	20.2	6.41	2.67	12.56
- Culturable waste	16.7	5.08	1.95	10.04
- Permanent pasture & grazing land	12.0	3.65	0.85	4.10
- Land under miscellaneous tree crops & other groves	3.5	1.06	0.004	0.02
- Current fallow	24.6	7.48	0.54	2.30
- Other fallow	*	*	0.33	1.43
- Land put to non-agricultural uses	19.5	5.93	1.09	5.29
- Unreported area	24.6	7.548	0.78	3.96
Total for Gujarat	328.8	100.00	19.60	100.00

* - included in current fallow.
Source: (1) India's figures are based on GOI (1985a)
(2) Gujarat's figures are based on GOG (1989).

Annexure 1.8: Changes in land-use pattern in Gujarat between 1977-78 and 1985-86

(sq km)

Type of land use	1977-78	1985-86	Change	%
Net area sown	95,424	94,020	-1,404	-1.47
Forest area	19,687	18,777	-910	-4.62
Culturable waste	20,024	19,501	-523	-2.61
Permanent pastures	8,498	8,463	-35	-0.41
Other fallows	4,136	425	-3,711	-89.72
Barren & unculturable	24,866	26,757	+1,891	+38.86
Current fallows	4,866	9,373	+4,507	+92.62
Non-agricultural use	10,568	10,891	+323	+3.06

Source: compiled from various reports of GOG and GFD.

Annexure 1.9: Various estimates of wastelands in India

Agency	M.Ha.
1. NCA(1976)	175.0
2. Gadgil, et.al. (1982)	88.0
3. SPWD (1984)*	93.5
4. Institute of offshore and coastal reaserch	55.4
6. Vohra (1985)	103.0
7. NRSA (1985)	53.3
8. Khan, Irshad (1987)	80.0
9. World Bank (1988)	115-130
10. Chamber, Saxena and Shah (1989)	84.0
11. FAO (1989)	92.7
12. Shah (1988)	100.0

* does not include degraded forest lands

Source: CSE (1986); Khan, Irshad (1987); Chamber, Saxena and Shah (1989); FAO (1989); Shah (1988).

Annexure 1.10: Forest types and their extent in India

Forest types	Sq km	Percent
I-Tropical Forests		
1-Wet Ever Green	51,249	8.0
2-Semi-" "	26,424	4.1
3-Moist Deciduous	236,794	37.0
4-Littoral & Swamps	4,046	0.6
5-Dry Deciduous	186,620	28.6
6-Thorn	16,491	2.6
7-Dry Ever Green	1,404	0.2
II-Montane Sub-Tropical Forests		
8-Sub-Tropical Broad Leaved	2,781	0.4
9- " " Pine	42,377	6.6
10- " " Dry Ever Green	12,538	2.5
III-Montane Temperate Forests		
11-Montane Wet Temperate	23,365	3.6
12-Himalayan Moist "	22,012	3.4
13- " Dry "	312	Neg.
IV-Alpine Forests		
14-Sub-Alpine)		
15-Moist ")	18,628	2.9
16-Dry ")		

Source: FSI (1987)

Annexure 1.11: A comparison of forest resources of selected countries

(Area in million hectares)

Country	Geographical Area	Forest area total	%	Closed forest	Per capita forest (Ha)
India	328.8	64.0	19.46	37.8	0.07
China	956.1	115.0	12.03	97.8	0.10
Pakistan	79.6	2.5	3.14	2.2	0.02
Indonesia	190.5	116.9	61.36	113.9	0.66
Malaysia	33.0	21.0	63.64	21.0	1.17
Brazil	851.2	514.0	60.38	357.5	3.42
Australia	768.7	106.7	13.88	41.7	6.24
U.K.	24.5	2.2	8.98	2.0	0.04
France	55.2	15.1	27.35	13.9	0.27
Canada	997.6	436.4	43.74	264.1	16.47
U.S.A.	937.3	296.0	31.58	209.6	1.18
Japan	37.8	25.3	66.93	23.9	2.05
World*	13,077.0	4,289.0	32.80	2,937.0	0.89
Developed*	5,483.0	1,968.0	35.90	1,462.0	1.63
Developing*	7,595.0	2,321.0	30.60	1,475.0	0.64

Source: World Bank, 1992.
* - (GOI, 1987).

Annexure 1.12: State-wise forest area, forest cover and per capita forests

State	Forest Area sq km	Forest cover sq km	Dense forest sq km	Per capita (ha)
Andhra Pradesh	63,726	47,290	25,017	0.10
Arunachal Pradesh	51,540	68,757	54,542	6.00
Assam	30,708	24,751	15,842	0.14
Bihar	29,226	26,668	13,285	0.03
Goa	1,256	1,253	996	0.10
Gujarat	19,388	11,907	6,224	0.05
Haryana	1,687	513	329	0.51
Himachal Pradesh	37,591	11,780	8,911	0.74
Jammu & Kashmir	20,174	20,064	10,986	0.26
Karnataka	38,646	32,199	24,856	0.09
Kerala	11,222	10,292	8,421	0.04
Madhya Pradesh	155,414	135,785	95,385	0.23
Maharashtra	63,861	44,044	26,172	0.08
Manipur	15,154	17,685	5,309	0.03
Meghalaya	9,496	15,875	3,305	0.54
Mizoram	15,935	18,853	4,279	2.32
Nagaland	8,625	14,321	3,531	0.71
Orissa	59,555	47,205	27,349	0.19
Punjab	2,842	1,343	481	0.01
Rajasthan	31,539	12,835	3,027	0.07
Sikkim	2,650	3,033	2,403	0.66
Tamilnadu	22,599	17,713	9,757	0.04
Tripura	6,292	5,535	1,825	0.23
Uttar Pradesh	51,502	33,609	22,649	0.04
West Bengal	11,379	8,015	3,381	0.02
Andaman & Nicobar	7,171	7,622	6,583	2.58
Chandigarh	31	5	4	0.005
Dadra & Nagar Haveli	207	206	159	0.15
Daman & Diu	*	2	-	*
Delhi	42	22	-	-
Laksdweep	-	-	-	-
Pondicherry	-	-	-	-
Total	770,078	639,182	385,008	0.09

* included in Goa. Source: FSI (1991).

Annexure 1.13: Functional classification of India's forests

Type	Area(m.ha.)	Role
Protection forests	10.0	Ecological stability
Production forests	16.0	Timber for industries, commerce,defence and railways.
Social forests	25.0	Firewood and fodder.
National Parks & Wildlife Sanctuaries	13.0	Protection of wildlife

Source: FSI (1987)

Annexure 1.14: Details of forest revenue and expenditure in India

(Rs in million)

Year	Revenue	Expenditue
1982-83	6,964.2	4,648.8
1983-84	7,819.3	4,935.4
1984-85	8,275.2	6,097.6
1985-86	9,156.4	7,135.6

Source: (GOI, 1987)

Annexure 1.15: Average annual yields of timber and fuelwood in Gujarat (1960-90)

Period	Timber (million cubic metres)	Fuelwood (miilion tonnes)
1960-65	0.22	0.27
1965-70	0.20	0.15
1970-75	0.17	0.18
1975-80	0.16	0.16
1980-85	0.15	0.15
1985-90	0.09	0.09

Source: GOG (1984; 1989; 1992b).

Annexure 1.16: Diversion of forest land for non-forestry uses in India (1951 to 1987)

Type of uses	million hectares
Agriculture	2.623
River Valley Projects	0.502
Industry & Township	0.134
Transmission lines & Roads	0.061
Miscellaneous	1.008
Total	4.328

Source: FSI (1987)

Annexure 1.17: Diversion of forest land in Gujarat (1960-90)

Non-forest activity	area in hectares
Submergence	25,831.33
Rehabilitation	19,414.46
Agriculture	4,598.60
Roads and transmission lines	385.73
Industries and township	1,683.70
Miscellaneous purposes	10,068.16
Sub-total	61,981.98
Occupancy rights given in Dangs	56,214.00
Authorised cultivation in forests	22,483.00
Grand total	140,678.98

Source: GFD (1992b)

Annexure 1.18: Annual Rate of deforestation in India and Gujarat

(in sq km)

Assessing agency	Year	Landsat imagery	Loss/gain in forest India	Gujarat
N.R.S.A.	1984	72-75 to 80-82	-13,000	-489
F.S.I.	1987	81-83	-	-
F.S.I.	1989	85-87	-475	-18
F.S.I.	1991	87-89	+280	-7

Source: FSI (1987; 1989; 1991)

Annexure 1.19: A comparative statement on basic indicators of selected countries

Country	Population Mid-1990 (million)	Area m.ha.	Per capita GNP (1990) US Dollars	Life expectancy (years)	ICP of GDP per capita
Low income economies					
India	849.5	328.8	350	59	4.7
China	1,133.7	956.1	370	70	-
Pakistan	112.4	79.6	380	56	8.2
Indonesia	178.2	190.5	570	62	-
Middle income economies					
Malaysia	17.9	33.0	2,320	70	-
Brazil	150.4	851.2	2,680	66	-
High income economies					
Australia	17.1	768.7	17,000	77	69.0
U.K.	57.4	24.5	16,100	76	68.0
France	56.4	55.2	19,490	77	70.0
Canada	26.5	997.6	20,470	77	92.9
USA	250.0	937.3	21,790	76	100.0
Japan	123.5	37.8	25,430	79	75.9

Note: ICP refers to the United Nation's International Comparison Programme with U.S.A. as one hundred.
Source: World Bank, 1992.

Annexure 1.20: Share of Agriculture, forestry, logging, etc. in the State Domestic Product of Gujarat
at constant prices (1980-81) (Rs. in million)

Year	Total State Domestic Product	Agriculture sector	Percentage of Agriculture
1980-81	65,940	25,950	39.3
1981-82	72,640	30,640	42.2
1982-83	71,290	26,040	36.5
1983-84	84,340	32,090	38.1
1984-85	84,570	30,640	38.2
1985-86	76,650	19,800	25.8*
1986-87	82,410	21,170	25.7*
1987-88	75,330	9,490	12.6*
1988-89	103,910	31,510	30.3
1989-90	105,420	28,100	26.7

Note: @- in 1970-71, the agriculture sector was contributing 48.9% of the total State Domestic Product.
* Decreases were due to three consecutive drought years.

Source: GOG (1991b)

Annexure 1.21: Contribution of forestry and logging sector to the gross domestic product of India

(Rs. in million)

Year	At constant prices	At current prices
1977-78	3,610	7,260
1978-79	3,860	8,730
1979-80	3,530	9,990
1980-81	3,290	10,540
1981-82	3,350	12,960
1982-83	3,110	15,090
1983-84	3,260	17,760

Source: GOI (1987)

Annexure 2.1: Details of foreign aided social forestry projects in India

States	Funding agencies	Project period	Project cost (million Rs)	Target (ha)
Andhra Pradesh	CIDA	1983-90	383.78	150,725
Bihar	SIDA	1985-91	538.57	168,200
Gujarat	WB	1980-85	654.00	274,280
Gujarat	WB/USAID	1985-90	1,296.50	313,400
Haryana	WB/DANIDA	1982-90	333.25	67,000
Himachal Pradesh	WB/USAID	1985-90	572.90	112,833
Jammu & Kashmir	WB/DANIDA	1982-90	237.40	44,000
Karnataka	WB/ODA	1983-88	552.30	149,500
Kerala	WB	1984-90	599.11	85,300
Madhya Pradesh	USAID	1981-86	470.00	63,450
Maharashtra	USAID	1982-90	564.00	81,000
Orissa	SIDA	1983-88	281.70	134,400
Orissa	SIDA	1988-93	783.40	83,500
Rajasthan	WB/USAID	1985-90	391.90	120,800
Tamilnadu	SIDA	1981-88	591.38	224,495
Tamilnadu	SIDA	1988-93	854.00	78,380
Uttar Pradesh	WB	1979-84	400.00	95,071
Uttar Pradesh	WB/USAID	1985-90	1,611.60	161,950
West Bengal	WB	1981-90	348.65	93,000
Total			11,464.44	2,501,284

Gujarat' share

cost-wise (percent to total)	17.01
Area-wise (percent to total)	23.49

WB = World Bank.
Note: The village woodlot scheme contribute nearly 20% of the total covergae in India and about 15% of the village woodlots of India are in Gujarat state.
Source: NWDB.

Annexure 2.2: Plan-wise details of afforestation in India

Plans	Area covered ('000 ha)	Amount spent (Rs in million)
I (1951-56)	52	12.80
II (1956-61)	311	68.60
III(1961-66)	583	211.30
(1966-69)	453	230.02
IV (1969-74)	714	443.40
V (1974-79)	1,221	1,072.80
(1979-80)	222	371.00
VI (1980-85)	4,650	9,260.10
VII(1985-90)	8,880	24,558.60

Source: NWDB.

Annexure 3.1: Survival rate of trees in Gujarat

(in percent)

Districts	All plantations	Farm forestry	Non-farm forestry	Village woodlots
Valsad	79.06	39.81	83.80	90.80
Surat	67.41	57.16	69.04	88.20
Vadodara	65.09	47.69	74.45	79.68
Kheda	74.54	45.00	79.93	82.16
Mahesana	63.91	41.28	76.01	76.80
Banaskantha	59.08	15.51	62.32	73.12
Sabarkantha	65.14	29.61	71.09	79.91
Junagadh	55.81	20.25	63.07	65.25
Gujarat	66.87	40.67		

Source: IIPO (1991).

Annexure 5.1

VILLAGE PROFILE

Name of village :_____

Name of taluka :_____

Name of district:_____

(1) Lan-duse details:

- Total land :_____
- Agriculture land :_____
- Grazing land :_____
  - total :_____
  - under village woodlot:_____

(2) Population details:

- Total population :_____
- No.of households :_____
- Big farmers :_____
- Small farmers :_____
- Marginal farmers :_____
- Landless :_____

(3) Livestock details:

- Total no. :_____
- Cattle :_____
- Sheep and goats :_____

Annexure 5.2

QUESTIONNAIRE FOR FIELDWORK IN GUJARAT, INDIA

Name of village :————————————————

Name of taluka :————————————————

Name of district:————————————————

Name of the respondent:————————————————

Category : Panchayat member (VPR) [ ]
Big farmer (BF) [ ]
Small farmer (SF) [ ]
Marginal farmer (MF) [ ]
Landless labourer (LL) [ ]

(A) Agency for raising village woodlots

1. Which of the following agencies have raised village woodlots in your village?

Forest Department [ ]1 Panchayat [ ]2
Other [ ]3

2. Who raised the first village woodlot in your village?

Forest Department [ ]1 Panchayat [ ]2
Other [ ]3

(B) Reasons for raising village woodlots

3. What are the main reasons for raising the village woodlots?

Fuelwood [ ]1 Fodder [ ]2
Timber [ ]3 Income [ ]4
Employment [ ]5 Land reclamation [ ]6

(C) Resolution and Agreement for village woodlots

4. Are you aware of any resolution of Panchayat for raising the village woodlot on panchayat land?

Aware [ ]1 Not aware [ ]2

5. Are you aware of any agreement for the village woodlot?

Aware [ ]1 Not aware [ ]2

(D) Choice of species for village woodlots

6. Who selected the species?

Forest Department [ ]1 Village Panchayat [ ]2
Both [ ]3

7. Do you agree with the chosen species?

Agree [ ]1 Disgree [ ]2

8. In your opinion which species are suitable for planting in the village woodlots? (Give only five)

[1] _____
[2] _____
[3] _____
[4] _____
[5] _____

(E) Protection problems for village woodlots

9. What are the protection problems in your village woodlots?

Grazing [ ]1 Fire hazard [ ]2
Damage by people [ ]3 Other [ ]4

(F) Condition of the village woodlots

10. In your opinion what is the condition of your village woodlot?

Very good [ ]1 Good [ ]2
Bad [ ]3 Very bad [ ]4

(G) Access to the villagers for using the produce of the village woodlots

11. Who is allowed to use the produce from woodlots?

Landless [ ]1 Farmers [ ]2
None [ ]3 All [ ]4

(H) Accrual of benefits from village woodlots

12. Which intermediate produce do villagers get from the woodlots?

Fodder	[ ]1	Fuelwood	[ ]2
Minor forest produce	[ ]3	Poles	[ ]4
None	[ ]5		

13. Who takes out the intermediate produce?

Forest department	[ ]1	Panchayat	[ ]2
Villagers	[ ]3		

14. Has any of the village woodlot been harvested in your village so far?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

15. Who organises harvesting of the village woodlot?

Forest department	[ ]1	Panchayat	[ ]2
Both	[ ]3	Other	[ ]4

16. What were the main produce from harvested woodlot?

Fuelwood	[ ]1	Timber	[ ]2
Poles	[ ]3		

17. How were the main produce disposed of?

Free distribution	[ ]1	Subsidised rates	[ ]2
Auction	[ ]3		

18. Did the villagers oppose the auction of the produce?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

(I) Income from the village woodlots

19. Are you aware of any income to the Panchayat from the woodlots?

Aware	[ ]1	Not aware	[ ]2

20. How does the Panchayat utilise the income?

School building	[ ]1	Panchayat building	[ ]2
Village road	[ ]3	Raising of woodlot	[ ]4
Other	[ ]5		

(J) Involvement of villagers in the activities of village woodlots

21. In your opinion how is the involvement of people in raising of the village woodlots?

High	[ ]1	Medium	[ ]2
Low	[ ]3	Don't know	[ ]4

22. How does your village resolve the issues relating to the village woodlots?

Panchayat meetings	[ ]1	Gram Sabha	[ ]2
By the Forest Dept.	[ ]3	Don't know	[ ]4

(K) Willingness to manage the village woodlots

23. Can your Panchayat manage the village woodlots ?

Yes	[ ]1	No	[ ]2

24. Has your Panchayat asked the Forest Department for transfer of any of the woodlots?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

25. Has any of the woodlot been transferred to the Panchayat by the Forest department?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

26. How is the condition of the transferred village woodlots now?

Very good	[ ]1	Good	[ ]2
Bad	[ ]3	Don't know	[ ]4

(L) Self-help village woodlots

27. Is there a self-help village woodlot in your village?

Yes	[ ]1	No	[ ]2

28. What are the reasons for raising self-help woodlot?

For 100 % benefits	[ ]1	People's cooperation	[ ]2
Freedom for works	[ ]3	Freedom for use	[ ]4
External Funding	[ ]5		

29. Does the Panchayat pay for the works in self-help village woodlots?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

30. Is self-help village woodlot better than the departmental woodlot?

Better	[ ]1	Both good	[ ]2
Bad	[ ]3		

(M) Condition and use of Panchayat (gaucher) land

31. What was the condition of Panchayat (gaucher) land before establishment of the village woodlots?

Barren wasteland	[ ]1	Grassland	[ ]2
Degraded	[ ]3	Productive	[ ]4
Don't know	[ ]5		

32. What were the main uses of panchayat land before establishment of the village woodlots?

Grazing	[ ]1	Fodder source	[ ]2
Fuel source	[ ]3	Encroachment	[ ]4
Other	[ ]5	Don't know	[ ]6

33. Was the Panchayat getting any income from this land before establishment of the village woodlots?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

34. Is there any other Panchayat (gaucher) land in your village?

Yes	[ ]1	No	[ ]2

35. What is the condition of the remaining Panchayat land?

Barren wasteland	[ ]1	Grassland	[ ]2
Under encroachment	[ ]3	Other	[ ]4
Don't know	[ ]5		

36. What are the main benefits of the remaining Panchayat land?

Grazing	[ ]1	Fuel	[ ]2
Fodder	[ ]3	M.F.P.	[ ]4
Don't know	[ ]5		

37. Is there any income to the Panchayat from the remaining Panchayat land?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

(N) Attitude and perception of villagers

38. Who opposes tree plantation on the Panchayat (gaucher) land?

Landless	[ ]1	Graziers	[ ]2
Small/marginal farmers	[ ]3	Big farmers	[ ]4
Don't know	[ ]5		

39. Did the villagers get some employment in the village woodlots?

Yes	[ ]1	No	[ ]2

40. Who objected for not employming the villagers in the village woodlots?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

41. Do the village woodlots help in meeting the forest produce's requirement of the villagers?

Yes	[ ]1	No	[ ]2
Don't know	[ ]3		

42. Is it good to raise more village woodlots in your village?

Yes	[ ]1	No	[ ]2

43. Who is responsible for protection of the woodlots?

Forest department	[ ]1	Panchayat	[ ]2
Both	[ ]3	Villagers	[ ]4

44. Who is the owner of village woodlots?

Forest department	[ ]1	Panchayat	[ ]2
Both	[ ]3	Villagers	[ ]4

45. Which type of woodlots should be raised in your village?

Departmental	[ ]1	Self-help	[ ]2
Both	[ ]3	Don't know	[ ]4

46. Who should organise harvesting of village woodlots?

Forest department	[ ]1	Panchayat	[ ]2
Villagers	[ ]3	Contractor	[ ]4
Other	[ ]5		

47. How do the villagers wish to distribute the produce from the village woodlots?

Free	[ ]1	Subsidised rate	[ ]2
Auction	[ ]3		

48. Should the produce from the village woodlots be sold at market price for realising maximum income to the village Panchayat?

Yes [ ]1 No [ ]2

49. Should the villagers be allowed to use the forest produce from village woodlots?

Yes [ ]1 No [ ]2

50. Should the village woodlot scheme be continued in your village?

Yes [ ]1 No [ ]2

Annexure 5.3

List of sampled villages showing category-wise number of respondents interviewed during the questionnaire survey

Code No.	Villages	District	Category of respondents (no.) VPR	BF	SF	MF	LL
1.1	Borbhatabet	Bharuch	1	2	3	4	5
1.2	Kasad	Bharuch	1	2	3	4	5
1.3	Pungam	Bharuch	1	2	3	4	5
1.4	Umra	Bharuch	1	2	3	4	5
2.1	Aganrai	Junagadh	1	2	3	4	5
2.2	Balot	Junagadh	1	2	3	4	5
2.3	Makhiyana	Junagadh	1	2	3	4	5
2.4	Palasva	Junagadh	0	2	3	0	5
3.1	Hajipar	Kachchh	1	2	3	4	5
3.2	Nagalpar	Kachchh	1	0	3	4	5
3.3	Samatra	Kachchh	1	2	3	4	5
3.4	Sukhpar	Kachchh	1	2	3	4	5
4.1	Alindra	Kheda	0	2	3	4	5
4.2	Bondani	Kheda	1	2	3	4	5
4.3	Gorel	Kheda	1	2	3	4	5
4.4	Javel	Kheda	1	2	3	4	5
5.1	Bhandu	Mahesana	1	2	3	4	5
5.2	Dediasan	Mahesana	1	2	3	4	5
5.3	Dharpur	Mahesana	1	2	3	4	5
5.4	Piludra	Mahesana	1	2	3	4	5
6.1	Gadhka	Rajkot	1	2	3	4	5
6.2	Kagwad	Rajkot	1	2	3	4	5
6.3	Kolithad	Rajkot	1	2	3	4	5
6.4	Kotharia	Rajkot	1	2	3	4	5
7.1	Daliyasar	S.Nagar	1	2	3	0	5
7.2	Janivadla	S.Nagar	0	2	3	4	3
7.3	Nana Kerala	S.Nagar	1	2	3	4	5
7.4	Vadod	S.Nagar	1	2	3	4	5
8.1	Barsol	Valsad	1	2	3	4	5
8.2	Fadvel	Valsad	1	2	3	4	5
8.3	Jamadiya	Valsad	1	2	3	4	5
8.4	Ugat	Valsad	1	2	3	4	5
32 villages		8 districts	29	62	96	120	160

Total number of respondents = 467

Note: VPR = Village Panchayat Representative
BF = Big Farmer
SF = Small Farmer
MF = Marginal Farmer
LL = Landless Labourer

Annexure 5.4: Planning for the fieldwork

Looking at the nature of data requirement and field survey work, an advance planning was considered necessary to organise the fieldwork in a coherent manner. The required questionnaire and formats were designed out and finalised in the first six months of the study. Simultaneously, the necessary permissions and approvals were obtained from the concerned authorities, i.e. Commonwealth Scholarship Commission, The World Bank, Government of India (National Wastelands Development Board), etc.

Dr Colin Price (Director of Studies) took special interest and requested the National Wastelands Development Board for extending all possible help during the fieldwork in Gujarat (5.4.a). Copies of his letter were also marked to the Commonwealth Scholarship Commission, Principal Chief Conservator of Forests, Gujarat state and Conservator of Forests (Social Forestry), Gujarat state. Following this, Mrs Kathleen Roberts (my Commonwealth Awards Administrator) wrote to the National Wastelands Development Board for necessary cooperation (5.4.b).

The prompt response of the National Wastelands Development Board (5.4.c) was quite encouraging. Finally the Chief Conservator of Gujarat (Social Forestry) took very special interest and supported the idea of Social cost-benefit analysis of social forestry and immediately requested all of the Conservators of Forests and all of the Deputy Conservator of Forests for rendering the necessary help and support during the fieldwork (5.4.d).

In view of the above facts, the fieldwork was undertaken between December, 1991 and May, 1992. It was possible to collect the relevant information in the stipulated time period.

5.4.a

Prifysgol Cymru · University of Wales
BANGOR

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29th October, 1991.

To,
Mr Samar Singh, IAS
Additional Secretary,
National Wastelands Development Board,
Ministry of Environment & Forests,
Paryavaran Bhavan, C.G.O. Complex,
Lodhi Road, **NEW DELHI,** 110003
INDIA.

SUBJECT : Field work in connection with Research work of Mr J.A.Khan, Commonwealth Scholar...

Dear Sir,

You are aware that Mr J.A.Khan is sponsored by the Government of India as a Commonwelth Scholar in the United Kingdom for doing PhD in Forest Economics. He has been working under my supervision in this Institution on the subject of social Cost-benefit Analysis of Social forestry in Gujarat state, India since October, 1990. This you will appreciate is a topic of great importance.

From the direction his research has taken, it has become clear that Mr Khan's visit to Gujarat, India is essential to enable his work to achieve full relevance. The data he seeks are of the kind that cannot be obtained by postal survey, and require an on-the-spot interview by him if the depth of response required is to be elicited. In order that he may produce realistic conclusions, it is necessary that he should spent some weeks undertaking fieldwork on which the cost-benefit analysis will be based.

I am enclosing herewith a complete and well thought out proposal showing the time-schedule for his field

Athro a Phennaeth yr Ysgol
Professor and Head of School
J B Owen, BSc, PhD, MA, FIBiol

work. I am confident that with the support of the National Wastelands Development Board, he can achieve his objectives with the time and resources available.

I would be extremely grateful for your co-operation in assisting Mr Khan in this important work. I would like to request you to extend all possible help to Mr Khan for successful conducting of the interviews in the randomly chosen sample villages, particularly by making travelling, lodging & boarding arrangements and also in obtaining the necessary information at all levels.

I would add further that Mr Khan's work is very satisfactory. He has been an exemplary and industrious student, and has shown himself capable of work of high quality. I hope it will be possible to support him in these ways, so that he may derive maximum benefit from his period of research to bring his doctoral thesis to a more meaningful conclusion.

With sincere thanks,

Yours faithfully

Dr Colin Price, M.A., DPhil (Oxon)
Director of Studies & Senior Lecturer

Enclosure : Proposed Field work of Mr J.A. Khan.

c.c. (1) **The Joint Secretary**, Department of Education, Ministry of Human Resources & Development, Shastri Bhavan, New Delhi, India. 110001.

(2) **The Principal Chief Conservator of Forests,** Forest Department, Kothi Annexe, Raopura, Vadodara, Gujarat, India. 390001

(3) **The Chief conservator of Forests**, Social Forestry, Kothi Annexe, Raopura, Vadodara, Gujarat, India. 390001

(4) **Miss Kathleen Roberts**, Commonwealth Awards Administrator, Commonwealth Scholarship Commission, Association of Commonwealth Universities, John Foster House, 36, Gordon Square, LONDON, U.K. WC1H OPF.

(5) **Mr J.A.Khan.**

Dr Colin Price, M.A., DPhil (Oxon)
Director of Studies & Senior Lecturer

5.4.b

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11 November 1991

Dear Sir

Mr JAMAL AHMAD KHAN - FIELDWORK IN CONNECTION WITH COMMONWEALTH SCHOLARHIP TENABLE FOR PhD IN FOREST ECOMICS AT THE UNIVERSITY COLLEGE OF NORTH WALES, BANGOR

Mr Jamal Ahmad Khan holds a Commonwealth Scholarship awarded by the Commonwealth Scholarship Commission in the United Kingdom for research in the Cost-benefit Analysis of Social Forestry which I understand to be a topic of great importance to India.

Dr Colin Price has copied to me his letter adressed to you and dated 29 October and I am now writing to endorse his comments. The Commission would be extremely grateful for your co-operatation and any assistance you are able to give this excellent student in carrying out his essential fieldwork in Gujarat State.

I take pleasure in thanking you in advance,

Yours sincerely

Kathleen Roberts
Commonwealth Awards Administrator

Mr Samar Singh, IAS
Additional Secretary
National Wastelands Development Board
Ministry of Environment and Forests
Paryavaran Bhavan, CGO Complex
Lodhi Road
NEW DELHI 110003
INDIA

राष्ट्रीय परती भूमि विकास बोर्ड
पर्यावरण तथा वन मंत्रालय, भारत सरकार

सत्यमेव जयते

NATIONAL WASTELANDS DEVELOPMENT BOARD
Ministry of Environment & Forests, Government of India

I.A. KHAN
DIRECTOR(IC)
TELE.362497

Ref.

Date

No.1/Misc./Dir(IC)/91
Dated: November 14, 1991

Dear Dr. Price,

Please refer to your letter dated 29th October, 1991, regarding the field work in connection with Research work of Mr. J.A. Khan, Commonwealth Scholar. We have formally requested the Principal Chief Conservator of Forests, Gujarat, to provide all assistance to Mr. Khan in carrying out field survey essential for his Research work. Mr. Khan was earlier working in our organisation and he belongs to the Gujarat State cadre of Indian Forest Service and, therefore, all necessary cooperation will be extended to him during his visit to NWDB and Gujarat.

With kind regards,

Yours sincerely,

(I.A. Khan)

Dr. Colin Price,
Director of Studies & Senior Lecturer,
University College of North Wales,
Deinlol Road,
Bangor, Gwynedd LL57 2UW

CC: Mr. J.A. Khan, PhD student,
University College of North Wales,
Forest Economics Wing,
Deiniol Road, Bangor,
Gwynedd, U.K.

Sub : Visit of Shri J.A.Khan, I.F.S.
to Gujarat State

NO.SF/B-T.S/5956-81 of 1991-92
Vadodara, dated: 20 Nov.,1991

Ref : Mr. J.A.Khan's letter dated 17th October, 1991 (Copy enclosed).

All the Conservator of Forests, Social Forestry Circles and all the Deputy Conservators of Forests, Social Forestry Divisions are requested to cooperate with Shri J.A. Khan, to render all the necessary help and support when he happens to visit their circles, divisions in connection of his research work involving social cost-benefit analysis of community forestry project in Gujarat from January 1992 To April 1992.

(R. L. JAVA)
Chief Conservator of Forests,
Social Forestry,G.S.,
Vadodara.

Suresh/1811/

Encl : As stated

To,

The Conservator of Forests,
Social Forestry Circle, (all).

The Deputy Conservator of Forests,
Social Forestry Divisions (all).

Annexure 6.1 Details of operations in rainfed and irrigated village woodlots

Particulars	Rainfed woodlots	Irrigated woodlots
Land preparation	pits measuring 30x30x30 cm	Site clearing, ploughing, levelling, water channels,
Protection	trench-cum live hedge (0.6 m deep, 1.2 m wide at top, 0.6 m wide at the bottom).	trench-cum live hedge (0.3x0.3 m)
Watchman	per 10 ha	per 4 ha
Seedlings	8 months old	6 months old
Tending		
Ist year	3 weeding and soil working in monsoon	3 weeding and soil working in monsoon, 5 watering followed by weeding and soil working
IInd year	2 weeding and soil working in monsoon	2 weeding and soil working in monsoon, 4 watering followed by weeding and soil working
IIIrd year	1 weeding and soil working in monsoon	1 weeding and soil working in monsoon, 4 watering followed by weeding and soil working
Ist year	-	4 watering followed by weeding and soil working
Harvesting	8th year	5th year.

Source: GFD (1990).

Annexure 6.2: District-wise distribution of harvested village woodlots

(area in hectares)

Region/ district	Rainfed woodlots		Irrigated woodlots	
	no.	area	no.	area
- Valsad	11	56.00	0	0.00
- Surat	6	26.00	0	0.00
- Bharuch	16	60.00	0	0.00
- Vadodara	7	41.00	0	0.00
- Ahmedabad	15	76.07	1	2.00
- Kheda	10	42.00	3	8.00
- Panchmahal	6	24.00	4	17.00
- Mahesana	11	63.01	0	0.00
- Sabarkantha	4	23.00	0	0.00
- Banaskantha	13	58.00	0	0.00
- Amreli	1	35.20	0	0.00
- Bhavnagar	3	43.00	0	0.00
- Junagadh	8	99.00	2	17.00
- Rajkot	2	13.00	0	0.00
- Jamnagar	0	0.00	1	3.00
Total	113	656.28	11	47.00

Annexure 6.3: District-wise survival rate of trees at the time of harvesting of village woodlots

(in percents)

Region/ district	Rainfed woodlots	Irrigated woodlots
- Valsad	59.91	-
- Surat	39.00	-
- Bharuch	54.75	-
- Vadodara	19.06	-
- Ahmedabad	46.00	4.86
- Kheda	32.25	31.07
- Panchmahal	12.35	17.94
- Mahesana	51.96	-
- Sabarkantha	23.50	-
- Banaskantha	57.08	-
- Amreli	57.07	-
- Bhavnagar	91.13	-
- Junagadh	39.25	87.80
- Rajkot	25.45	-
- Jamnagar	-	16.69

Annexure 6.4: District-wise details of the intermediate produce obtained from the harvested village woodlots

Region/ district	Type of the intermediate produce obtained		
	Grass		Minor forest produce
	Quintals	Rs	Rs
- Valsad	1,250	27,841	-
- Surat	984	6,290	10,100
- Bharuch	40	2,000	-
- Vadodara	-	-	-
- Ahmedabad	457	14,100	9,070
- Kheda	73	1,770	-
- Panchmahal	-	-	-
- Mahesana	118	5,540	10,000
- Sabarkantha	1,760	35,200	3,000
- Banaskantha	150	3,000	8,929
- Amreli	-	-	-
- Bhavnagar	-	-	-
- Junagadh	9	550	-
- Rajkot	-	-	-
- Jamnagar	-	-	-

Annexure 6.5: District-wise details of the final produce obtained from the harvested village woodlots

Region/	Timber cmt	Fuelwood quintals	Charcoal quintals
- Valsad	654	1,172	-
- Surat	162	2,135	-
- Bharuch	5	6,537	-
- Vadodara	45	3,747	-
- Ahmedabad	585	18,944	-
- Kheda	121	2,928	-
- Panchmahal	118	81	-
- Mahesana	-	6,608	376
- Sabarkantha	18	640	-
- Banaskantha	33	19,282	2,111
- Amreli	-	1,126	-
- Bhavnagar	-	4,177	-
- Junagadh	-	4,258	-
- Rajkot	10	825	-
- Jamnagar	-	454	-

Annexure 7.1: Frequency tables (question-wise) for the sampled districts and respondent-wise in four regions of Gujarat

This annexure furnishes the details of the sorting of the answers for each individual question (option-wise) in different ways and combinations. It attempts to present an overall picture of the distribution of responses from different angles. In the beginning, sorting of responses is given for the eight sampled districts. Thereafter, the respondent-wise sorting for four different regions of Gujarat are presented. In the last portion, the summarised figures are shown for each of the regions, followed by the total for Gujarat at the last.

For each of the categories mentioned above, the total number (N) is indicated as a comparing figure. However, the total number varies for some of the questions as they were addressed to a limited number of villages which were concerned about those aspects. For example, questions number 15 to 20 were meant for only seven villages (one each in Bharuch and Junagadh; and two each in Kheda, Mahesana and Valsad districts, respectively). Similarly, the question number 26 was confined to eight villages (one each in Bharuch and Kachchh; and two each in Kheda, Mahesana and Valsad districts, respectively). Further, the questions number 27 to 30 were pursued in seven villages (one in Bharuch and Valsad; two in Mahesana; and three in Rajkot districts, respectively).

Frequency Tables (Question 1 to 10 except 8)

VPR = Village panchayat representative, BF = big farmer, SF = small farmer, MF = marginal farmer, LL = landless

CATEGORY		N	Q. NO. 1			Q. NO. 2			Question No. 3						Q.No. 4		Q.No. 5		Question No. 6			Q. No. 7		Question No. 9				Question No. 10			
			1	2	3	1	2	3	1	2	3	4	5	6	1	2	1	2	1	2	3	1	2	1	2	3	4	1	2	3	4
BHARUCH		60	60	0	0	60	0	0	19	18	11	42	27	0	39	21	19	41	45	2	13	60	0	30	1	22	15	16	27	12	5
JUNAGADH		55	55	0	0	55	0	0	55	29	14	0	17	0	30	25	24	31	41	1	13	44	11	40	0	24	1	13	22	18	2
KACHCHH		58	58	0	0	58	0	0	37	28	1	14	20	6	46	12	17	41	18	6	34	57	1	55	0	1	12	16	23	12	7
KHEDA		59	59	0	0	59	0	0	39	22	22	33	19	3	54	5	15	44	57	1	1	58	1	50	0	31	0	8	35	13	3
MAHESANA		60	60	0	0	54	5	1	19	10	4	32	1	0	48	12	30	30	59	1	0	59	1	16	0	48	0	10	27	14	9
RAJKOT		60	60	0	0	60	0	0	24	11	5	7	45	8	9	51	5	55	37	0	23	59	1	50	0	22	2	8	24	18	10
S. NAGAR		55	55	0	0	55	0	0	47	8	1	2	4	9	44	11	39	16	49	1	5	53	2	50	1	16	1	9	27	16	3
VALSAD		60	60	11	11	60	0	0	44	10	34	45	41	0	50	10	34	26	59	1	0	60	0	56	14	42	1	11	30	16	3
SOUTH	VPR	8	8	1	1	8	0	0	4	2	4	7	5	0	8	0	7	1	5	1	2	8	0	5	2	4	1	4	3	1	0
GUJARAT.	BF	16	16	0	0	16	0	0	7	4	8	13	10	0	15	1	12	4	14	0	2	16	0	11	1	10	2	4	8	4	0
	SF	24	24	1	1	24	0	0	14	5	11	19	14	0	19	5	11	13	21	0	3	24	0	17	4	15	3	5	9	8	2
	MF	32	32	4	4	32	0	0	14	8	12	24	19	0	25	7	12	20	29	0	3	32	0	24	3	16	5	6	18	7	1
	LL	40	40	5	5	40	0	0	24	9	10	24	20	0	22	18	11	29	35	2	3	40	0	29	5	19	5	8	19	8	5
CENTRAL	VPR	3	3	0	0	3	0	0	1	1	1	3	1	1	3	0	2	1	3	0	0	3	0	3	0	2	0	1	2	0	0
GUJARAT	BF	8	8	0	0	8	0	0	3	1	2	6	2	1	6	2	6	2	8	0	0	8	0	6	0	3	0	2	4	2	0
	SF	12	12	0	0	12	0	0	9	7	5	6	4	0	12	0	2	10	11	0	1	12	0	12	0	5	0	1	8	2	1
	MF	16	16	0	0	16	0	0	9	5	7	9	5	1	16	0	2	14	16	0	0	15	1	13	0	10	0	2	8	4	2
	LL	20	20	0	0	20	0	0	17	8	7	9	7	0	17	3	3	17	19	1	0	20	0	16	0	11	0	2	13	5	0
NORTH	VPR	4	4	0	0	3	1	0	0	0	0	4	0	0	4	0	3	1	4	0	0	4	0	1	0	4	0	1	2	1	0
GUJARAT	BF	8	8	0	0	5	2	1	2	0	0	5	1	0	6	2	4	4	8	0	0	8	0	3	0	5	0	1	4	2	1
	SF	12	12	0	0	10	2	0	4	4	0	6	0	0	9	3	5	7	11	1	0	12	0	2	0	11	0	1	5	3	3
	MF	16	16	0	0	16	0	0	5	6	0	8	0	0	15	1	10	6	16	0	0	15	1	4	0	13	0	2	7	4	3
	LL	20	20	0	0	20	0	0	8	0	4	9	0	0	14	6	8	12	20	0	0	20	0	6	0	15	0	5	9	4	2
SAURASH	VPR	14	14	0	0	14	0	0	9	6	1	2	8	4	12	2	6	8	6	0	8	14	0	10	0	6	2	6	7	1	0
&	BF	30	30	0	0	30	0	0	21	14	1	4	11	3	20	10	11	19	17	0	13	27	3	24	0	12	2	6	10	10	4
KACHCHH	SF	48	48	0	0	48	0	0	36	16	8	6	14	4	28	20	17	31	27	0	21	43	5	42	0	10	2	8	18	19	3
	MF	56	56	0	0	56	0	0	36	19	5	5	24	6	28	28	20	36	37	4	15	55	1	50	1	10	5	12	28	10	6
	LL	80	80	0	0	80	0	0	61	21	6	6	29	6	41	39	31	49	58	4	18	74	6	69	0	25	5	14	33	24	9
South Gujarat		120	120	11	11	120	0	0	63	28	45	87	68	0	89	31	53	67	104	3	13	120	0	86	15	64	16	27	57	28	8
Centr Gujarat		59	59	0	0	59	0	0	39	22	22	33	19	3	54	5	15	44	57	1	1	58	1	50	0	31	0	8	35	13	3
North Gujarat		60	60	0	0	54	5	1	19	10	4	32	1	0	48	12	30	30	59	1	0	59	1	16	0	48	0	10	27	14	9
Saur & Kachchh		228	228	0	0	228	0	0	163	76	21	23	86	23	129	99	85	143	145	8	75	213	15	195	1	63	16	46	96	64	22
Gujarat		467	467	11	11	461	5	1	284	136	92	175	174	26	320	147	183	284	365	13	89	450	17	347	16	206	32	91	215	119	42

Frequency Tables (Question 11 to 20)

VPR = Village panchayat representative, BF = big farmer, SF = small farmer, MF = marginal farmer, LL = landless

CATEGORY		N	QUEST NO. 11				QUESTION NO. 12					Q. NO. 13			Q. NO. 14			N	QUEST. NO.15				QUEST. NO. 16			QUEST. NO.17			Q.NO.18			Q.NO.19		Q. NO.20				
			1	2	3	4	1	2	3	4	5	1	2	3	1	2	3		1	2	3	4	1	2	3	1	2	3	1	2	3	1	2	1	2	3	4	5
BHARUCH		60	0	0	19	41	55	0	11	0	5	16	31	13	15	45	0	15	14	0	0	1	15	0	0	0	0	15	0	13	2	15	0	0	0	0	15	12
JUNAGADH		55	1	0	10	44	51	3	0	0	4	34	17	13	15	39	1	15	15	0	0	0	15	0	0	9	6	6	0	5	10	2	13	0	0	0	0	15
KACHCHH		58	1	0	48	9	27	5	4	5	22	27	10	30	0	47	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
KHEDA		59	13	13	19	26	57	20	31	0	2	22	10	28	30	29	0	30	30	0	0	0	30	29	1	0	3	30	0	23	7	29	1	1	1	1	1	29
MAHESANA		60	19	0	11	30	45	4	1	1	10	21	15	25	30	20	10	30	29	0	1	0	27	3	0	0	0	30	5	10	15	27	3	13	1	0	8	13
RAJKOT		60	5	4	38	14	60	0	0	0	0	60	1	0	0	54	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
S. NAGAR		55	9	0	10	36	48	5	0	0	4	51	1	3	0	55	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VALSAD		60	24	9	19	17	43	29	12	14	0	16	34	16	30	29	1	30	30	0	0	0	17	28	10	2	10	30	1	18	11	19	11	15	1	15	0	14
SOUTH	VPR	8	2	1	3	3	6	2	2	1	0	2	4	3	3	5	0	3	3	0	0	0	2	2	1	0	0	3	0	2	1	3	0	1	1	1	1	1
GUJARAT.	BF	16	4	2	5	7	14	3	5	1	0	6	8	3	6	10	0	6	6	0	0	0	5	4	0	0	2	6	0	5	1	5	1	2	0	2	2	4
	SF	24	4	1	11	9	20	7	6	3	0	5	15	6	9	15	0	9	9	0	0	0	7	5	2	0	2	9	1	6	2	7	2	3	0	3	3	6
	MF	32	4	0	10	18	26	9	7	5	0	9	16	8	12	19	1	12	12	0	0	0	8	7	2	0	2	12	0	8	4	9	3	4	0	4	4	6
	LL	40	10	5	9	21	32	8	3	4	5	10	22	9	15	25	0	15	14	0	0	1	10	10	5	2	4	15	0	10	5	10	5	5	0	5	5	9
CENTRAL	VPR	3	1	0	0	2	3	1	2	0	0	0	1	2	2	1	0	2	2	0	0	0	2	2	1	0	1	2	0	2	0	1	1	1	1	1	1	1
GUJARAT	BF	8	0	1	1	6	7	1	3	0	1	3	0	5	4	4	0	4	4	0	0	0	4	4	0	0	0	4	0	4	0	4	0	0	0	0	0	4
	SF	12	3	2	4	6	11	3	8	0	1	5	2	6	6	6	0	6	6	0	0	0	6	5	0	0	1	6	0	6	0	6	0	0	0	0	0	6
	MF	16	3	4	7	5	16	7	6	0	0	6	2	8	8	8	0	8	8	0	0	0	8	8	0	0	1	8	0	6	2	8	0	0	0	0	0	8
	LL	20	6	6	7	7	20	8	12	0	0	8	5	7	10	10	0	10	10	0	0	0	10	10	0	0	0	10	0	5	5	10	0	0	0	0	0	10
NORTH	VPR	4	1	0	1	2	2	0	0	0	2	1	2	2	2	2	0	2	2	0	0	0	2	0	0	0	0	2	0	1	1	2	0	1	0	0	1	1
GUJARAT	BF	8	2	0	2	4	5	1	1	0	2	3	0	5	4	2	2	4	4	0	0	0	4	0	0	0	0	4	0	2	2	3	1	1	0	0	2	2
	SF	12	4	0	2	6	9	0	0	1	2	3	3	6	6	5	1	6	5	0	1	0	6	0	0	0	0	6	0	3	3	5	1	1	0	0	0	5
	MF	16	6	0	2	8	13	1	0	0	2	6	4	6	8	7	1	8	8	0	0	0	6	2	0	0	0	8	1	3	4	7	1	4	0	0	2	4
	LL	20	6	0	4	10	16	2	0	0	2	8	6	6	10	4	6	10	10	0	0	0	9	1	0	0	0	10	4	1	5	10	0	6	1	0	3	1
SAURASH	VPR	14	0	1	5	8	13	1	1	0	0	9	3	3	1	12	1	1	1	0	0	0	1	0	0	0	1	1	0	1	0	1	0	0	0	0	0	1
&	BF	30	0	0	17	13	26	2	1	0	3	24	5	3	2	27	1	2	2	0	0	0	2	0	0	1	1	1	0	2	0	1	1	0	0	0	0	2
KACHCHH	SF	48	4	0	25	20	40	0	0	1	7	40	7	7	3	45	0	3	3	0	0	0	3	0	0	3	0	0	0	0	3	0	3	0	0	0	0	3
	MF	56	8	0	21	27	44	1	0	3	8	39	8	13	4	41	11	4	4	0	0	0	4	0	0	4	0	0	0	2	2	0	4	0	0	0	0	4
	LL	80	4	3	38	35	63	9	2	1	12	60	6	20	5	70	5	5	5	0	0	0	5	0	0	1	4	4	0	0	5	0	5	0	0	0	0	5
South Gujarat		120	24	9	38	58	98	29	23	14	5	32	65	29	45	74	1	45	44	0	0	1	32	28	10	2	10	45	1	31	13	34	11	15	1	15	15	26
Centr Gujarat		59	13	13	19	26	57	20	31	0	2	22	10	28	30	29	0	30	30	0	0	0	30	29	1	0	3	30	0	23	7	29	1	1	1	1	1	29
North Gujarat		60	19	0	11	30	45	4	1	1	10	21	15	25	30	20	10	30	29	0	1	0	27	3	0	0	0	30	5	10	15	27	3	13	1	0	8	13
Saur & Kachchh		228	16	4	106	103	186	13	4	5	30	172	29	46	15	195	18	15	15	0	0	0	15	0	0	9	6	6	0	5	10	2	13	0	0	0	0	15
Gujarat		467	72	26	174	217	386	68	59	20	47	247	119	128	120	318	29	120	118	0	1	1	104	60	11	11	19	111	6	69	45	92	28	29	3	16	24	83

Frequency Tables (Question 21 to 30)

VPR = Village panchayat representative, BF = big farmer, SF = small farmer, MF = marginal farmer, LL = landless

CATEGORY		N	QUEST NO. 21				QUEST NO. 22				Q.No. 23		Q. NO. 24			Q. NO. 25			N	QUEST NO. 26				N	Q. No. 27		QUESTION NO. 28					QUEST.NO.29			QUEST.NO.30		
			1	2	3	4	1	2	3	4	1	2	1	2	3	1	2	3		1	2	3	4		1	2	1	2	3	4	5	1	2	3	1	2	3
BHARUCH		60	22	20	18	0	4	5	21	35	28	32	8	8	43	8	19	33	15	9	6	0	0	15	15	45	2	11	1	0	1	3	2	10	1	14	0
JUNAGADH		55	25	28	1	1	18	9	30	6	23	32	0	22	33	0	21	34	0	0	0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0
KACHCHH		58	35	11	4	8	30	2	23	10	18	40	15	21	22	15	24	19	15	0	11	4	0	0	0	58	0	0	0	0	0	0	0	0	0	0	0
KHEDA		59	18	41	0	0	8	16	44	1	37	22	6	32	21	24	10	26	29	0	20	9	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0
MAHESANA		60	7	45	8	0	32	11	16	1	30	30	15	5	40	16	13	31	30	0	10	20	0	30	30	30	0	1	4	0	24	27	2	1	5	11	14
RAJKOT		60	13	38	4	5	13	0	50	2	11	49	1	4	55	0	5	55	0	0	0	0	0	45	45	15	12	32	4	1	3	13	27	5	4	32	9
S. NAGAR		55	8	46	1	0	4	25	40	7	33	22	7	30	18	0	35	20	0	0	0	0	0	0	0	55	0	0	0	0	0	0	0	0	0	0	0
VALSAD		60	32	23	5	0	36	23	12	0	45	15	24	21	15	33	6	21	30	6	22	2	0	15	15	45	15	0	0	0	0	15	0	0	0	15	0
SOUTH	VP	8	5	2	1	0	4	3	3	1	6	2	4	4	0	4	3	1	3	2	1	0	0	2	2	6	1	0	0	0	1	2	0	0	0	2	0
GUJARAT.	BF	16	8	5	3	0	7	4	4	3	10	6	6	5	5	7	6	3	6	2	4	0	0	4	4	12	3	0	1	0	0	3	0	1	0	4	0
	SF	24	12	8	4	0	8	6	7	7	14	10	8	6	10	9	6	9	9	4	4	1	0	6	6	18	3	3	0	0	0	4	2	0	0	6	0
	MF	32	10	13	9	0	9	7	9	10	19	13	9	9	13	11	5	16	12	3	8	1	0	8	8	24	4	4	0	0	0	4	0	4	1	7	0
	LL	40	19	15	6	0	12	8	10	14	24	16	5	5	30	10	5	25	15	4	11	0	0	10	10	30	6	4	0	0	0	5	0	5	0	10	0
CENTRAL	VP	3	1	2	0	0	0	1	3	0	3	0	1	2	0	1	2	0	1	0	1	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
GUJARAT	BF	8	4	4	0	0	1	2	6	0	6	2	2	3	3	4	2	2	4	0	4	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0
	SF	12	3	9	0	0	4	4	7	1	7	5	1	6	5	6	1	5	6	0	5	1	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0
	MF	16	4	12	0	0	2	3	14	0	10	6	1	10	5	6	3	8	8	0	4	4	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0
	LL	20	6	14	0	0	1	6	14	0	11	9	1	11	8	7	2	11	10	0	6	4	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0
NORTH	VP	4	0	3	1	0	2	1	1	0	3	1	1	3	0	1	3	0	2	0	2	0	0	2	2	2	0	0	0	0	2	2	0	0	0	1	1
GUJARAT	BF	8	1	7	0	0	3	3	2	0	4	4	2	1	5	2	0	6	4	0	4	0	0	4	4	4	0	0	0	0	4	4	0	0	0	2	2
	SF	12	0	11	1	0	6	3	3	0	8	4	3	0	9	3	3	6	6	0	1	5	0	6	6	6	0	0	0	0	6	5	1	0	0	3	3
	MF	16	1	12	3	0	7	3	5	1	9	7	4	0	12	5	4	7	8	0	1	7	0	8	8	8	0	1	0	0	6	6	1	1	1	4	3
	LL	20	5	12	3	0	14	1	5	0	6	14	5	1	14	5	3	12	10	0	2	8	0	10	10	10	0	0	4	0	6	10	0	0	4	1	5
SAURASH	VP	14	5	9	0	0	6	3	10	0	5	9	2	10	2	1	11	2	1	0	1	0	0	3	3	11	0	3	0	0	0	1	2	0	0	2	1
&	BF	30	15	14	1	0	9	6	19	4	13	17	4	12	14	2	14	14	2	0	2	0	0	6	6	24	0	6	0	0	0	2	4	0	1	2	3
KACHCHH	SF	48	16	29	1	2	15	6	33	4	17	31	6	13	29	3	18	27	3	0	3	0	0	9	9	39	3	6	2	1	1	6	3	0	1	8	0
	MF	56	21	27	4	4	14	9	34	3	27	29	5	16	35	4	16	36	4	0	0	4	0	12	12	44	4	7	2	0	0	3	6	3	0	10	2
	LL	80	24	44	4	8	21	10	47	14	23	57	6	26	48	5	26	49	5	0	5	0	0	15	15	65	5	10	0	0	2	1	12	2	2	10	3
South Gujarat		120	54	43	23	0	40	28	33	35	73	47	32	29	58	41	25	54	45	15	28	2	0	30	30	90	17	11	1	0	1	18	2	10	1	29	0
Centr Gujarat		59	18	41	0	0	8	16	44	1	37	22	6	32	21	24	10	26	29	0	20	9	0	0	0	59	0	0	0	0	0	0	0	0	0	0	0
North Gujarat		60	7	45	8	0	32	11	16	1	30	30	15	5	40	16	13	31	30	0	10	20	0	30	30	30	0	1	4	0	24	27	2	1	5	11	14
Saur & Kachch		228	81	123	10	14	65	36	143	25	85	143	23	77	128	15	85	128	15	0	11	4	0	45	45	183	12	32	4	1	3	13	27	5	4	32	9
Gujarat		467	160	252	41	14	145	91	236	62	225	242	76	143	247	96	133	239	119	15	69	35	0	105	105	362	29	44	9	1	28	58	31	16	10	72	23

Frequency Tables (Question 31 to 40)

VPR = Village panchayat representative, BF = big farmer, SF = small farmer, MF = marginal farmer, LL = landless

CATEGORY		N	QUESTION NO. 31					QUESTION NUMBER 32						Q. NO. 33			Q.No. 34		QUESTION NO. 35					QUESTION NO. 36					Q.No. 37			QUESTION NO.38					Q.NO.39		Q. NO. 40		
			1	2	3	4	5	1	2	3	4	5	6	1	2	3	1	2	1	2	3	4	5	1	2	3	4	5	1	2	3	1	2	3	4	5	1	2	1	2	3
BHARUCH		60	37	4	1	0	18	44	2	1	0	1	12	0	26	34	45	15	37	12	1	6	9	42	0	7	7	4	8	48	4	1	18	0	30	11	58	2	5	44	11
JUNAGADH		55	37	20	5	0	1	40	17	2	1	1	1	2	30	23	42	13	18	49	3	0	0	44	2	13	0	0	16	39	0	18	30	0	12	0	53	2	1	53	1
KACHCHH		58	52	23	0	0	5	54	20	3	0	0	4	3	39	16	46	12	43	33	0	1	7	56	12	26	0	2	10	47	1	1	41	1	10	5	56	2	0	52	6
KHEDA		59	55	3	11	0	0	56	15	0	4	1	0	1	39	19	57	2	42	29	10	0	2	57	0	6	2	0	0	59	0	2	44	0	13	1	56	3	0	46	13
MAHESANA		60	39	6	11	1	4	30	23	1	5	0	4	1	47	12	56	4	47	12	5	0	0	24	7	30	1	0	13	47	0	8	35	3	2	12	48	12	5	30	25
RAJKOT		60	32	30	11	0	1	55	6	0	12	0	1	1	36	23	54	6	10	52	14	0	0	45	0	18	0	0	4	56	0	6	18	0	40	0	57	3	1	56	3
S. NAGAR		55	46	6	2	0	2	51	4	0	1	0	0	0	48	7	37	18	39	33	1	0	3	52	1	2	0	2	2	53	0	1	49	0	6	0	55	0	2	25	27
VALSAD		60	45	45	8	0	0	59	39	0	0	0	0	14	45	1	30	30	22	30	0	0	30	33	1	18	0	27	5	30	25	8	20	0	8	32	50	10	0	48	12
SOUTH GUJARAT.	VPR	8	4	4	0	0	1	6	3	0	0	0	1	1	6	1	5	3	3	4	0	0	3	5	0	1	0	3	0	6	2	0	2	0	3	3	8	0	0	7	1
	BF	16	8	5	3	0	2	14	4	0	0	0	2	1	11	4	10	6	8	6	0	0	6	11	1	4	0	4	0	12	4	1	4	0	4	8	15	1	0	15	1
	SF	24	17	9	2	0	3	20	9	1	0	0	3	3	15	6	15	9	13	8	0	0	9	13	0	8	0	7	2	15	7	1	9	0	5	10	20	4	0	17	7
	MF	32	28	10	3	0	3	28	13	0	0	0	3	4	18	10	20	12	17	10	1	1	11	21	0	9	2	7	7	18	7	1	11	0	11	10	30	2	3	23	6
	LL	40	25	21	1	0	9	35	12	0	0	1	3	5	21	14	25	15	18	14	0	5	10	25	0	3	5	10	4	27	9	6	12	0	15	12	35	5	2	30	8
CENTRAL GUJARAT	VPR	3	3	0	0	0	0	3	1	0	0	0	0	1	2	0	3	0	3	2	1	0	0	3	0	0	0	0	0	3	0	0	2	0	0	1	3	0	0	2	1
	BF	8	7	1	0	0	0	8	1	0	0	0	0	0	5	3	8	0	7	4	3	0	0	8	0	2	1	0	0	8	0	0	7	0	1	0	8	0	0	7	1
	SF	12	11	1	3	0	0	12	4	0	2	0	0	0	9	3	11	1	10	9	4	0	0	10	0	3	1	0	0	12	0	2	8	0	3	0	11	1	0	8	4
	MF	16	15	0	5	0	0	15	5	0	1	0	0	0	10	6	16	0	9	6	1	0	2	16	0	0	0	0	0	16	0	0	12	0	4	0	16	0	0	12	4
	LL	20	19	1	3	0	0	18	4	0	1	1	0	0	13	7	19	1	13	8	1	0	0	20	0	1	0	0	0	20	0	0	15	0	5	0	18	2	0	17	3
NORTH GUJARAT	VPR	4	3	0	1	0	0	3	1	0	0	0	0	0	4	0	4	0	4	0	0	0	0	2	0	2	0	0	0	4	0	0	2	1	0	1	3	1	0	3	1
	BF	8	4	1	2	0	1	3	5	0	1	0	0	0	8	0	8	0	6	2	1	0	0	3	1	4	0	0	2	6	0	1	5	0	0	2	8	0	0	4	4
	SF	12	8	2	2	0	0	5	5	1	0	0	1	0	9	3	12	0	11	1	0	0	0	3	2	7	0	0	5	7	0	0	7	1	1	3	9	3	0	8	4
	MF	16	9	2	2	1	2	6	7	0	3	0	1	1	11	4	15	1	12	3	3	0	0	8	3	7	0	0	5	11	0	1	13	1	0	1	13	3	0	8	8
	LL	20	15	1	4	0	1	13	5	0	1	0	2	0	15	5	17	3	14	6	1	0	0	8	1	10	1	0	1	19	0	6	8	0	1	5	15	5	5	7	8
SAURASH & KACHCHH	VPR	14	7	7	2	0	0	13	2	0	1	1	0	0	13	1	11	3	4	12	1	0	0	13	0	4	0	0	1	13	0	2	11	0	2	0	13	1	0	13	1
	BF	30	23	10	2	0	0	28	5	0	2	0	0	0	25	5	25	5	13	23	2	0	1	26	0	9	0	0	3	27	0	2	20	0	8	0	29	1	1	23	6
	SF	48	36	15	5	0	2	43	8	0	3	0	1	1	29	18	37	11	25	37	4	0	1	45	3	9	0	0	1	47	0	1	29	1	16	1	45	3	0	39	9
	MF	56	42	21	4	0	3	47	13	2	5	0	2	3	34	19	43	13	30	36	4	0	3	45	6	18	0	2	15	41	0	10	32	0	17	3	55	1	2	45	9
	LL	80	59	26	5	0	4	69	19	3	3	0	3	2	52	26	63	17	36	59	7	1	5	68	6	19	0	2	12	67	1	11	46	0	25	1	79	1	1	66	12
South Gujarat		120	82	49	9	0	18	103	41	1	0	1	12	14	71	35	75	45	59	42	1	6	39	75	1	25	7	31	13	78	29	9	38	0	38	43	108	12	5	92	23
Centr Gujarat		69	55	3	11	0	0	56	15	0	4	1	0	1	39	19	57	2	42	29	10	0	2	57	0	6	2	0	0	59	0	2	44	0	13	1	56	3	0	46	13
North Gujarat		60	39	6	11	1	4	30	23	1	5	0	4	1	47	12	56	4	47	12	5	0	0	24	7	30	1	0	13	47	0	8	35	3	2	12	48	12	5	30	25
Saur & Kachchh		228	167	79	18	0	9	200	47	5	14	1	6	6	153	69	179	49	110	167	18	1	10	197	15	59	0	4	32	195	1	26	138	1	68	5	221	7	4	186	37
Gujarat		467	343	137	49	1	31	349	126	7	23	3	22	22	310	135	367	100	258	250	34	7	51	353	23	120	10	35	58	379	30	45	255	4	121	61	433	34	14	354	98

Frequency Tables (Question 41 to 50)

VPR = Village panchayat representative, BF = big farmer, SF = small farmer, MF = marginal farmer, LL = landless

CATEGORY		N	Q. No. 41			Q.No. 42		QUESTION NO.43				QUESTION NO.44				Q. NUMBER 45				QUESTION NO. 46					Q. NO. 47			Q.NO.48		Q.NO.49		Q.NO.50	
			1	2	3	1	2	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	1	2	1	2	1	2
BHARUCH		60	55	0	5	58	2	15	6	26	15	5	26	30	0	25	1	34	0	39	18	6	0	0	1	40	19	36	24	60	0	59	1
JUNAGADH		55	45	8	2	53	2	15	0	40	0	2	15	38	0	33	0	11	11	32	20	12	0	4	6	36	14	32	23	46	9	53	2
KACHCHH		58	29	15	14	48	10	26	2	28	5	11	15	28	4	15	3	24	16	15	15	31	0	0	6	29	23	24	34	58	0	58	0
KHEDA		59	54	0	5	54	5	16	4	26	12	4	39	6	10	40	4	3	12	19	28	10	6	0	6	7	48	49	10	59	0	44	15
MAHESANA		60	32	1	27	50	10	23	32	2	3	16	42	2	0	49	3	8	0	32	26	2	0	0	2	15	43	34	26	59	1	59	1
RAJKOT		60	59	1	0	59	1	48	0	12	2	45	6	10	0	38	0	21	1	49	13	3	0	0	6	16	41	52	8	58	2	57	3
S. NAGAR		55	52	2	1	48	7	27	1	27	0	13	5	37	0	25	3	26	2	42	7	4	3	0	14	6	36	22	33	54	1	53	2
VALSAD		60	57	0	3	57	3	2	16	40	2	1	39	19	1	32	0	25	3	40	19	3	0	0	2	32	48	59	1	59	1	60	0
SOUTH	VPR	8	6	0	2	8	0	1	3	5	0	0	6	2	0	4	0	4	0	5	3	0	0	0	0	3	6	7	1	8	0	8	0
GUJARAT.	BF	16	15	0	1	16	0	4	1	9	3	0	10	6	0	7	1	7	1	12	5	2	0	0	0	8	12	14	2	16	0	16	0
	SF	24	22	0	2	21	3	2	4	14	4	1	11	12	0	10	0	13	1	15	7	2	0	0	0	13	14	19	5	24	0	24	0
	MF	32	30	0	2	32	0	4	5	18	5	2	16	15	0	16	0	16	0	21	11	2	0	0	0	22	16	26	6	32	0	31	1
	LL	40	39	0	1	38	2	6	9	20	5	3	22	14	1	20	0	19	1	26	11	3	0	0	3	26	19	29	11	39	1	40	0
CENTRAL	VPR	3	3	0	0	3	0	0	1	2	0	0	2	1	0	2	1	0	0	0	2	0	2	0	0	0	3	3	0	3	0	2	1
GUJARAT	BF	8	8	0	0	8	0	0	1	6	1	1	5	1	1	3	2	2	1	1	2	2	3	0	0	2	6	7	1	8	0	6	2
	SF	12	11	0	1	12	0	4	1	4	2	1	8	3	0	9	1	0	2	5	5	2	0	0	1	1	10	10	2	12	0	9	3
	MF	16	15	0	1	13	3	5	0	7	4	0	11	1	4	11	0	1	4	6	12	1	0	0	0	4	14	15	1	16	0	12	4
	LL	20	17	0	3	18	2	7	1	7	5	2	13	0	5	15	0	0	5	7	7	5	1	0	5	0	15	14	6	20	0	15	5
NORTH	VPR	4	2	0	2	3	1	1	2	1	0	0	3	1	0	3	0	1	0	2	2	0	0	0	0	0	4	2	2	4	0	4	0
GUJARAT	BF	8	4	0	4	6	2	3	5	0	0	2	6	0	0	6	0	2	0	4	4	0	0	0	0	1	7	6	2	8	0	8	0
	SF	12	8	0	4	11	1	5	5	0	2	3	8	1	0	9	0	3	0	6	5	1	0	0	1	3	8	7	5	12	0	11	1
	MF	16	8	1	7	12	4	7	8	1	0	5	11	0	0	12	2	2	0	8	8	0	0	0	1	2	13	9	7	15	1	16	0
	LL	20	10	0	10	18	2	7	12	0	1	6	14	0	0	19	1	0	0	12	7	1	0	0	0	9	11	10	10	20	0	20	0
SAURASH	VPR	14	11	3	0	12	2	8	0	6	2	6	2	5	1	5	0	9	0	9	4	2	0	0	1	7	8	8	6	13	1	13	1
&	BF	30	22	4	4	27	3	14	0	16	2	8	6	15	2	19	0	8	3	16	10	4	1	0	3	10	18	16	14	26	4	27	3
KACHCHH	SF	48	37	8	3	43	5	24	2	22	0	13	9	25	1	17	2	19	10	25	15	12	1	1	5	19	24	26	22	45	3	46	2
	MF	56	49	3	4	51	5	29	0	26	1	23	10	23	0	32	0	19	6	32	12	14	1	1	14	20	24	31	25	56	0	56	0
	LL	80	66	8	6	75	5	41	1	37	2	21	14	45	0	38	4	27	11	56	14	18	0	2	9	31	40	49	31	76	4	79	1
South Gujarat		120	112	0	8	115	5	17	22	66	17	6	65	49	1	57	1	59	3	79	37	9	0	0	3	72	67	95	25	119	1	119	1
Centr Gujarat		59	54	0	5	54	5	16	4	26	12	4	39	6	10	40	4	3	12	19	28	10	6	0	6	7	48	49	10	59	0	44	15
North Gujarat		60	32	1	27	50	10	23	32	2	3	16	42	2	0	49	3	8	0	32	26	2	0	0	2	15	43	34	26	59	1	59	1
Saur & Kachchh		228	185	26	17	208	20	116	3	107	7	71	41	113	4	111	6	82	30	138	55	50	3	4	32	87	114	130	98	216	12	221	7
Gujarat		467	383	27	57	427	40	172	61	201	39	97	187	170	15	257	14	152	45	268	146	71	9	4	43	181	272	308	159	453	14	443	24

Annexure 7.2: List of species suggested by the villagers

The most preferred species are as follows:

Species	Number of respondents out of 467
Acacia nilotica	290
Eucalyptus spp	220
Azadirachta indica	217
Casuarina equisetifolia	135
Bamboos	112
Prosopis juliflora	117

Many other species were also named by some of the respondents. A complete list of species suggested by the respondents is given below:

Timber	(1) *Ailanthus excelsa*, (2) *Albizia lebeck*, (3) *A. procera*, (4) *Dalbergia sissoo*, (5) *Eucalyptus* spp., (6) *Gmelina arborea*, (7) *Tectona grandis* (8) *Terminalia bellerica*;
Fuelwood	(1) *Acacia auriculiformis*, (2) *A. tortilis*, (3) *Cassia siamea*, (4) *Casuarina equisetifolia*, (5) *Prosopis juliflora*, (6) *Tamarix dioca*;
Multi-purpose	(1) *Acacia nilotica*, (2) *Azadirachta indica*, (3) *Acacia senegal* (4) *Leucaena leucocephala*, (5) *Moringa oleifera*, (6) *Pongamia pinnata*, (7) *Prosopis spicigera*;
Minor forest produce	(1) *Acacia catechu*, (2) Bamboos*, (3) *Commiphora mukul*, (4) *Phoenix sylvestris* (5) *Madhuca latifolia*, (6) *Sapindus emarginatus* (7) *Salvadora persica*;
Fruit	(1) *Annona squamosa*, (2) *Terminalia catapa* (3) *Cordia dichotoma*, (4) *Punica granatum*, (5) *Emblica officinalis*, (6) *Citrus* spp., (7) *Mangifera indica*, (8) *Manilkara hexandra*, (9) *Pitoclobium dulce*, (10) *Psidium guajava*, (11) *Syzigium cumini*, (12) *Tamarindus indica*, (13) *Zyziphus* spp.;
Ornamental	(1) *Saraca indica* (2) *Delonix regia*, (3) *Ficus bengalensis*, (4) *Ficus religiosa*

* Bamboos include *Bambusa arundinacea* and *Dendrocalamus strictus*.

Annexure 7.3 District-wise numbers of species suggested by the respondents

District	Total	Timber	Fuelwood	MPT	MFP	Fruit	Ornamental
Bharuch	20	2,4,5, 6,7	4,6	1,2,4 5	1,2	4,6,7, 9,10, 11,13	nil
Junagadh	18	1,5,7	1,2, 4,5	1,2,4	2	3,6,9, 12,13	3,4
Kachchh	17	2,5	2,3, 4	1,2,3 7	1,3, 4,6, 7	9,10, 13 10,13	nil
Kheda	13	1,4,5 6,7	nil	1,2,4 6	2	5,7,11	nil
Mahesana	16	1,2,4, 5	2	1,2,4, 6,7	4, 5	3,7, 8,13	nil
Rajkot	30	1,4,5, 6,7	2,3, 4,5	1,2,4 6,7	1,2, 7	1,3,4, 6,7,8, 9,11, 12,13	1, 3, 4
S'nagar	26	1,2,4, 5,6,7	2,5	1,2,3 4,7	2,7	2,4,6, 7,10, 11,12, 13	2,3 4
Valsad	18	3,4,5, 6,7,8	1,4, 6	1,2,4, 6	2	7,11, 12	2
Total	45	8	6	7	7	13	4

MPT = Multi-purpose trees, MFP = Minor forest produce

Note: The numbers indicated for each category are the serial numbers of the species belonging to six different groups, mentioned in the annexure 7.2.

Annexure 8.1: Details of direct and indirect costs for social forestry projects in Gujarat during 1980-81 to 1989-90.

(in Rs million)

Year	Planting	Staff	Veh & equ	Overhead	Total
1979-80	12.59	4.66	0.91	0.55	18.71
1980-81	28.37	12.73	8.04	5.64	54.78
1981-82	53.65	20.54	7.15	5.44	86.79
1982-83	78.29	28.54	4.20	9.70	120.73
1983-84	94.15	39.11	1.78	8.67	143.71
1984-85	65.29	61.86	0.12	7.98	135.25
1985-86	95.43	70.53	5.20	1.04	172.20
1986-87	97.11	68.63	5.60	2.05	173.39
1987-88	114.80	61.24	4.92	7.17	188.13
1988-89	170.72	26.95	4.46	4.05	206.18
1989-90	235.49	83.88	4.70	8.61	332.67
Avergae	95.08	43.51	4.28	5.54	148.41
Percent	64.06%	29.32%	2.88%	3.73%	100.00%

Annexure 8.2: Details of year-wise costs for rainfed village woodlots

Year	Total amount (Rs)	Percentage
0th year	43,131	27.86
1st year	81,773	52.82
2nd year	19,383	12.52
3rd year	9,846	6.36
4th year	681	0.44

Note: These are based on the actual expenditure figures (year-wise) for 28 village woodlots,

Annexure 8.3: Results of financial NPV from the view-points of the forest department, village panchayat and the village people

(No. of plots with NPV >0 at 10% discount)

Regions	N	Forest department	Village panchayat	Village people
South	40	0	39	39
Central	31	0	24	26
North	28	0	27	28
Saurashtra	14	0	12	10
Irrigated	11	0	6	11
Total	124	0	108	114

Annexure 9.1: Item-wise rates for rainfed and irrigated village woodlots

(a) Rainfed village woodlots

Items	1987-88		1988-89		1989-90		Average costs		Labour	Labour
	Material	Labour	Material	Labour	Material	Labour	Material	Labour	Scarce	Surplus
Nursery	630	645	661	662	781	780	691	696	0	696
Land preparation										
Survey/site clearing	0	40	0	41	0	49	0	43	0	43
Gully plugging	0	52	0	53	0	62	0	56	0	56
Pits & alignment	0	681	0	698	0	822	0	734	0	734
Trench & mound fence	0	105	0	608	0	717	0	477	0	477
Planting										
Transport, planting & weeding	180	3149	190	3228	222	3807	197	3395	3395	0
Application of fertiliser & pesticides	170	125	179	129	210	151	186	135	135	0
Dibbling of seeds & grafting	20	40	21	41	24	48	22	43	21	22
Watchman	0	1225	0	1256	0	1492	0	1324	0	1324
Contingency	30	20	32	21	39	24	34	22	0	22
Total	1030	6082	1083	6737	1276	7952	1130	6924	3551	3374
Percent	14.48%	85.52%	13.85%	86.15%	13.83%	86.17%	14.03%	85.97%	51.28%	48.72%

(b) Irrigated village woodlots

Items	1987-88		1988-89		1989-90		Average costs		Labour	Labour
	Material	Labour	Material	Labour	Material	Labour	Material	Labour	Scarce	Surplus
Nursery	765	1025	410	545	948	1240	708	937	0	937
Land preparation										
Survey/site clearing	55	680	25	75	68	823	49	526	0	526
Ploughing & alignment										
or pits & alignment	500	120	515	125	619	145	545	130	0	130
Leveling & soil conservation	310	105	320	50	384	125	338	93	0	93
Channels & ridges	20	1020	20	1040	24	1235	21	1098	0	1098
Trench & mound fence	0	105	0	140	0	127	0	124	0	124
Planting										
Transport, planting & weeding	170	1920	90	1010	210	2323	157	1751	1751	0
Application of fertiliser & pesticides	4620	1800	2485	950	5674	2175	4260	1642	398	1244
Irrigation	4450	1335	4585	1365	8184	1626	5740	1442	0	1442
Soil working	0	6690	0	5100	0	8085	0	6625	0	6625
Dibbling of seeds on mounds	30	25	30	25	37	30	32	27	27	0
Weeding	0	1442	0	765	0	1745	0	1317	1317	0
Watchman	0	2445	0	2480	0	2959	0	2628	0	2628
Contingency	75	10	70	10	93	12	79	11	0	11
Total	10995	18722	8550	13680	16241	22650	11929	18351	3493	14858
Percent	37.00%	63.00%	38.46%	61.54%	41.76%	58.24%	39.40%	60.60%	19.03%	80.97%

Annexure 9.2: Figures on daily wage rates for labour in forestry operations of Gujarat (in Rs)

Year	Prevailing daily wage rates@			Average of 1,2,3	Peak wage rate	Off-season wage rate
	1	2	3			
1973-74	3.00			3.00	3.00	1.65
1974-75	3.20			3.20	3.20	1.76
1975-76	3.40			3.40	3.40	1.87
1976-77	3.50			3.50	3.50	1.93
1977-78	4.15			4.15	4.15	2.28
1978-79	5.00			5.00	5.00	2.75
1979-80	5.50	6.00		5.75	5.75	3.16
1980-81	6.00	7.20	7.50	6.90	6.90	4.28
1981-82	7.95	8.70		8.33	8.33	5.16
1982-83	9.90	10.50		10.20	10.20	6.32
1983-84	11.40	12.00		11.70	11.70	7.25
1984-85	13.20	13.85		13.53	13.53	8.39
1985-86	14.45			14.45	14.45	8.96
1986-87	15.20	15.80		15.50	15.50	9.61
1987-88	17.00	17.45		17.23	17.23	10.68
1988-89	19.40			19.40	19.40	12.03
1989-90	20.60			20.60	20.60	12.77
1990-91	21.95			21.95	21.95	13.61
1991-92	25.25			25.25	25.25	15.66
Overall average	11.06	11.44	7.50	11.21	11.21	6.85
Average 73-83	5.73	8.88	7.50	5.92	5.92	3.49
Average 80-86	11.16	11.34	7.50	11.51	11.51	7.14
Average 83-91	8.80	16.73		17.73	17.73	10.99
Phase I (World Bank's estimate: 1980-85)					5.50	3.00
Phase II (World Bank's estimate: 1985-90)					13.00	8.00

Note: (1) Average for 1973-83 has been used for planting in rainfed woodlots

Note: (2) Average for 1980-86 has been used for planting in irrigated woodlots

Note: (3) Average for 1983-91 has been used for harvesting in both types of woodlots

APPENDICES

Appendix 1.1: Details of environmental regions of Gujarat

The environmental regions of Gujarat (FAO-Unesco, 1977) are described below:-

1. Geomorphological regions

Geomorphologically Gujarat state has three regions:

(i) Western Ghats in the south,

(ii) Deccan plateau and

(iii) Gujarat lowlands.

The major part consists of an undulating plateau with some low hills (up to 500 metres altitude) and a series of peneplains (Wadia, 1953). In some areas, weathering is very deep and quite advanced. Four major rivers of Gujarat (Sabarmati, Mahi, Narmada and Tapti) are located in the south and central regions. The rivers in the north are seasonal. Saurashtra peninsular plateau is bounded by sea on three sides with the gulf of Kachchh in the north and gulf of Khambhat (Cambay) in the south-east. Kachchh is an undulating dry rocky region with Little and Great Rann of Kachchh. Largely, this area is a saline tract and usually remains inundated in the sea and inland waters for several months every year. There are no perennial rivers in this region. It does not possess any significant storage of ground water resources either.

2. Climatic regions

Being situated on both sides of the Tropic of Cancer, Gujarat has four distinct climatic regions:

(i) humid semi-equatorial in the southern part,

(ii) hot tropical along south coast,

(iii) cool winter and hot tropical in most parts of Gujarat and

(iv) hot semitropical in north Gujarat and parts of Saurashtra.

On the whole, the climate is moist in the southern part and dry in the northern areas. There are three different seasons in the state, viz. summer (March to mid-June), rainy season (mid-June to September) and winter (November to February) with October being a transitional month.

3. Vegetation regions

There are five vegetation regions in the state:

(i) the tropical deciduous forests,

(ii) tropical open forests,

(iii) subtropical scrub savannah and open forest,

(iv) subtropical semi-desert formations and

(v) littoral salt marshes.

These regions support some typical species of flora and fauna in Gujarat.

4. Geological and lithological regions

The Deccan trap and Alluvial & coastal regions are the two geological regions of Gujarat. The Deccan trap is made of vast, thick lava beds forming a volcanic plateau. The lava beds are separated by thin, discontinuous sedimentary strata. The Narmada and Taptl troughs, filled with a thick layer of alluvium intercalcated with sand and gravel are tectonic depressions in the Deccan trap. The coastal deposits consist of fluviatile, deltaic and lagoon sediments which are often overlain by aeolian sands.

The northern and eastern parts of the state consist of rocky and uneven land having the hills of the three mountain ranges, namely the Aravalli, the Vindhya and Satpura which mainly lie outside the state. Gujarat's most ancient mountain ranges are the Aravallis. Between the Narmada

and Tapi rivers lie the hills of the Satpura ranges. Across the Tapi river, towards south, there are hills of the Sahyadri ranges.

Gujarat's five lithological regions are as under:

(i) Acid/Basic effusive rocks (rhyolite, quartz, porphyry, dacite, trachyte, basalt, diabase, dolerite and andesite);

(ii) Basic effusive rock (basalt, diabase, dolerite and andesite);

(iii) Consolidated clastic sediments (sandstone, siltstone, shale and conglomerate);

(iv) Recent and unconsolidated fluvial and lacustrine sediments and

(v) Recent and unconsolidated aeolian sediments.

5. Broad soil regions

The state's soils are grouped into three broad soil regions:

(i) Yermosols-Xerosols association,

(ii) Vertisols-Cambisols association and

(iii) Luvisols-Nitosols association.

The south Gujarat has deep, clayey and fertile black cotton soil. The plains in the central region have deep, sandy loam soil forming the most fertile part of the state. The north Gujarat has course, sandy and alluvial soil of recent origin. Fringes of alluvial plains with thin, sandy loam soil and vast tracts of saline flat lands are common in Saurashtra and Kachchh peninsula.

In general, the soils of Gujarat are deficient in boron, copper, iron, manganese, molybdenum and zinc (Kanwar and Randhawa, 1974).

Appendix 1.2: Agroclimatological data of Gujarat

The agroclimatological data (FAO, 1987a) present a wide variation in seasonal temperatures and monthly rainfall in different parts of the state. The type of humid season in Gujarat is 'season with dry period'.

Centres	Average annual rainfall (mm)	Dry days	Inter-mediate days	Wet days	Mean average temperatures (^{0}C)
Surat	1,205	236	17	112	27.7
Ahmedabad	821	258	25	82	34.2
Veraval	606	256	52	57	26.2
Rajkot	674	268	55	42	27.4
Jamnagar	491	284	41	40	26.7
Bhuj	349	310	41	14	27.7

Source: (FAO, 1987a)

Within the state, there are great differences in summer and winter temperatures from one end to the other. Usually, it ranges between 3^0C in winter to 46^0C in summer (GOG, 1991b). Temperature variations are less in coastal zones and in south Gujarat but high in the northern part of the state. December and January are the coldest months. May is the hottest month in most parts of the state.

The south-westerly monsoon brings rain in Gujarat. The rest of the year is virtually dry. Gujarat's rainfall is marked by uncertainty of occurrence, prolonged dry spells, time of commencement & withdrawal of monsoon, and also the amount received. On the whole, the rainfall is quite low, extremely erratic, uneven and generally with long spells of dry days in northern and western parts. The regional variations in the distribution of annual rainfall are quite large (as high as over 2,500 mm in Valsad and Dangs to less than 350 mm in Kachchh). The humid period (number of wet days) is quite short, the maximum being 112 days in Surat and minimum being only 14 days in Kachchh. More than 90% of the total annual rainfall in the state is received during the humid period.

Appendix 1.3: Agriculture in Gujarat

The gross cropped area is 11.15 million hectares (59%) in Gujarat. The critical man-land ratio of Gujarat has declined from 0.51 ha in 1961 to 0.25 ha in 1990. But the net cropped area per agricultural worker is 1.42 hectares which is higher than the national average of 0.95 hectares (GOG, 1991b). The scope for increasing the gross cropped area is limited except through reclamation of desert, saline and the ravine areas (Mehta, S.S., 1991).

According to the figures of 1985-86, there are 3.14 million land holders in the state. Average farm size is 3.16 hectares. 1.5 million of landholder have below 2.0 hectares of land covering 15% of the cultivable areas while the remaining landholders (who have above 2.0 hectares) own 85% of the cultivable areas. Thus the cultivable area is not evenly distributed in the state. 26% of landholders have control over 63% of the land. Details of landholders in Gujarat during 1985-86 are tabulated below:-

Size (Ha)	Class	Landholders No.('00)	%	Area (sq km)	%	Average landholding
<2	Marginal	15,377	49	14,959	15	0.98 ha
2-4	Small	7,845	25	22,331	22	2.85 "
>4	Big	8,231	26	62,251	63	7.56 "
Total		31,453	100	99,541	100	3.16 ha

Source: GOG (1989).

Over the years, the farm sizes have substantially reduced due to increasing fragmentation of landholding. The average farm size was 4.1 , 3.71, 3.44 and 3.16 hectares in 1970, 1976, 1980 and 1985, respectively. It shows a decrease of 23% between 1970-71 to 1985-86. The number of marginal and small farmers increased from 1.19 million in 1976-77 to 1.54 million in 1985-86. The farm size distribution is largely determined by local agro-climatic conditions. There are large variations from one district to another. The farms in the low rainfall areas are significantly larger than in the high rainfall areas (GFD, 1984).

Nearly three-fourth of the cultivable area of Gujarat depends on the monsoon. The state's position is highly precarious in respect of irrigation facilities too. Only 26% of the cultivated area receives irrigation of some kind. The major sources for irrigation in Gujarat are well and tube-wells (67%), dams and canals (31%) and tanks (2%). The ground water potential has been almost fully exploited in many parts of the state and in many areas it has been over exploited to the point of ecological degradation (Patel, V.M., 1991).

The farmers of Gujarat grow rice, wheat, millets, sorghum, pulses, groundnuts, cotton and tobacco. The last three crops cover 24.39% of the gross cropped area of Gujarat, sharing 20.25%, 13.01% and 34.62% of the total production in India. Saurashtra region mainly grows groundnuts while the farmers of south Gujarat grow cotton and farmers in central plains prefer to raise tobacco. In terms of value added per hectare production, the farmers of Gujarat are next only to Punjab and Haryana (Mehta, Sanat, 1991).

Appendix 1.4: Benefit-sharing mechanisms in communal woodlots of Gujarat.

First phase (1980-85): (World Bank, 1979)

1. Strip woodlots

People from adjoining villages are allowed to collect minor forest produce free of cost. Collection of leaf fodder & fruit is to be organised by the adjoining village panchayats. All other produce will go to the forest department. Net profits are to be shared on 50:50 basis between forest department and taluka panchayat. Taluka panchayat will distribute the amount among the village panchayats on an equitable basis.

2. Village woodlots (Departmental)

The harvesting will be done by the villagers for wages and organised by village panchayats under the supervision of staff of the forest department. Major produce will be sold to meet the outstanding debts. Gross revenue to be shared 50:50 between forest department and village panchayats.

3. Degraded forests

(a) Social security through plantations

Preference will be given to the settled labourers for collection of minor forest produce. Net profit at maturity will be shared on 80:20 basis between forest department and the beneficiaries.

(b) Departmental

Free collection of minor forest produce will be allowed. At maturity, harvesting will be organised by the Forest Labourers Cooperative Societies (FLCS). Net profit will be shared on 80:20 between forest department and FLCS.

Second phase (1985-90): (World Bank, 1985b)

1. Strip woodlots

24% of the benefits will go to the people (grass,branch fuel, to be collected and distributed to all the households). Balance 76% will be sold and net profit will be shared between forest department and panchayat (so, 38% to forest department and 38% to the panchayat).

2. Village woodlots

35% of the produce will go to the people and rest 65% will be sold and shared between forest department and the village panchayat (so, 33% to village panchayat and 32% to the forest department).

3. Degraded forests

(a) Social security scheme

The arrangement is same as in the first phase.

(b) Departmental

11% of the produce will go to the people and balance 89% will be sold and income will be shared on 80:20 between forest department and forest labourers' co-operative societies.

Present government order

In view of the above proposals, the Government of Gujarat has tried to standardise the criteria of sharing the benefits from communal woodlots (strip woodlots and village woodlots) by issuing a government order from time to time (latest one was issued in November, 1985). The order is applicable to the strip woodlots and village woodlots, raised under the social forestry projects. The criteria are summarised below.

Intermediate produce

1. Strip woodlots

Villagers are allowed to take headloads of minor forest produce (grass, leaves, pods, dry fallen wood, gum, brush, flowers and fruits) free of cost without damaging the trees. Special fruits and flowers found in abundance will be sold by the forest department through auction. 100% net profit will go to the taluka panchayat for rural development work through the village panchayats.

2. Village woodlots

Villagers are allowed to take headloads of minor forest produce (grass, leaves, pods, dry fallen wood, gum, brush, flowers and fruits) free of cost without damaging the trees. Special fruits

and flowers may be sold on annual basis by the forest department and the net income will go to the concerned village panchayat.

Final produce

1. Strip woodlots

Lops & tops (<20 cm girth) will be given free of cost to the labourers, employed for harvesting. The main produce (>20% girth) will be sold to the people in the adjoining villages (landless, small and marginal farmers) at 60% of the market rate. Any surplus left after subsidised sale or unsold after one month, will be sold by auction. Net revenue will be shared on 50:50 basis between forest department and taluka panchayat.

2. Village woodlots

Lops & tops (<20 cm girth) will be given free of cost to the labourers, employed for harvesting of trees. The main produce (>20 cm girth) will be sold to the landless, small and marginal farmers of the village at 60% of the market rate. After one month, the surplus material may be sold by open auction. The net revenue will be given to the village panchayat with a binding that 25% of this income will be used for raising woodlots in the village.

Appendix 4.1: Brief description of non-discounting criteria of profitability

a. Ranking by inspection

Ranking by inspection is a very simple criterion which selects the projects by looking at the investment cost and the shape of the stream for the net value of incremental production.

b. Payback period

Payback period is the length of time from the beginning of the project until the net value of the incremental production stream reaches the total amount of capital investment. In business enterprises, it is a common criterion, giving more weight to early than to late cash flows. It treats all revenues equally before the investment is paid off and ignores all revenues after that date. For forestry projects, this criterion is potentially very misleading, because it does not consider earnings after the payback period and the timing of proceeds does not receive adequate consideration either.

c. Proceeds per unit of outlay

Proceeds per unit of outlay indicates the total net value of incremental production divided by the total amount of the investment. This also fails to consider timing.

d. Average annual proceeds per unit of outlay

Average annual proceeds per unit of outlay is obtained by dividing the average of the annual proceeds (total of net value of incremental production divided by the number of years) by the original outlay for capital items. Its serious flaw is that it does not consider the length of time of

the benefit stream and introduces a serious bias toward short-lived investments with high cash proceeds.

e. Average income on book value of the investment

The ratio of average income to the book value of the assets (i.e. value after subtracting depreciation) stated in percentage terms gives the average income on book value of the investment. It is useful and commonly used for assessing the performance of an individual firm. But it fails to take adequate account of the timing of the benefit stream.

f. Capital output ratio

Capital output ratio is the ratio of the accounting profit generated by an investment project to the required capital outlay, expressed as a percentage. It is usually computed as the ratio of the average annual profit generated over the life of the investment to the average annual capital value.

g. Maximum forest rent

The mean annual net revenue over the rotation is called the forest rent. Its positive value can be accepted for the investment. This criterion is very common in European forests, especially those with near-normal age-class structure. But, it makes no distinction between costs and revenues occurring at different times.

h. Rate of return concept

The net revenue in the first year divided by the initial sum gives the rate of return. It is also known as the rate of profit or efficiency of the investment. A peak rate of return indicates the

highest net revenue in any year of project's life divided by the initial sum invested. Similarly the average rate of return is the mean annual revenue divided by the initial investment.

I. Profit after interest

The net profit after the payment of compound interest on loan is the profit after interest. It can provide an adequate measure of forest investment. But its drawback is that the outcome of the analysis is difficult to interpret in present-day terms.

Appendix 8.1: A copy of the spreadsheet in Quattro Pro (v4.0) for the computations of Financial CBA

As mentioned in chapter eight, the computations for financial CBA of village woodlots have been carried out by using the spreadsheet (Borland Quattro Pro v4.0). Four different spreadsheets have been developed for four regions of Gujarat and a fifth one is meant for irrigated village woodlots. The basic computational arrangements have been kept similar in all cases (except the differences of year-wise distribution of costs in rainfed and irrigated village woodlots).

A print out of the spreadsheet for the financial CBA of rainfed village woodlots of Central Gujarat has been kept in the pouch. In the beginning of the spreadsheet, the overall results of financial CBA and also the village-wise results, leading to the district-wise and for the region as a whole, for the financial NPV (total and per hectare), Financial IRR and financial BCR are given. The basic details of the village woodlots are given in the right hand side of the spreadsheet. The upper portion of the spreadsheet has been used to meet the necessary requirements of the financial CBA.

Special care has been taken to maintain the intactness of basic data for each of the woodlots because the same spreadsheet has been used for ECBA and SCBA by making the appropriate changes.

Appendix 9.1: A copy of the spreadsheet in Quattro Pro (v4.0) for the computations of Economic CBA

As mentioned in chapter nine, the computations for financial CBA of village woodlots have been carried out by using the spreadsheet (Borland Quattro Pro v4.0). Four different spreadsheets have been developed for four regions of Gujarat and a fifth one is meant for irrigated village woodlots. The basic computational arrangements have been kept similar in all cases (except the differences of year-wise distribution of costs in rainfed and irrigated village woodlots).

A print out of the spreadsheet for the economic CBA of rainfed village woodlots of Central Gujarat has been kept in the **"pouch"**. In the beginning of the spreadsheet (left-hand corner), the provisions for choosing the appropriate SWRs and discount rates have been made. This is followed by the overall results of economic CBA and also the village-wise results, leading to the district-wise and for the region as a whole, for the economic NPV (total and per hectare), economic IRR and economic BCR are given.

Beside the results, all details of break-down of direct and indirect costs, planting and harvesting costs, and the details of shadow pricing for different items are shown. Particularly, the shadow wage rates of labour have been mentioned.

The basic details of the village woodlots are given in the right hand side of the spreadsheet. The upper portion of the spreadsheet has been used to meet the necessary requirements of the economic CBA.

Special care has been taken to maintain the intactness of basic data for each of the woodlots because the same spreadsheet has been used for FCBA and SCBA by making the appropriate changes.

Appendix 10.1: A copy of the spreadsheet in Quattro Pro (v4.0) for the computations of Social CBA

As mentioned in chapter ten, the computations for social CBA of village woodlots have been carried out by using the spreadsheet (Borland Quattro Pro v4.0). Four different spreadsheets have been developed for four regions of Gujarat and a fifth one is meant for irrigated village woodlots. The basic computational arrangements have been kept similar in all cases (except the differences of year-wise distribution of costs in rainfed and irrigated village woodlots).

A print out of the spreadsheet for the social CBA of rainfed village woodlots of Central Gujarat has been kept in the "**pouch**". In the beginning of the spreadsheet (left-hand corner), the provision for choosing the appropriate parameters for SCBA has been made. By changing the values of the parameters, different kinds of sensitivity analyses have been carried out.

The overall results of social CBA are given beside the parameters, followed by the village-wise results, leading to the district-wise and for the region as a whole, for the social NPV (total and per hectare), social IRR and social BCR are given.

Beside the results, all details of break-down of direct and indirect costs, planting and harvesting costs, and the details of shadow pricing for different items are shown. Particularly, the computed values of weights for social costs and social benefits are shown for each of the items of costs and also for the distribution of income among the village poor, village rich, village panchayat and the forest department.

The basic details of the village woodlots are given in the right hand side of the spreadsheet. The spreadsheet provides the details of income distribution among the village poor, village rich, village panchayat and the forest department. The upper portion of the spreadsheet has been used to meet the necessary requirements of the social CBA, especially the computations of consumption weights.

Special care has been taken to maintain the intactness of basic data for each of the woodlots because the same spreadsheet has been used for FCBA and ECBA by making the appropriate changes.

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