

# **JOINT FOREST MANAGEMENT AT SOLIYA, GUJARAT**

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## Introduction

The roots of the current Joint or Participatory Forest Management program (JFM) in India can be traced back to the Arabari experience in West Bengal in 1973. The JFM work in Gujarat was however initiated very late, sometimes in 1986. As per the Principal Conservator of Forest (PCCF), Forest Department, Gujarat, some 1000 villages are under or in the process of adopting JFM program in Gujarat; and, about 2% of the total forest area of the state is potentially available for the JFM program. The actual adoption and success of JFM depends on the collective efforts of people towards organising protection and economic benefits to people. The magnitude and timings of economic benefits emanating under JFM programme are the most important factors which would affect the success and sustainability of JFM program at large. Since JFM is basically a community-based forestry program, sustenance of this institution depends upon the continuing interest of the community in the program.

The major objective of JFM is to regenerate, conserve, develop, and manage India's degrading forest through community participation on sustained basis. This can be only achieved if people participating in it can be ensured gainful economic remuneration. The economic remuneration depends upon the magnitude and timing of harvest of various products from a forest crop. For example, nontimber products are available in early years of forest crop but their magnitude may not be very large. On the other hand, large timber benefits arise after 15 to 30 years since planting but they require a long waiting period. Hence the time preference of the community towards returns from JFM would determine whether it will develop a self-financing sustainable institution in the long run or not. Several questions thus loom in the policymakers' minds as to how exactly these benefits would come, of what value they would be to people, and how people would react to different income sharing arrangements between community and Forest Department. An attempt is made to answer these various questions by undertaking the study of Soliya village in Bharuch district in Gujarat. The major objectives of this case study are as follows:

- (1) To study the institutional issues related to the development of JFM in Soliya village.
- (2) To appraise the financial feasibility of afforestation program and to suggest alternative forest management strategies so as to make JFM economically more attractive to people.
- (3) To study the patterns of income flows to community and Forest Department under different income sharing arrangements and perceptions of people with regard to these arrangements.

The knowledge of economic flows from such jointly managed forest is crucial for policymaking and evaluation of the program. This knowledge would also be helpful in deciding how the benefits between the Forest Department and community would be shared between the two.

## Location and General Resource Position

Soliya village is located in Dediapada taluka of Bharuch district in Gujarat. It is at a distance of 26 kilometers from Netrang, 18 kilometers from Dediapada, and 42 kilometers from Rajpipla via Khakar (Figure 1). The village is situated at the bank of Karjan river and is surrounded by hills and has a highly undulating topography. Soliya is the largest village in the Dediapada taluka. The river Karjan flows on the western border of the village; and, Pangam, Dhanor and Magardevi villages surround Soliya from all other sides (Figure 2). There is some hilly area at the north end of the village and soil in this part of village is nearly sandy loam. The south end of village is characterized by rocky areas and medium black soil. The central belt of the village is relatively fertile. In terms of commercial vegetation, bamboo predominates in the north and south ends of the village where soil is not very fertile while both teak and bamboo are very common in the central fertile belt.

In 1993, there were some 320 households in the village comprising a total population of 2100 people. Of 2100 souls, 900 are adult males, 800 adult females, and 400 children aged below 15 years. Thus

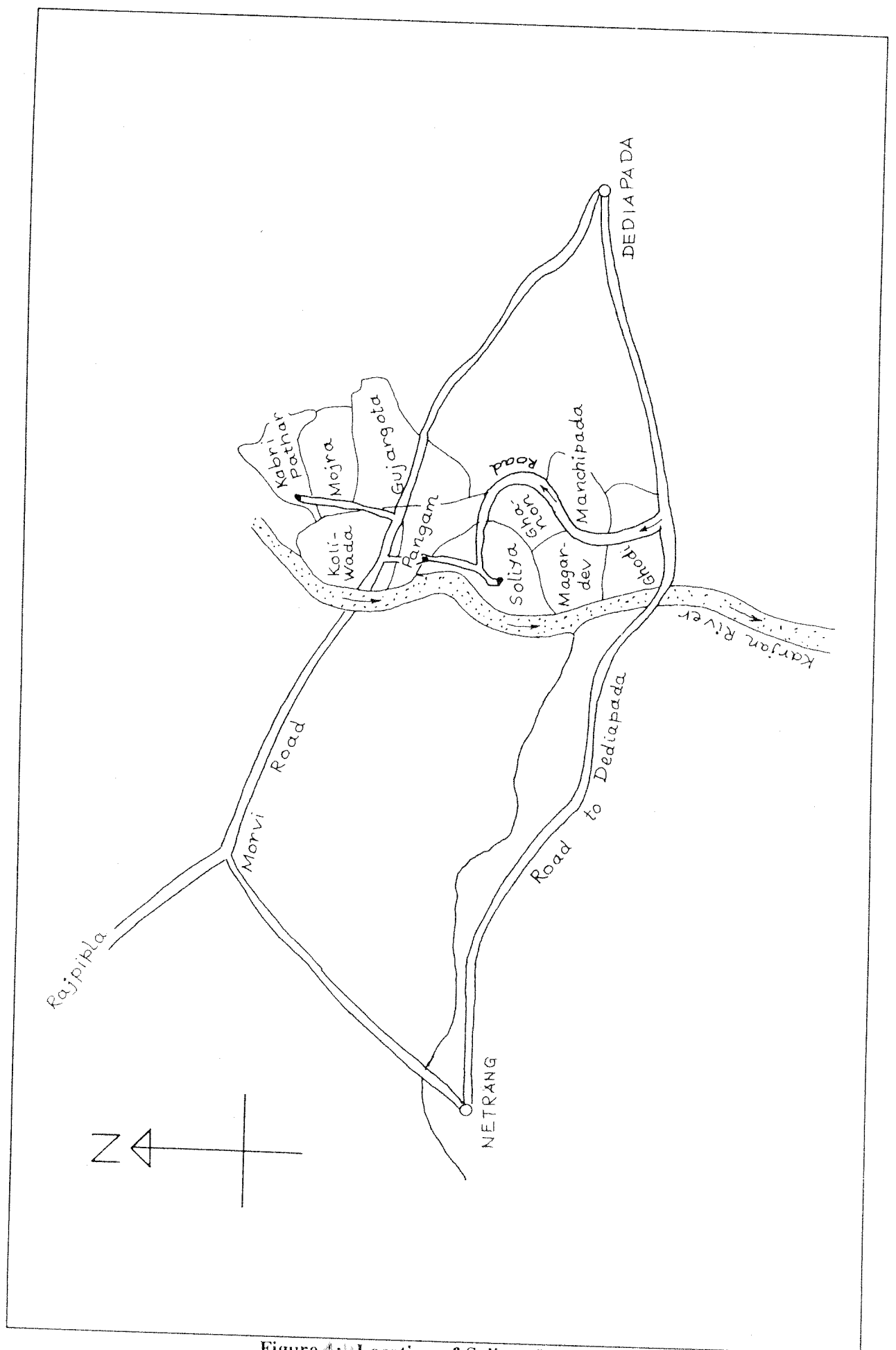


Figure 4.1: Location of Soliya, Gujarat

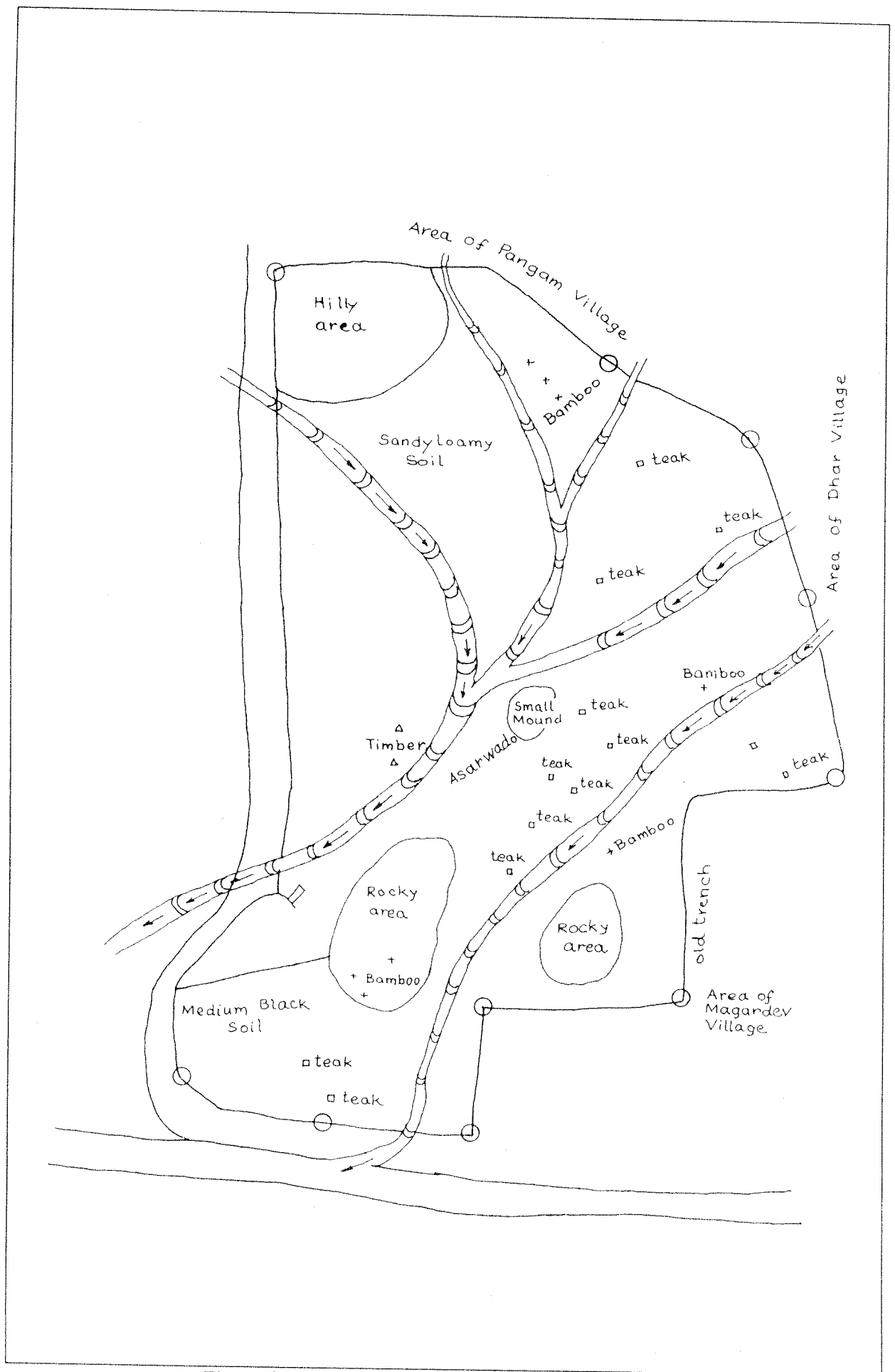


Figure 2. A Sketch Map of Soliya Village, Gujarat

children constitute only 19% of the total population. Soliya is a tribal village comprising mostly Vasava community. The three households belong to Rohit community, and 4 households belong to Kotwaliya community. Vasava community people are basically agriculturists or farmers; Kotwaliya are a migrating community, basically wage laborer, going from one village to the other in search of employment. Rohit community is basically of cobblers and provide service to all villagers. The lower income groups such as Rohits and Kotwaliyas are landless class. Some Vasava households also do not have land. In all, about 10 to 15 households are landless in the village; and they are landless laborers. Other 10 to 15 households have land-holding of more than 4 hectares (10 acres) or so. The remaining households have land between 1.25 to 2 hectares. However, most farmers are marginal type with land-holding of less than 1 hectare only.

The total area of the village is about 814 hectares. Out of 814 hectares, 380 hectares (46.67%) are under private ownership; 388 hectares (47.71%) are owned by the Forest Department; some 20 hectares are revenue wastelands and 10 hectares are gaucher lands; and 15 hectares fall in the unclassified category (Table 1). The privately owned land is basically farm land which is mainly rainfed. Only 4 hectares are irrigated and the rest 375 hectares are dependent on monsoon.

Livestock is also an important resource of the village and is the source of draft power for agriculture, milk and meat for meeting nutritional needs of the people. The total livestock population in the village is around 1700 animals. There are some 1125 buffaloes, constituting some 66% of the total livestock population (Table 2). Buffaloes are reared for milk as their milk yield is almost three or four times of the indigenous cow. Next to buffaloes is the population of bullocks or oxen which constitute 17.6% of total livestock population. People also rear goats; some 125 goats are in the village. Conspicuous absence of sheep is noted. On an average there are 5 animals per household.

Being an agriculture based village economy, oxen play an important role as they are the sole source of draft power. However, prices of oxen are very high as these are brought to Gujarat by Rajasthani traders who charge exorbitantly. For example, price of one pair of oxen varies from Rs.4000 to Rs.5000. There is no veterinary doctor in the village and the insemination facilities are virtually absent. According to Mr Bhupendrabhai Patel, Principal of High school, Soliya, the main reason for declining milk production in the village overtime is the lack of proper insemination facilities, i.e., there were no male buffaloes or bulls to impregnate she-buffaloes and cows. As a result, the number of milch animals declined rapidly over the years. But official records of Taluka office show that

**Table 1: Land Use Pattern in Soliya, Gujarat**

Particulars	Area (ha.)
1. Privately Owned Land	
Irrigation	4.05
Rainfed	375.55
2. Revenue wasteland	20.23
3. FD owned land	388.1
4. Gauchar land	10.11
5. Other lands	15.38
<b>Total</b>	<b>813.43</b>
Source: 1. Discussion with Soliya Villagers. 2. Taluka Development Office, Dediapada.	

**Table 2: Livestock Population, Soliya, Gujarat**

Population	Number
Cows	150
Bullocks	300
Buffaloes	1125
Sheep	0
Goats	125
Others	0
<b>Total</b>	<b>1700</b>
Source: 1. Discussion with Soliya Villagers. 2. Taluka Development Office, Deidapada.	

there are four bulls in the village. This however does not match with facts.

Most people in the village, in particular Vasavas, work on fields and rear livestock. Very few, such as Kotwalias or Rohits or other landless people, sell labor and collect nontimber forest products from forests. There are 2 to 3 cowboys in the village; their job is to collect all cows and other animals of the village and take them for grazing in the jungle.

A sharp division of labor between men and women exists. Men primarily do the ploughing operations, and all other operations such as weeding, harvesting, thrashing, winnowing are done by women. Children also provide labor for agricultural operations. Agriculture and animal husbandry go together in the village. Each household who has land keeps at least a pair of bullocks for traction power and a buffalo for milk purpose. Even landless households rear one or two cows or buffaloes for milk.

There are 3 tubewells in the village which have been dug after 1985 with the assistance of Agha Khan Rural Support Program--a non-governmental organization. Water from these tubewells is primarily used for drinking purposes. All the three tubewells are owned by the village community and none is privately owned.

Farmers grow cereals, pulses, oilseeds, vegetable and fibre crops. Cropping pattern data for 1993 are given in Table 3. Cereals occupy some 45% of the total sown area, pulses 34%, fibre crops 5%, and oilseeds 15%, and vegetables the rest 5%. Among cereals crops, jowar, bajra, and maize and dry paddy are major crops and form staple food of villagers. All of these crops are grown during monsoon and perhaps none is grown during winter. Some farmers have tried to grow wheat but with little success. Pulse crops include mung (green gram), Tuver (Arhar), Chana (gram), Chola (maize) urad (black gram). Cotton is the major fibre crop. Among oilseeds, castor and groundnut constitute some 91% of the total oilseed acreage. Very little acreage, about 5 hectares, is devoted to vegetables like okra and brinjals. Being rainfed agriculture, crop yields are very low and so are net returns. The average annual gross income of most households ranges between Rs.3000 to Rs.4000 per annum. The average per capita per month income hence falls between Rs.50 and Rs.66, indicating that all village population falls below poverty line.

### Culture and Religion

All villagers in Soliya are tribals and religion plays important role in various ways in guiding cultural and social affairs of the people. People celebrate 4 major festivals, Navratri, Ganesh Puja, Dev Puja, and Navratri. Dev Puja is very specific of tribal culture as it venerates land as God. A day

**Table 3: Cropping Pattern in Soliya Village, Gujarat, 1992-93**

Crops	Area under Cultivation (ha.)
<b>Cereals</b>	
Jowar (Rabi)	26
Jowar (Kharif)	46 <sup>a</sup>
Bajra	10
Maize	22
Paddy	55
Mor	01
<b>Subtotal</b>	<b>155</b>
<b>Pulses</b>	
Moong	03
Tur	83
Urad	24
Val	01
Chola	02
Chana	03
<b>Subtotal</b>	<b>116</b>
<b>Vegetables</b>	
Brinjal	02
Okra	02
<b>Subtotal</b>	<b>04</b>
<b>Fibrecrop</b>	
Cotton	17 <sup>b</sup>
Grass	15
<b>Subtotal</b>	<b>32</b>
<b>Oilseeds</b>	
Groundnut	17
Castor	16
Jowar Bhat	03
<b>Subtotal</b>	<b>36</b>
<b>Total Area</b>	<b>343</b>

a: Of this 43% is under hybrid jowar.

b: Of this 70% is hybrid cotton.

Source: Taluka Development Office, Dediapada, Gujarat.

is fixed for Bhoomi Pujan and all villagers come together to celebrate this occasion. This is supposed to bring the peace and prosperity to village. Most people in the village worship Lord Hanumanji as He is considered to be the embodiment of power or shakti. Religion has however not been very powerful to put restraint on various vices or unacceptable norms of gender relations as are generally perceived in the Indian society. For example, some 40% people, both male and female, take to drinking. Drinking is very popular on occasions of festivities such as marriages etc. Moreover, it is seen that most wage-earners are addicted to drinking despite their meagre living conditions. This adds to various quarrels in the village and to the personal enmity. Some village leaders opined the condition of addicts beyond repair and religion of no avail to influence them. The other 40% people in the village are teetotalers or called "Bhagat" in local parlance. Bhagats don't drink alcohol, don't eat meat, and devote time to kirtans.

Gender relations in Soliya village are far more open and equal. There is no restrictions or social taboos on free intermingling of boys and girls. Villagers' attitude towards sex is also a healthy one and they accept it as a natural biological process. Free intermingling of boys and girls allows them to choose their life partners. Both boy and girl has equal preference in choosing his/her partner. Marriage is a relatively simple affair and does not cost much. Most of the marriages are unlawful as couples are generally below the marriageable age as per Indian law. The average expenditure on a typical marriage comes to around Rs.1000 to Rs.1500. There is no dowry at all. Just as marriage is simple and easy, divorce is also easy and either party can dissolve the marriage by paying some compensation to other partner after the consent of village opinion leaders.

Like any tribal culture, villagers in Soliya repose a lot of belief in ghosts and spirits and they take it very seriously. For example, under the Jawahar Rojgar Yojna, the government initiated the construction of low cost pucca houses in Soliya village and some 10 such houses were built. But since then villagers have not occupied them as most believed that these houses are haunted by ghosts and spirits.

Cases of elopement of girl by boy are also existent in the village. However, this is not liked by the village community. Generally when eloped girl or boy comes back to the village, he or she is fined. The amount of fine ranges between Rs.1000 to Rs.2000.

The concept of family planning is totally absent and people at large do not believe in using contraceptives. Females don't like go to male doctor as they feel shy. However, at the same time, they do not feel shy in bathing openly in the river. There are instances of unwed mothers raising children too.

### Education and Health Care

The state of education is very poor in the village. Until 2-3 years ago, there was not a single school in the village. All village children worked either on farms or went out in search of wages. Some 3% of people knew a little bit of reading and writing of Gujarati language. Within last five years, a school has come up in the village. The school runs classes from 7th to 12th standards. Some 400 children come to this school, of which 125 children or 31% of the total are from Soliya village alone. Some 325 children were believed to be made literate by this school as per estimate of Mr Bhupendrabhai Patel, the principal of the school. The village has thus about 375 literate out of 2100 people--18 % of the total population. School also runs a hostel for students who cannot come every day from their faraway villages. Mr Bhupendrabhai Patel maintains that they have asked the state government for recognition of the school but nothing has happened yet. Currently classes are held in a building owned by Mrs. Patel. There is no laboratory facilities available for students. This makes teaching difficult and unpalatable to students. The financial position of the school is not sound as maintained by the Principal of the school.

According to Mr. Bhupendrabhai Patel, villagers as a whole in Soliya have not realized the importance of education. Many kids do not join the school either because of fear of getting beaten by teachers or because parents do not accord education any value. Among those who join the school, a large proportion drop out before graduating from high school. Only one or two individuals from village attend college. And even then who manage to finish college education have not found jobs of any kind. For example, the secretary of GVM, Mr Shantilal Vasava, is a graduate but he has not been able to get a job and is running a small grocery shop in the village.

According to Mr Bhupendrabhai Patel, the school teacher has much more responsibility in terms of training children to learn some basic principles of personal hygiene and sanitation, in addition to academic curriculum. Most kids are not aware of personal hygiene of keeping teeth and nail clean, wearing decent dress in the school, etc. School teachers have to work a lot and convince parents about the possible hazards of uncleanness.

The school children have also set exemplary standards in doing public works during the emergency hours of needs. For example, the road joining Rajpipla and Soliya broke due to heavy rains on 4th July, 1993. As a result, many students were not able to attend schools, and none care to repair it until 20th August, 1993, when school children of Soliya village finally repaired it.

Mr Patel also told that one of the aim of school is to expose students to outside world so that they can choose reference lines to assess their conditions in much more objective manner. The school has therefore organized long tours across different nearby regions of Gujarat or Maharashtra. Villagers do accept benefits of having school. School has thus become a centre of cultural change in the village.

The health care of the village is rather good when compared to other villages but is certainly not satisfactory from the view point of health care standards of the country. One Primary Health Centre (PHC) has been set up in the village. But it has been of no major help to Soliya residents as doctors and nurses are generally absent and come once or twice a week. The coverage area assigned to PHC is about 40 kilometers with no telephone and poor road facilities, there is very little scope for providing timely help to patients in the need of medicare at an emergency. One of the common endemic disease, locally called "Khas," has virtually affected every children in the village. This is a skin disease in which lesions develop on the skin and they become very itchy and painful. It has been found that this disease is due to bathing in dirty water in Karjan river. The water is dirtied due to decomposition of sunnhemp--a local plant whose fibres are used for rope making. Knowledge of medical science has not percolated yet among villagers. For example, people refuse to take antibiotics after the infection of chicken pox/measles.

### **Formation and Functioning of the Gram Vikas Mandal (GVM)**

In the past, some 3 or 4 types of organizations have been built up in Soliya. However most of them are non-functional or defunct. These include: Agricultural Credit Society (Khet Dhiran Mandli, KDM), Forest Labour Cooperatives (FLC), Village Dairy Cooperative Society (DCS) (Raju and Vaghela, 1993). Agricultural Credit Society or Khed Dhiran Mandli (KDM) went phut due to poor performance in disbursing timely loans. The Forest Labour Cooperative (FLC), based at Valpur, has three members from Soliya. FLC is now engaged in cutting dry trees, but was earlier engaged in coupe cutting with Forest Department. The Dairy Cooperative Society was started in 1978-79 with the purchase of exotic cattle breeds for its members. But insufficient green fodder became major constraint and milk yields declined tremendously. In 1991, large scale deaths of several animals occurred, this virtually wiped out the Dairy Cooperative Society.

Then came Dr. Parikh, during early 1980s in the village. He was stationed at Soliya Primary Health Centre. Having realized the potential of the village for development, he started organizing people and was successful in persuading villagers to form a Gram Vikas Samiti (GVS or Village Development Council). Later in 1985, the Agha Khan Rural Support Programme (AKRSP) approached the



Divisional Forest Officer, Rajpipla for his approval for initiation of Joint Forest Management programme in Soliya village. Having agreed by the Forest Department, AKRSP adopted the village for afforestation. The first thing that AKRSP did was to form the Gram Vikas Mandal (GVM). The pre-existence of GVS facilitated the formation of GVM.

The GVM in 1985 was a sort of informal organization and had a total 50 members. All members were landless. Later landed members were also added to it. In June 1993, its total general body membership was about 183--more than threefold increase in the member population. It has a president and a secretary, and a total of 12 executive members. List of Executive Committee members of Soliya GVM as of June 1993 are given in Table 4. A perusal of Table 4 reveals that vasava community--the majority in the village--supports the new initiative of village organization. The other interesting feature of the executive committee is that 2 women members are also part of this decision making unit. Currently Mr. Laab Singh is the president of GVM. Mr Laab Singh is a security officer in Surat and hails from Soliya. He is highly respected individual in the village. He visits the village every month to attend meetings. Up until May 1993, his brother Mr Bahadur Singh was the secretary of GVM. In June 1993, Mr Bahadur Singh along with 15 other persons from the village have been arrested and have been put in jail for murder charges<sup>1</sup>. Hence the new secretary, Mr. Shantilalbhair, who is a graduate from one of the colleges of Gujarat University, has taken charge. He is also leader of the Nav Yuvak Mangal Dal (NYMD) in the village.

**Table 4: List of Executive Members of Soliya Gram Vikas Mandal, 1992**

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President	:	Laabh Shankar Devjibhai Vasava
Deputy President	:	Ramanlal Hiralalbhair Vasava
Secretary	:	Shantilalbhair Vasava
Members	:	Raisinghbhai Vasava Shepatiyabhai Vasava Pratapbhai Vasava Manilalbhair Vasava Somabhai Vasava Mathunjibhai Vasava Rupjibhai Vasava Jesalbhair Vasava Bhailalbhair Vasava Narshinghbhai Vasava Smt. Kokilaben Vasava Smt. Kamalaben Vasava

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Source: Based on Survey

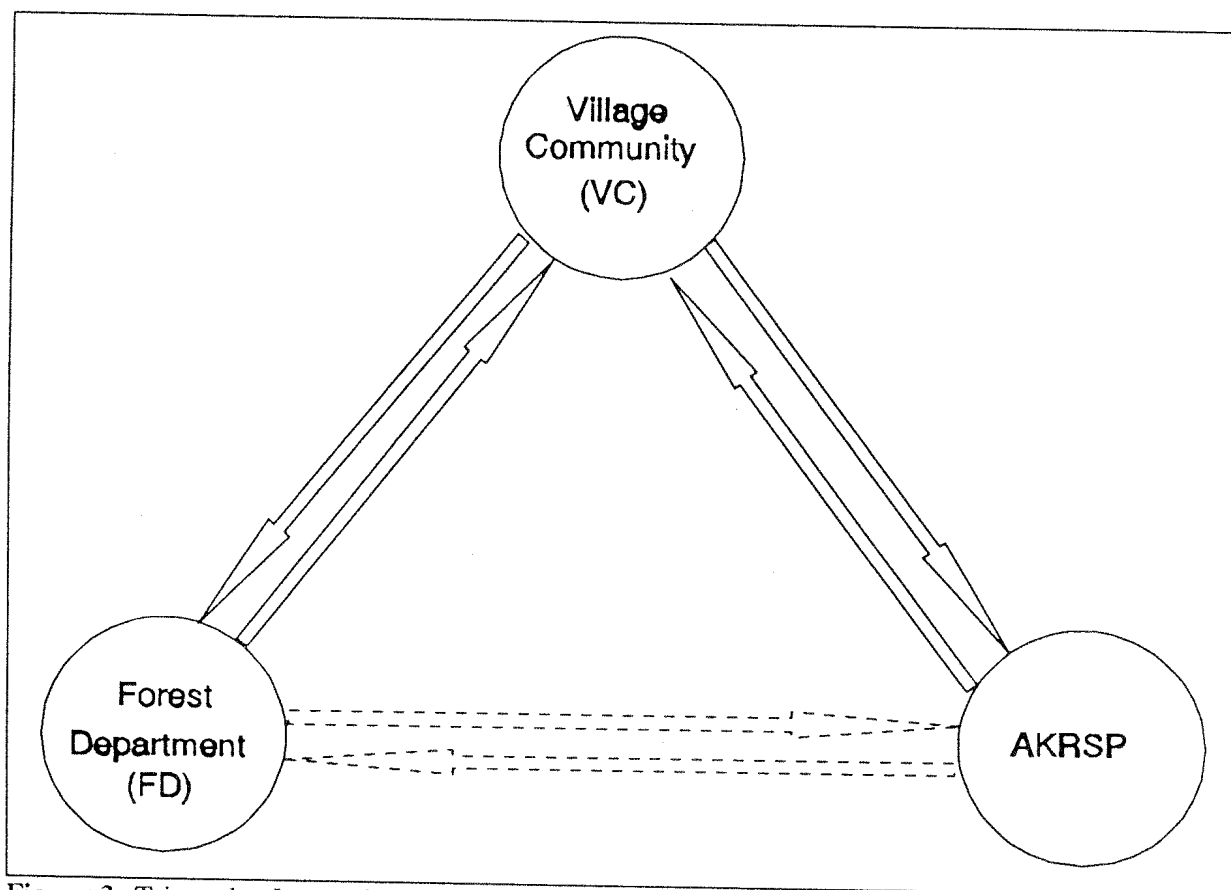
The criteria for membership of GVM has changed considerably since starting of GVM in 1985. At the time of starting in 1985, only landless villagers were members. The criteria of membership was that one who can contribute labour towards forest protection can become the member. At that time only 50 people joined the program. Later landed people were also made members who agreed to the "principle of labor contribution". The improved performance of JFM program attracted more people. As a result, several people who had not participated yet are now willing to be GVM members. Mr. Shantilalbhair, the GVM secretary, told that they are now going to charge a lifetime membership fee of Rs.11 per person which would include a share of Rs.10 in the society and Rs.1 as entry fee.

The AKRSP played a significant role in mobilizing the villagers' opinion towards formation of GVM. The first thing that AKRSP did was to prepare villagers psychologically to participate in the afforestation programme. The AKRSP officials listened to villagers and told them about the possible benefits of afforestation, especially in the form of employment opportunities generated in the plantation work in the instant future. The other important task that they did was to take participating people in confidence so that they devote time to protect the afforested lands. Villagers however were doubtful about their share in the economic benefits of afforestation that would arise in the future. But despite all these reservations, villagers participated in hope for the best possible reaction from the government. In brief, an unwritten psychological contract was signed between villagers and the government with the help of AKRSP as guarantor. Thus preparatory and appraisal phase of participation worked well.

The third and fourth phases of organization and evaluation did not go very smoothly. One major problem cropped up in connection with the wage payment to villagers for plantation. For example, in 1990, Forest Department provided the saplings and technical help in plantating the JFM land in the village and villagers were asked to contribute labor. But villagers in return expected wage payments as they got payment for similar work from the AKRSP. On the other hand, the Forest Department assumed that villagers would contribute free labor to this jointly managed venture. As a result, Forest Department declined to pay wages. This created discontent among villagers and they approached AKRSP. AKRSP agreed to pay wages under the condition that the villagers would repay the amount after the first harvest from the forest. AKRSP did this perhaps to protect its fatherly image and also to win hearts of people. This act was, however, interpreted differently by the Forest Department. Forest Department alleged that AKRSP implicitly wants a share in the forest produce to which it is not entitled. This is strongly refuted by AKRSP people who say that they are only asking repayment of their money which they had given as interest free loan. AKRSP feels that unless loan is repayed it will set a bad precedent. Villagers on the other hand are reluctant to pay as they consider that money paid by AKRSP to be their legitimate wages. This has had impact on sales of bamboos that had come from the first harvest. Sales are being delayed unnecessarily as people fear that AKRSP may take its own share.

The second major problem cropped up in November 1991, when rival GVM was launched in the village with the blessings of Forest Department officials. The Deputy Conservator of Forest (Dy. CF) took special interest in this bid. Mr. Hasmukhbhai, a shopkeeper as well as a farm household in the village was encouraged to form a rival GVM with overlapping membership. The major convincing argument that Forest Department used was to question the motive of loan by AKRSP. This humiliated AKRSP to a great extent. At the same time, Forest Department officials informally promised the possibility of giving them employment at work taken up by the Forest Department in nearby Dhanor village. People thus joined the rival-GVM so as to minimize the risk of losing something by not joining any organization. But residents of Dhanor village protested against employing outsiders and this put an end to the hope of Soliya villagers as Forest Department officials could not go against the wishes of Dhanor villagers. The final effect was the death of rival-GVM sometime in January 1993, and people settled for the original GVM.

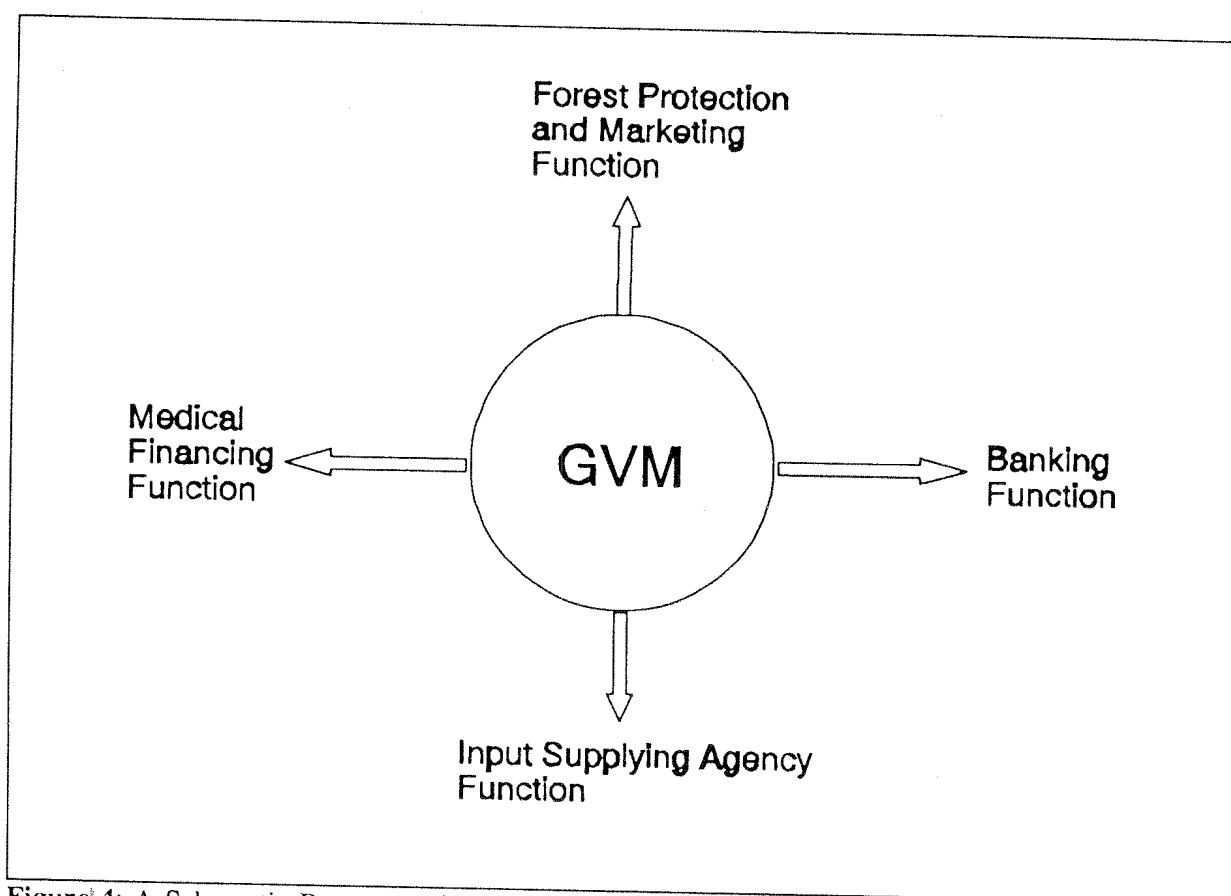
From the foregoing discussion, it is clear that the triangular relationship between Village Community (VC), Forest Department (FD), and Agha Khan Rural Support Programme (AKRSP) is very delicate and sensitive. Communication channels among three parties are not direct (Figure 3). Community is the central focal point. The communication between FD and VC, and between AKRSP and VC, is direct and the possibility of feedback is ample. However, communication between FD and AKRSP is very loose and unstructured. And a lot more understanding of various programmes and facts run by each organization (FD and AKRSP) depends upon the perceptions and hearsay that runs among the community members and village opinion leaders. Hence chances to pollute the contents of messages are very high as people may manipulate them as per their vested interests and motives. Interesting thing is that no dialogue has yet taken place between FD and AKRSP to squash these misunderstanding. Some initiative towards dialogue to reach a common understanding is hence must.



**Figure 3:** Triangular Interaction between Village Community, Forest Department, and Agha Khan Rural Support Program

The Gram Vikas Mandal (GVM) is an institutional innovation to meet various multiple community needs. In fact, GVM in Soliya is performing various functions. Basically these functions can be classified into four categories: (1) forest protection and marketing function; (2) banking function; (3) medical insurance functions; (4) input-supplying agency function (Figure 4).

Organizing protection of forests is the major objective of GVM. It organizes the schedule of protection duty and fines members those who skip their protection duties. In addition, it fines members and nonmembers who steal from forests and designs punishment criteria which are practicable. So it must have the sanction of the villagers' will to execute these rules to be enforced. GVM also function as a bank for villagers. All those who work in the afforestation program are paid through GVM. The individual is paid after making two types of deductions at the source: (1) GVM commission deduction (GCD); (2) individual's savings deduction (ISD). The GVM commission deduction is used for maintaining the GVM office, for buying implements like pesticides, sprayers, and sugarcane crusher, for paying wages to watchmen during monsoon season, etc. The GVM, Soliya, has now 5 sprayers and 1 sugarcane crusher. The GVM rents them out to farmers for spraying pesticides. The GVM deductions are thus community savings. The individual's savings deductions are kept by the GVM in the individual's account with GVM. The GVM meticulously maintain these records. Members can take loan against these savings from GVM. Interest rate charged by GVM is however high around 24% as told by the Secretary, Shantibhai Vasava. In 1992, Villagers were paid Rs.29.75 per day. Out of Rs.29.75, the GVM commission deduction was Rs.1.75 while the individual savings deduction was Rs.4; the remaining Rs.24 per day was paid to the individual. The aggregate details of community and individual savings generated by GVM for this year are given in Table 5. Thus total money generated in 1992 was Rs.43,226.75 through planting of sapling and digging pits.



**Figure 4:** A Schematic Representation of Functions of GVM, Soliya

Out of this a total of Rs.34,872 was paid to individuals, Rs.5,822 went to individuals' accounts with GVM, and the rest Rs.2,541.75 went to the community savings account (Table 5).

<b>Table 5: Details of Community and Individual Savings Generated by GVM, Soliya, 1992</b>			
Particulars	Activities		Total
	Digging	Planting	
Total mandays	319	1134	1453
Total money paid to GVM by AKRSP @ Rs.29.75 per day	9,490.25	33,736.50	43,226.75
Individual savings @ Rs.4 per day	1,286.00	4,536.00	5,822.00
GVM commission reduction @ Rs.1.75 per day	557.25	1,984.50	2,541.75
Actual money paid to individuals	7,656.00	27,216.00	34,872.00
Source: Records of GVM, Soliya			

Out of so generated funds, the GVM lends money to members to buy agricultural inputs such as hybrid seeds, pesticides, and fertilizers. Since access to these inputs is not easy, GVM buys them from nearby markets and then retails in the village and thus performs role of an input-supplying agency. Members find it very convenient as they get loan from GVM and the seeds or fertilizers at the right time in the village. Since timely supply of these inputs is very necessary in order that yield may not go down, the GVM supplies of inputs with loan facility come in handy to villagers.

But more important and the noble thing that GVM has done in Soliya is the financing for medical help. Many people who fall sick and have no money find this facility as boon to them. In point of fact, many participants acquired this as the greatest service by GVM to villagers. Interesting thing is that loan facility for medical help is instant. If anyone goes to doctor or/and to buy medicines, he can instantly get loan to pay for these expenses. No other financial institution can provide such a timely help in an efficient manner as does GVM. Having realized the importance of GVM, people are also very sincere in making repayments. According to Mr. Shantibhai, Secretary, the recovery is rather good and they don't have as yet any problem of default.

### **Role of Forest Resources in the Village Economy**

There are three types of forests in Soliya village which people use for extracting different kinds of benefits: (1) reserve forest, (2) revenue forests, (3) jointly managed forests. Village has access to nearby reserve forests which are being managed by the Forest Department. But, in recent years, in particular after 1986, afforestation work has been initiated on the revenue wastelands and lands surrounding villages which are owned by the Forest Department. As a result, dependence on reserve forests is declining. Forests form an integral part of lifestyle of village people. People derive and acknowledge multiple benefits from forests. Various benefits emanating from forests that people use can be classified into four categories: (1) economic benefits (2) ecological benefits (3) community related benefits (4) cultural benefits. Villagers accept that the economic benefits are the major attraction to them though other benefits are equally important.

Economic benefits include both timber and nontimber products. Various nontimber products become available in the early and mid stages of forest growth and timber at the end. Various nontimber forest product (NTFPs) include gums, resins, leaves, flowers, roots, stem bark, fuelwood, fodder, medicinal herbs, etc. Local people collect a number of NTFPs especially from reserve forests. People collect one or multiple parts of species from forest and sell in the local market. Most commonly collected NTFPs include: timru leaves, khakhar leaves, asitra leaves, mahua flower and seeds, baheda fruits, amla fruits, karanj seeds, saag seeds, modad seeds, haldu seeds, bamboo seeds, khair seeds, sewan seeds, tado seeds and flowers, ambo fruits, bila fruits, umba fruit, khatti umba and so on. Various uses of NTFP items are summarized in Table 6. Common English names of various NTFP species, and amount collected of various NTFP items in 1992-93, are given in Table 7. Timru leaves collection is a major activity in terms of value and volume. Some 2 lac pudas or bundles are annually collected, each puda/bundle consisting 50 leaves. These leaves are used for making bidi--the local smoke. Since 1986, there has been a significant reduction in the timru leaves collection according to the local collection agent of the Gujarat Forest Development Corporation, (GFDC). The collection from Soliya village has declined from 8 lacs pudas in 1978/79 to 1.87 lacs in 1993 (Viksat, 1993). This is not because that the timru plant population has declined but because that no pruning has been done since 1986, the fact which has led to the production of smaller and thicker leaves (which makes them prone to diseases). The pudas of such leaves are unacceptable to GFDC's standards. Khakar and Asitra leaves are also collected and sold but their production is less. Khakar leaves are also used for making leaf-cups.

Most NTFPs are collected during summer when villagers are rather free from agricultural work. They utilize this time to supplement their incomes through NTFP collection. The estimated time taken in collection and generated employment and labor productivity are given in Table 8. An annual employment of about 4000 mandays is generated through collection of NTFPs in Soliya village. A rough estimate suggests that NTFPs worth Rs.90 thousands to 1.25 lacs are collected annually besides the fuelwood and fodder extracted by villagers for self-consumption. The aggregate imputed wage for collection comes around Rs.34 per day as opposed to the market rate of Rs.32/day. Looking at the differential between market and imputed wage rates, collection of timru leaves, baheda fruits, sag seeds is very profitable, giving a very lucrative margin (Table 8).

Table 6: Major Uses of Various NTFPs, Soliya

Sr. No.	Local Name	Common Name	Part Used	Uses
1.	Timru	Tendu Patta	Leaves	Bidi
2.	Khakra	Palas	Leaves	Bidi, Cup & Plates
3.	Asitra	Katchnar	Leaves	Bidi
4.	Mahudo	Mahua	Flower	Medicine & Alcohol
5.	Mahudo	Mahua	Seed	Oil
6.	Baheda	Bahera	Fruit	Fruit
7.	Amla	Amla	Fruit	Oil
8.	Karanj	Karanja	Seed	Seed Oil
9.	Saag	Teak	Seed	To sell
10.	Modad	Modal	Seed	To sell
11.	Hardad	Haldu	Seed	To sell
12.	Vans	Bamboo	Seed	Food
13.	Khair	Khair	Seed	To sell
14.	Sewan	Sewan	Seed	To sell
15.	Tado	Fruit & Flower		Alcohol
16.	Ambo		Fruit	Food & To sell
17.	Kowad	Karaya	Gum	Gum
18.	Bila	Bael	Fruit	Food
19.	Umba	Umba	Fruit	Food
20.	Khatiumba	Kusum	Fruit	Food
21.	Ambli	Imbli	Fruit	Food
22.	Gorasambli	Vilayati Imbli	Fruit	Food
23.	Al	Al	Flower	Medicine
24.	Gugad	Gugad	Gum	Gum
25.	Soghad	Soghad	Seeds	
26.	Rantog ) Goyand )	Leaves & Fruit		Neera
27.	Himada			Medicine
28.	Alu Kakad			Medicine
29.	Hud Pad			Medicine

Source: Based on discussion with AKRSP officials, villagers, and Forest Department officials.

**Table 7: Estimates of Collection of Various NTFPs by Soliya Villagers, 1992-93**

Sr. No.	Local Name	Commercial Name	Part Used	Amount Collected Per Annum
1.	Timru	Tendu Patta	Leaves	2,00,000 Pudas
2.	Khakra	Palas	Leaves	75,000 Pudas
3.	Asitra	Katchnar	Leaves	1,00,000 Pudas
4.	Mahudo	Mahua	Flower	20 Qtls.
5.	Mahudo	Mahua	Seed	3 Qtls.
6.	Baheda	Bahera	Fruit	1 Qtl.
7.	Amla	Amla	Fruit	2 Qtls.
8.	Karanj	Karanja	Seed	40 Kgs.
9.	Saag	Teak	Seed	40 Kgs.
10.	Modad	Modal	Seed	15 Kgs.
11.	Hardad	Haldu	Seed	14 Kgs.
12.	Vans	Bamboo	Seed	100 Kgs.
13.	Khair	Khair	Seed	20 Kgs.
14.	Sewan	Sewan	Seed	60 Kgs.
15.	Tado	--	Fruit & Flower	500 ltr.
16.	Ambo	Mango	Fruit	25 Qtls.
17.	Kowad	Karaya	Gum	12 Qtls.
18.	Bila	Bael	Fruit	30 Kgs.
19.	Umba	Umba	Fruit	30 Kgs.
20.	Khatiumba	Kusum	Fruit	20 Kgs.
21.	Ambli	Imbli	Fruit	100 Kgs.
22.	Gorasambli	Vilayati Imbli	Fruit	20 Kgs.
23.	Al	Al	Flower	40 Kgs.
24.	Gugad	Gugad	Gum	100 Kgs.
25.	Soghad	Soghad	Seed	20 Kgs.
26.	Rangot-)			
	Goyand )	--	Leaves & Fruits	10 Kgs.
27.	Himada	--		500 Gms.
28.	Alu Kakad	--		500 Gms.
29.	Hud Pad	--		500 Gms.

Source: Based on discussion with AKRSP officials, villagers, and Forest Department officials.

The collection period for various NTFPs and composition of collectors in terms of men, women, and children is given in Table 9. As obvious, most NTFPs are collected during April to May and mostly women are engaged in the collection. In addition to NTFPs, people also collect crop residues. The collection period of these residues during the year is shown in Figure 5.

In addition to above, fuelwood and fodder are two important NTFP items which are collected from forests for self-consumption purpose. A random survey based on 30 households in the village revealed that on an average fuelwood consumption amounts to 1kg/person/day. Using this estimate, the fuelwood requirement of 320 households, each households having 7 members in the family, is assessed to be 792 tonnes for the whole year. But the actual consumption is less than the stipulated amount. This is because the availability of fuelwood has been a severe constraint in the past. As a result, people have sought alternatives or substitutes such as crop residues of tuber and cotton. These residues

suffice for 4 months and are used along with fuelwood for cooking. In recent years, in particular during the 1980s, there has been a spurt in the biogas plants in the village. Significant savings of fuelwood are estimated by use of both crop residues and biogas.

**Table 8.8 Time Taken in Collection of NTFPs and Estimated Employment Generation, and Labor Productivity, Soliya, Gujarat**

Sr. No.	Local Name	Collection Per Trip	Total Collection	Total Mandays	Total Value	Imputed Wage Rs./Day	Market Wage Rs./Day	Difference
1.	Timru Leaves	225 Pudas	2,00,000 Pudas	889.00	42,000	47.24	32	+ 15.24
2.	Khakra Leaves	125 Pudas	75,000 Pudas	600.00	8,250	13.75	32	- 18.25
3.	Asitra Leaves	110 Pudas	1,00,000 Pudas	1,136.00	25,000	22.00	32	- 10.00
4.	Mahudo Flower	20 Kgs.	2,000 Kgs.	75.00	4,000	53.33	32	+ 21.33
5.	Mahudo Seed	5 Kgs.	3,000 Kgs.	900.00	9,000	10.00	32	- 22.00
6.	Baheda fruit	20 Kgs.	1,000 Kgs.	62.50	3,000	48.00	32	+ 16.00
7.	Amla fruit	10 Kgs.	2,000 Kgs.	125.00	8,000	64.00	32	+ 32.00
8.	Karanj seed	2 Kgs.	40 Kgs.	12.50	-	-	-	-
9.	Saag seed	15 Kgs.	40 Kgs.	2.33	200	85.83	32	+ 53.88
10.	Modad seed	0.5 Kg.	15 Kgs.	41.25	-	-	32	-
11.	Hardad seed	0.5 Kg.	14 Kgs.	28.00	-	-	32	-
12.	Bamboo seed	10 Kgs.	100 Kgs.	15.00	-	-	32	-
13.	Khair seed	3 Kgs.	20 Kgs.	4.16	80	19.23	32	- 13.23
14.	Sewan seed	5 Kgs.	60 Kgs.	12.00	270	22.50	32	- 9.50
15.	Tado fruit/flower	10 Ltrs.	500 Ltrs.	12.50	2,500	200.00	32	+168.00
16.	Ambo fruit	250 Kgs.	2,500 Kgs.	15.00	17,500	1,166.66	32	+1134.66
17.	Kowad gum	0.5 Kg.	25 Kgs.	37.50	1,000	26.66	32	- 5.34
18.	Bila fruit	20 Kgs.	30 Kgs.	1.13	-	-	32	-
19.	Umba fruit	2.5 Kgs.	30 Kgs.	9.00	-	-	32	-
20.	Khatiumba fruit	4 Kgs.	20 Kgs.	3.75	-	-	32	-
21.	Ambli fruit	12.5 Kgs.	100 Kgs.	3.00	500	166.66	32	+134.66
22.	Gorasambli fruit	5 Kgs.	20 Kgs.	0.50	100	200.00	32	+168.00
23.	Al	3 Kgs.	40 Kgs.	8.30	-	-	32	-
24.	Gugad	0.5 Kgs.	100 Kgs.	300.00	4,000	13.33	32	- 18.67
25.	Soghad	2.5 Kgs.	20 Kgs.	12.00	-	-	32	-
26.	Rantog Goyand	1 Kg.	1 Kg.	1.50	40	26.66	32	- 5.34
27.	Himada	0.1 Kg.	0.5 Kg.	7.50	-	-	32	-
28.	Alu Kakad	0.5 Kg.	0.5 Kg.	1.50	-	-	32	-
29.	Hud Pad	-	0.5 Kg.	-	-	-	32	-
Total		-	-	4040.92	1,25,400	34.00	-	-

\* 1 Manday = 8 hrs.

Source: Constructed from Data Obtained from Survey and based on discussion with AKRSP officials, villagers, and Forest Department officials.

**Table 8.9 Period of Collection and Number of Men, Women, and Children Engaged in NTFP Collection, Soliya, Gujarat**

Sr. No.	Local Name	Collection Period	No. of Persons Collecting		
			Men	Women	Children
1.	Timru	Apr. - May	-	50	10
2.	Khakra	Apr. - May	-	25	-
3.	Asitra	Apr. - Oct.	25	-	-
4.	Mahudo flower	Apr. - May	25	-	-
5.	Mahudo seed	May - Jun.	30	50	10
6.	Baheda	Aug. - Sep.	10	30	30
7.	Amla	Jul. - Jan.	10	5	-
8.	Karanj	Mar. - Apr.	5	-	10
9.	Saag	Mar. - Apr.	5	-	5
10.	Modad	May - Jun.	2	1	3
11.	Hardad	Apr. - May	5	5	2
12.	Vans	Mar. - Nov.	10	10	-
13.	Khair	Mar. - Apr.	15	7	5
14.	Sewan	May - Jun.	5	2	2
15.	Tado	Mar. - Jun.	-	15	5
16.	Ambo	Mar. - Jul.	50	15	25
17.	Kowad	Jan. - Dec.	5	-	-
18.	Bila	Mar. - Jul.	7	5	15
19.	Umba	Jun. - Jul.	5	3	10
20.	Khatiumba	May - Jun.	5	2	10
21.	Ambli	Feb. - Apr.	10	20	25
22.	Gorasambli	Mar. - Apr.	5	7	25
23.	Al	Jul. - Sep.	10	8	25
24.	Gugad	Jan. - Dec.	-	25	-
25.	Soghad	Mar. - Apr.	5	2	1
26.	Hidido leaves	Apr. - May	2	1	5
27.	Rantog Goyand	Jan. - Dec.	5	-	-
28.	Himada	Jul. - Sep.	5	-	-
29.	Alu Kakad	Jan. - Dec.	5	-	-
30.	Hud Pad	Jul. - Sep.	1	1	-

Source: Based on Discussion with AKRSP and Forest Department Officials and Villagers of Soliya



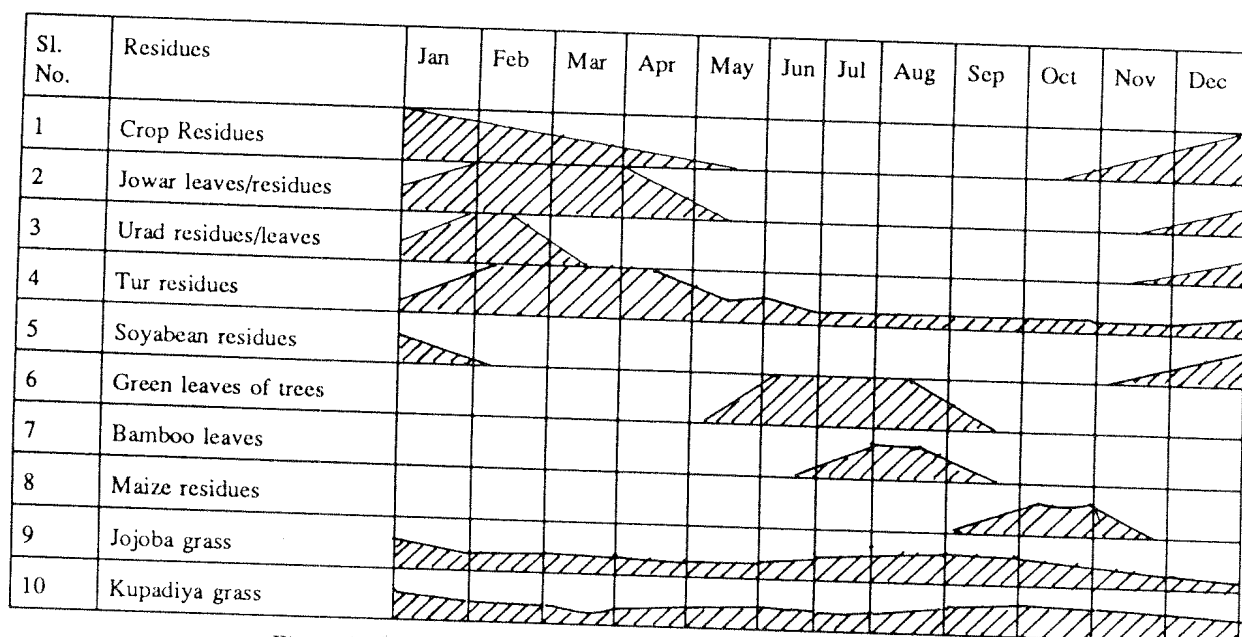


Figure 5: Collection Time for Various Residues During the Year

A comparison of three types of households using different mix of fuelwood, cropresidues, and biogas is made in Table 10. A household which uses crop residues for four months saves some 14% of fuelwood, while other households who uses crop residues as well as biogas saves some 66% of fuelwood compared to the Household Type I, who is fully dependent on fuelwood only (Table 10). The survey revealed that access to fuelwood substitutes is not available to all households. Some 93 households, or 29% of the total households population, do not have access to both residues and biogas and are totally dependent on forests for meeting fuelwood requirements (Table 11). Other 54% of the households, or 172 households in the village, can substitute crop residues for 4 months. It is estimated that some 3 Kgs of fuelwood per household is replaced by residues, amounting to consumption of 4 Kgs fuelwood/household for 4 months or 120 days in the year. About 55 households, or 17% of the total household population, in the village have biogas plants which are in working conditions.

The total requirement of fuelwood for the entire village comes out to 817.6 tonnes per year, based on the estimate of 7kg fuelwood/household/day for 365 days. The estimated actual fuelwood consumption works out to be 662.19 tonnes, to which another 1.5 tonne/year is added to account for additional consumption for marriages, deaths etc. Thus fuelwood consumption for entire village is 663.69 tonnes-reusling into savings of 155.41 tonnes (Table 11).

Household Type	Fuelwood use per annum (Kgs.)	Fuelwood savings per annum (Kgs.)	Relative fuelwood savings per annum compared to household Type I (%)
<b>Household Type I:</b> Having complete dependence on fuelwood.	2555	Nil	Nil
<b>Household Type II:</b> Using crop residues for four months.	2195	360	14.09
<b>Household Type III:</b> Using crop residues for four months and biogas for the whole year.	855	1700	66.53

Source: Based on Survey

Table 11: Distribution of Households Using Fuelwood, Crop Residues, and Biogas and Their Fuelwood Savings, Soliya, Gujarat						
Particulars	Number of households	Total annual fuelwood requirement	Total fuelwood consumption	Fuelwood savings from:		Total fuelwood savings
				Crop residues	Biogas	
Tonnes						
Household Type I: Having complete dependence on fuelwood.	93 (29.1) <sup>a</sup>	237.62	237.62	Nil	Nil	Nil
Household Type II: Using crop residues for four months.	172 (53.8)	439.46	377.54	61.92	Nil	61.92
Household Type III: Using crop residues for four months and biogas for the whole year.	55 (17.2)	140.53	47.02	13.20	80.30	93.51
Additional fuelwood <sup>b</sup>	--	1.50	1.50	--	--	--
Total	320 (100)	819.100	663.69	75.12	80.30	155.41
<sup>a</sup> Figures in parentheses represent percentage to total <sup>b</sup> It includes consumption for marriage and death ceremonies Source: Constructed data obtained from survey.						

It is obvious that dependency on fuelwood can be greatly reduced with expansion of biogas program in the village.

Fuelwood supply in Soliya village is met mainly from Reserve forests through cut-back arrangement and illegal extraction. Under the cutback arrangement, the forest department hires the services of villagers for felling of dead trees, weeding, and for lopping unwanted branches that obstruct growth. And, in return, villagers are paid in kind in the form of fuelwood. That is, the Forest Department allows villagers to take away the cutwoods and deadwoods. On an average, a family collects this way 2 cartloads each weighing 500-700 kgs of wood once in a year under the cut-back arrangement. In addition, women are allowed to collect one headload (3-7)kg of fuelwood everyday from the reserve forests<sup>2</sup>. It is also believed that a relatively large amount of headload is met by illegal fellings of fuelwood from forests. Both Forest Officers and villagers accept this fact. The exact amount of illegal fellings is difficult to determine as villagers are tight lipped about it. Foresters accept that they turn blind eye to illegal fellings if they are small and warn villagers not to repeat it. At times case against villagers are registered. A Range Forest Officer (RFO) who requested anonymity put the illegal fellings between 25-30% of headload fuelwood. Forest Officials accept that exerting extra pressure on villagers invites political interference and weakens their control over forest resources. A rough estimate, made by the author, of the supply of fuelwood is given in Table 12. Note that some 45% of the fuelwood requirement is met by cutback arrangement; and, of the total headloading about one-third is illegally extracted.

Fodder is the second most important NTFP item of consumption. Based on interviews with villagers and cowboys, the average fodder requirement per day for cow, buffalo, and goat are respectively 20, 30, and 7 kilograms<sup>3</sup>. Using these estimates, the total requirement for the entire village when all animals are stallfed would be 15923 tonnes or about 16 thousand tonnes (Table 13). Note that three-fourths of total fodder is consumed by buffaloes. Buffaloes also outnumber cows and goats. When probed for reasons why buffaloes are preferred, the answer is obvious; their milk yields are almost more than twice or thrice than cows and their lactation period is also relatively longer. The second

important livestock is bullocks required for traction power. Bullocks and buffaloes and milch cows are stall-fed while non-milching cows and other livestock population goes for grazing. The grazing areas include reserve forests, jointly managed forests, and fallow lands. Some 8-10% of the total fodder requirement of the village is met through grazing alone<sup>4</sup>.

Table 12: Sources of Supply of Fuelwood, Soliya, Gujarat			
Sl. No.	Source	Amount of Fuelwood	Percent of Total
		Tonnes	
1.	Through cut-back arrangement once in a year.	300	45.25
2.	Headloading		
	Allowed	242	36.50
	Illegal	121	18.25
	Subtotal	363	54.75
	<b>Total</b>	<b>663</b>	<b>100</b>

Source: Based on survey and discussions with Forest Department Officials and villagers of Soliya

Table 13: Annual Fodder Requirement, Soliya, Gujarat				
Sl. No.	Livestock Type	Number	Requirement Per Day (Kgs.)	Annual Requirement (Tonnes)
1.	Cows	150	20	1095.00 (06.87) <sup>a</sup>
2.	Bullocks	300	20	2190.00 (13.75)
3.	Buffaloes	1125	30	12,318.75 (77.36)
4.	Goats	125	7	319.38 (02.05)
	<b>Total</b>	<b>1700</b>	<b>--</b>	<b>15,923.13 (100)</b>

<sup>a</sup> Figures in parentheses are percentage of the total.  
Source: Based on data obtained from Taluka Development Office, Dediapada and Field Survey.

After fuelwood and grass, bamboo has a greater role in the village economy. It is profusely used for construction of houses. For construction of a small house, some 1000 poles of bamboo are needed, and for a large some 2000 to 3000 poles of bamboo are needed. Villagers are authorised to obtain 50 poles of bamboo per household for house construction or repair by making an application to the Forest Department along with a Panchayat certification.

Besides NTFPs, villagers require timber for making houses, furniture, and agricultural implements. Teak poles are used for house construction while seven wood is used primarily for making agricultural implements. Khair and ber based furnitures are also common. Since Forest Department did not allow villagers cutting of any timber and this has put enormous pressure on people, particularly when they have to build new houses, the thefts and illegal fellings from reserve forests were rampant until after the emergence of Joint Forest Management in 1986. An interview with local forest guards revealed that since then there has been a 50% reduction in theft and forest crimes.

## Joint Forest Management Program

With the formation of GVM, the AKRSP initiated the afforestation program in the village. The first afforestation work in the village was done on 17 hectares of revenue wasteland in 1985 by the members of GVM. In 1986, some 85 hectares were afforested, of which 75 hectares were on Forest Department's land. As time went by, more area was brought under afforestation. By 1992, some 189 hectares were afforested and 86% of this hectareage belonged to the Forest Department. The details of yearwise afforestation until 1991 and other associated information are given in Table 14. After 1991, another 88 hectares have been afforested, thus total forest area reaching to about 247 hectares. A perusal of Table 14 reveals that from 1985 to 1991, about 449.9 thousand saplings were planted and out of which some 348.8 thousands survived till March 1991--thus overall survival percentage being 77.5%. The average height of teak in 5-6 year period was about 5.4 meters (18 feet) and girth about 32 cms. (13 inches). It is considered to be reasonable growth given the climate and soil moisture conditions of the area.

Basically, forests in Soliya can be classified into two categories; (1) partially planted forests which include roughly 25% natural regeneration and 75% enrichment planing; (2) completely or 100% planted forest. Some 30 species are grown in Soliya; a list of various species grown is given in Appendix A. Of all species, bamboo and teak predominate though density varies with topography and with old and new plantations, as evident from density computed for some forest patches.

Table 14: Yearwise Afforestation in Soliya under the Joint Forest Management Program								
Year of Planting	Types of Land	Area Planted (ha.)	Total No. of Saplings Raised Including Casualty Replacement (000)	Total No. of Saplings Planted Till 1992 (000)	Total No. of Plants Surviving March 1991 (000)	Survival Percentage etc.	Average Height (ft.)	Average Girth on Mar.'92 (cm)
1. 1985	R	17	94.5	51.00	36.00	85	18	32
2. 1986**	R	10	55.5	30.00	21.20	85	17	30
3. 1986	F	75	190.0	187.00	220.00	--	18	32
4. 1989	F	30	41.4	40.40	24.20	81	5	4
5. 1990*	F	30	28.5	28.40	18.11	64	5	4
6. 1991	F	27	40.0	39.09	29.34	75	--	--
<p>* Casualty replacement taken up by the Forest Department.</p> <p>** There has been only one year of planting. The plot has quite a substantial proportion of natural plants. The survival counting has been done on the basis of quadrant model.</p> <p>R - Revenue Land</p> <p>F - Forest Department Land</p> <p>Source: Data supplied by AKRSP and villagers</p>								

The GVM of Soliya has developed a set of rules and regulations to arrange protection for afforested areas. All the male members of GVM protect the forested areas as per the basic principle of labor contribution by which each member is required to supply labor towards protection of forests. Protection in Soliya is done round the clock, throughout the year. Everyday from 6 a.m. to next day 6 a.m., six GVM members patrol the afforested area of 247 hectares. The largest strip of protected forest is on the southern side of the village while two other strips of 25 hectares each are on the Northern side. With a total of 183 members, each member gets his turn once in a month. So this does not impose too much constraint on the individual's household work. A member who is paid Rs.10 per day maintains the records of duties and informs members when their turns come. During

the agricultural season when people are busy with their field work GVM employs two watchmen who are paid Rs.300 each per month.

Protection is required to guard forests property from thefts by members and non-members in the village and persons coming from outside the village. On probing with villagers and local Forest Guards, it was found that one person can steal on the average 10-15 green or 20-25 dry bamboos sticks or 2-3 teak pole at a time. Villagers accepts that persons from nearby villages which do not have joint forest management program do come to steal from Soliya forests. According to Soliya people, people from villages of Roopghat, Valpar, and Chalibaug have been constantly stealing from Soliya forests. Since incidents of thefts have been very common in the past, the Soliya GVM has formed some rules for punishing offenders. Both member- and non-member residents of Soliya Village, and non-members from outside Soliya, have indulged in thefts. In general, thefts of bamboo sticks and branches of trees or poles are very common. Punishment charges or fines as decided by the GVM, Soliya, for members and non-members are given in Table 15. A member found stealing bamboo or teak pole is charged fine at the rate of Rs.10 per bamboo stick and Rs.25 per teak pole, as opposed to market price of Rs.5 per bamboo stick, and Rs.10 per teak pole. In addition, the stolen offence material is forfeited. For non-members, the fine rates are just doubled. The rationale for differential rates for members and nonmembers lies in the expected commitments towards protection. Members are expected to have commitments while non-members have no concerns at all. A comparison of GVM fine rates against those charged by the Forest Department reveals that the former ones are a bit higher. The sanctioned rates of time for offence material for the year 1993-94, charged by the Forest Department are given in Appendix A-4.

Table 15: Fines Charged by GVM, Soliya vis-a-vis Forest Department, Gujarat		
Items of Theft	Rates of Fine Charges	
	GVM	FD
Members		
Bamboo Stick	Rs.10/stick	Rs.3642 per cubic meter of teak wood + 25% surcharge + 25% additional penalty. In addition, the cut-poles or teak wood is forfeited.
Teak Pole	Rs.25/stick	
Non-Members		
Bamboo Stick	Rs.20/stick	Rs.350/stick + 25% surcharge + forfeital of cut sticks.
Teak Pole	Rs.50/pole	
Source: Field Survey and Discussion with Forest Department Officials		

It is interesting to note that, with the initiative of JFM in Soliya and nearby villages in Bharuch, illegal extractions from reserve forests has dwindled by more than 50% as revealed by local Forest Guards. Villagers of Soliya village also confirm that after the end of anti-social elements in the village the task of protection has become very easy and simple as now most members oblige the rules of protection. In September 1993, when this village was surveyed it was found that only two watchmen were protecting forests and people were busy with their fieldwork. These two watchmen were able to protect the large area of 247 hectares. Villagers in general subscribed to the idea that stealing would finally nail down the community efforts. Everybody seemed to understand his/her social responsibility towards protection very well.

Understanding the psychology of individual household or participant and of the community as a whole is a key towards developing sustainable protection efforts. For this purpose, some 35 participants and other village opinion leaders were interviewed. Several reasons appear why people in Soliya participated in the afforestation program. The 35 participants that were chosen randomly were asked

to express their opinion or preference on 1 to 5 scale; 1 for strong agreement with the statement and 5 for strong disagreement. The brief characteristics of 35 interviewees are given in Appendix \_\_\_\_.

Villagers cite several reasons for joining the JFM program but the most important one to them is the idea of economic benefits. Three things are important here in this respect: (1) the magnitude of economic benefit; (2) timings of these benefits; (3) the expectation horizon in the people's mind. For convenience of understanding, we can classify various economic benefits into three categories: (1) that are available instantly or instant benefits; (2) that are available within the immediate near future or 3 to 7 years of plantation; and the (3) distant benefits which are available beyond 10 years. Villagers give high weightage to instant benefits whatever may be their magnitudes. In point of fact, availability of such benefits in terms of wage employment provided by the AKRSP was the prime attraction to villagers to join JFM program in Soliya. This was cited as the main reason by many participants for joining JFM in Soliya. The wage rate paid by AKRSP was also better than that available in agriculture. For example, agricultural wage is about 50% of what people were paid in forestry operations<sup>5</sup>. Other lucrative thing is that wage rate in forestry work has increased rapidly over the years. For example, in 1986, wage rate paid by AKRSP was Rs.14.20 per manday; it was revised upward to Rs.17.20 in 1989 and Rs.32.15 in 1993.

The other instant and second most important economic benefit that people viewed as strong incentive to join JFM program was the availability of other advantages such as availability of hybrid seeds, finance for medical expenses, etc., from the Gram Vikas Mandal (GVM). Interesting thing to note is that most participants interviewed agreed that prices charged by GVM are very reasonable and disbursement of agricultural inputs such as seeds, chemicals, and fertilizers, is very timely unlike their previous experience with Dairy Cooperative Society which took lots of time in sanctioning loan and disbursement was always late. Villagers considered the availability of NTFPs--in particular fuelwood and fodder--as the next immediate near future economic benefits. People need fuelwood and fodder directly to meet out their daily needs. In particular the women of the village felt that easy access to fodder and fuelwood from jointly managed forest would save their drudgery of walking miles together to faraway places for collection of fuelwood. This would also save time which could be employed elsewhere gainfully. Besides fuelwood and fodder, other immediate near future benefit that people expected to materialize within 3-5 years of JFM plantation was the harvesting of bamboo. Bamboo crop can be harvested from the fourth year since planting, and it can meet the liquidity needs of the people at large.

Villagers also pointed out the distant economic benefits in terms of timber that they expect to come after 30 to 50 years. But they are also uncertain about them. The biggest concern to them is the uncertainty of the so-called sharing arrangement between Forest Department and the community in general. Various economic benefits along with their expectation horizon and amount of uncertainty involved are shown in Table 16.

Apart from economic benefit, villagers in general recognize the ecological and sociological benefits arising out of the JFM program. People in general believe that good forest cover brings out good rainfall in the village. The other executive committee member Mr. Ramanbhai Vasava asserted that rainfall has increased after the JFM was commenced; as a result, water was available even during summer months, which otherwise was absent. This fact may be sheer coincidence and needs more scientific investigation. Mr Vasava also said that the agricultural yields have increased by one and half times due to good rains; and, the growth of grass around the agricultural fields have increased, adding to increased fodder supply in the village. Improved yields and water supplies were also valued highly for example, one executive committee member Mr. Roopsingh Vasava pointed out that after the JFM program in the village there has been a definite improvement in the agricultural yields in Soliya due to good and regular monsoon. He even acknowledged that no village wells have gone dry even once since the JFM program was initiated in the village.

Table 16: People's Expectation about Economic Benefits, Soliya, Gujarat			
Particulars	Instant Benefit	Near Future Benefit	Distant Future Benefits
Type of Benefits	Wage employment  Availability of timely loan for agricultural input and medical needs.	Fuelwood  Fodder  Bamboo  Commercial and non-commercial NTFP*	Timber  Fuelwood
Expectation Horizon	Within 0 to 2 years of the project.	Within 3 to 7 years of the project.	Beyond 7 to 10 years
Uncertainty involved in the people's mind	Least	More	Most
<p>* Other commercial NTFPs include timru, khakar leaves, gums, etc. Other non-commercial NTFPs such as berries, fruits, etc., used for supplementary daily diets.</p> <p>Source: Based on discussion with JFM participants, Soliya</p>			

Villagers also accept that JFM has brought out social change in the village in terms of increased interaction among villagers (Table 17). For example, one of the villagers noted that prior to commencing JFM program villages had very little interaction among them and they did not decide anything jointly. With the initiation of JFM in the village the group dynamics began working and people started interacting frequently. This has made them conscious of social good/bad in general. People now discussed even provincial and national issues and express their joint stand or opinions in the community get-togethers. JFM has thus united people in purpose to make combined efforts or to combat anti-socialism or hooliganism in the village. Some 77% of participants interviewed agreed to the statement that JFM has developed a culture of solving problems through dialogue and understanding.

Table 17: Perceptions of the Sociological Benefits of Joint Forest Management Program, Soliya, Gujarat						
Questions	Scale					
	S.A.	A.	U.D.	D.A.	S.D.A.	Total
1. JFM has forged unity among villagers.	12	20	2	1	0	35
2. JFM has increased interaction among villagers by breaking caste and gender barriers.	7	23	3	2	0	35
3. JFM has inculcated a culture of discussing and solving our problems among ourselves.	6	20	6	2	1	35
4. JFM has made us politically aware and active.	6	21	3	3	3	35
<p>S.A. : Strongly Agree; A : Agree; U.D. : Undecided; D.A. : Disagree; S.D.A. : Strongly Disagree</p> <p>Source : Based on Survey Results</p>						

Besides economic incentives that spring out from JFM, several other factors also affect people's protection efforts. For example, 33 out of 35 participants interviewed felt strongly that frequent visits by officials of Forest Department/AKRSP promote participation and protection efforts of the community. People in general felt that other ventures on participation basis can be also started in the village.

### Financial Analysis of Joint Forest Management

Two important things that needs to be investigated for successful proliferation of JFM program in Gujarat, or for that matter in India, are its financial viability and optimal sharing of financial benefits between the village community and Forest Department. The financial viability of the program is assessed in this section; followed by the economics of benefit-sharing in the following section. In order to study the financial feasibility, the financial or private benefit-cost analysis (PBCA) was applied to the cultivation of some major tree species in Soliya, Gujarat. Although some 30 species are grown in Soliya forest, basically three types of species are important: (1) teak, (2) bamboo, and (3) fuelwood and fruit species. But teak and bamboo predominate and are lucrative in terms of cash-earning prospects. Other species are generally used to meet the fuelwood and fodder requirements of villagers. Teak and bamboo are hence important ones in terms of meeting cash needs of villagers. A survey of JFM participants indicated that they are more interested in quick and frequent cash returns. To this end, two possible strategies are possible: (1) frequent harvesting schedules can be allowed in bamboo and teak cultivation; (2) different combination of teak and bamboo can be grown to meet cash needs of the community after setting aside some area for fuelwood and fodder species for meeting fuelwood and fodder requirements.

Bearing the above strategies in mind, the PBCA was applied to a set of promising scenarios (Table 18).

1. Scenario 1 entails complete bamboo cultivation in the designated JFM land and some seven types of bamboo management models are appraised.
2. Scenario 2 focuses on complete teak plantation, including 4 types of harvesting schedules, allowing more frequent thinning yields.
3. Scenario 3 assumes that some 40% area is under bamboo, and other 40% under teak, and the rest 20% is under fuelwood and fodder species to meet fuelwood and fodder demand of the village.
4. Scenarios 4 to 11 assume different proportions of bamboo and teak along with fuelwood and fodder species.

Cashflows were worked out for bamboo, teak, and various combinations of bamboo and teak. Cashflows for combination scenarios were worked out using the principle of proportion. That is, for example, the cashflow for scenario 7 would be worked out by multiplying cash flows of bamboo and teak each by 0.4 and then summing them up to get the combination cashflows. Having computed cash flows for each scenario, the following three measures of PBCA were computed: (1) Gross Benefit-Cost Ratio (GBCR), (2) Net Present Value (NPV), (3) Financial Internal Rate of Return (FIRR). The GBCR and NPV are given by the following formulas:

$$\text{GBCR} = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}} \quad \dots(1)$$

$$\text{NPV} = \sum_{t=1}^n \left( \frac{B_t - C_t}{(1+i)^t} \right) \quad \dots(2)$$



where

$i$  = discount rate,  
 $n$  = economic life of the project,  
 $B_t$  = total benefits in the  $t^{\text{th}}$  year,  
 $C^*$  = total costs in the  $t^{\text{th}}$  year.

Table 18: Scenarios for Tree Cultivation Appraised for Soliya, Gujarat			
Scenarios	Bamboo	Teak	Other Species
	% Area/Hectare		
1	100 (B1-B7) <sup>a</sup>	0	0
2	0	100 (M1-M4)	0
3	40 (B1) <sup>b</sup>	40 (T1)	20
4	40 (B1)	40 (T2)	20
5	40 (B1)	40 (T3)	20
6	40 (B1)	40 (T4)	20
7	40 (B2)	40 (T1)	20
8	40 (B2)	40 (T2)	20
9	40 (B2)	40 (T3)	20
10	40 (B2)	40 (T4)	20
11	30 (B2)	30 (T2)	40
<sup>a</sup> Figures in parentheses represent either numbers of models or the type of individual tree model used in combination with other model. <sup>b</sup> A combination of teak and bamboo is assumed to have one life cycle of 50 years of teak and two life cycles of bamboo of 25 years each. Source: Analysis			

The GBCR refers to the ratio of present value of total benefits to the present value of total costs; while the NVPs refer to the present worth of the net cash flows obtained over the economic life of the plantation. FIRR refers to the maximum earning capacity of the project: or it is the rate of discount which equates the present value of total costs to the present value of total benefits or in other words makes NPV equal to zero as indicated:  $FIRR = i$  such that  $NPV = 0$ . For estimating FIRR, however, the following formula is used (Gittinger, 1972, pp.55-56):

$$FIRR = i_l + (i_h - i_l) \left( \frac{NPV_l}{|NPV_h - NPV_l|} \right)$$

where,  $i_l$  = lower discount rate at which NPV is positive;  
 $i_h$  = higher discount rate at which NPV is negative  
 $NPV_l$  = net present value at lower discount rate  
 $NPV_h$  = net present value at higher discount rate

Financial analysis results of seven different bamboo management models are given in Table 19. Some important observations that can be made from the above are highlighted here. Firstly, the financial internal rate of return (FIRR) from all these projects varies from 60% to 112%; the highest one being for model B1 and the lowest one for model B7. All these projects are financially feasible even at 30% discount rate--the highest rate of interest that perhaps can be charged by any financial institution today. For example, the present values of net benefits at 30% discount rate totaled Rs.6,137, Rs.4,296, Rs.4,134, Rs.4,441, Rs.3,064, and Rs.2,944 respectively for B1 to B6 bamboo management models. For B7 bamboo management model, the present value of net benefit totaled some Rs.30,974. Similarly, the GBCRs are 5.68, 4.83, 4.73, 4.90, 4.06, 3.98, and 4.88 respectively for B1 through B7 models, indicating that they are financially feasible venture.

Table 5

**Table 19. Result of Benefit-Cost Analysis for Different Bamboo Management Models (B1 to B7), Soliya, Gujarat**

Models	10%	20%	30%	40%
<b>Model 1 (B1)</b>				
NPV	33,060.40	12,892.43	6,137.37	3,262.58
GBCR	7.96	6.84	5.68	4.62
FIRR	.. (112.26) ..			
<b>Model 2 (B2)</b>				
NPV	28,864.92	9,999.65	4,296.94	2,083.16
GBCR	7.76	6.24	4.83	3.67
FIRR	.. ( 91.88) ..			
<b>Model 3 (B3)</b>				
NPV	28,760.53	9,850.62	4,134.91	1,929.52
GBCR	7.65	6.18	4.73	3.52
FIRR	.. ( 82.35) ..			
<b>Model 4 (B4)</b>				
NPV	24,472.82	9,463.23	4,441.56	2,317.32
GBCR	7.30	6.08	4.90	3.88
FIRR	.. ( 99.22) ..			
<b>Model 5 (B5)</b>				
NPV	21,288.20	7,288.04	3,064.77	1,432.57
GBCR	6.97	5.44	4.06	3.00
FIRR	.. ( 80.37) ..			
<b>Model 6 (B6)</b>				
NPV	21,255.45	7,182.87	2,944.44	1,317.62
GBCR	6.97	5.40	3.98	2.87
FIRR	.. ( 73.45) ..			
<b>Model 7 (B7)</b>				
NPV	2,23,883.50	77,041.73	30,974.30	12,876.17
GBCR	6.92	4.88	3.34	2.27
FIRR	.. ( 62.41) ..			
<b>Model 1 (B1)</b>				
NPV	1,849.70	1,083.26	638.43	367.59
GBCR	3.72	2.99	2.39	1.93
FIRR	.. (112.26) ..			
<b>Model 2 (B2)</b>				
NPV	1,072.63	558.46	276.19	112.52
GBCR	2.78	2.13	1.65	1.30
FIRR	.. ( 91.88) ..			
<b>Model 3 (B3)</b>				
NPV	935.58	439.95	175.40	27.55
GBCR	2.59	1.91	1.42	1.07
FIRR	.. ( 82.35) ..			

Table 19 (contd...)

Models	50%	60%	70%	80%
<b>Model 4 (B4)</b>				
NPV	1,275.69	713.57	389.78	194.48
GBCR	3.05	2.40	1.90	1.51
FIRR	... ( 99.22) ...			
<b>Model 5 (B5)</b>				
NPV	692.69	319.96	118.09	3.18
GBCR	2.23	1.68	1.29	1.00
FIRR	... ( 80.37) ...			
<b>Model 6 (B6)</b>				
NPV	590.00	231.12	42.53	-60.52
GBCR	2.07	1.50	1.10	0.82
FIRR	... ( 73.45) ...			
<b>Model 7 (B7)</b>				
NPV	4,685.54	637.07	-1,472.43	
GBCR	1.56	1.08	0.77	
FIRR	... ( 62.41) ...			
<b>Model 1 (B1)</b>	90	100	115	120
NPV	196.69	85.95	12.81	-36.14
GBCR	1.56	1.27	1.04	0.86
FIRR	... (112.26) ...			
<b>Model 2 (B2)</b>				
NPV	13.82	-47.30		
GBCR	1.04	0.84		
FIRR	... ( 91.88) ...			
<b>Model 3 (B3)</b>				
NPV	-57.50			
GBCR	0.82			
FIRR	... ( 82.35) ...			
<b>Model 4 (B4)</b>				
NPV	72.74	-4.90		
GBCR	1.21	0.98		
FIRR	... ( 99.22) ...			
<b>Model 5 (B5)</b>				
NPV	-64.40			
GBCR	0.80			
FIRR	... ( 80.37) ...			
<b>Model 6 (B6)</b>				
NPV				
GBCR				
FIRR	... ( 73.45) ...			
<b>Model 7 (B7)</b>				
NPV				
GBCR				
FIRR	... ( 62.41) ...			

Source: Estimation

**Table 20: Results of Benefit-Cost Analysis for Different Teak Management Models (T1 to T4), Soliya, Gujarat**

Models	10%	20%	30%	40%
<b>Model 1 (T1)</b>				
NPV (Rs./ha.)	1,01,806.40	17,079.79	3,320.216	-429.558
GBCR	9.19	3.70	1.71	0.89
FIRR (%)	.. . . . .	(38.12)	.. . . . .	.. . . . .
<b>Model 2 (T2)</b>				
NPV (Rs./ha.)	94,312.47	15,269.55	3,023.999	-479.454
GBCR	8.88	3.45	1.65	0.88
FIRR (%)	.. . . . .	(38.86)	.. . . . .	.. . . . .
<b>Model 3 (T3)</b>				
NPV (Rs./ha.)	86,137.40	15,021.06	3,206.979	-399.965
GBCR	8.44	3.41	1.69	0.90
FIRR (%)	.. . . . .	(38.23)	.. . . . .	.. . . . .
<b>Model 4 (T4)</b>				
NPV (Rs./ha.)	90,505.20	16,836.69	3,815.119	-182.489
GBCR	8.56	3.64	1.81	0.95
FIRR (%)	.. . . . .	(39.24)	.. . . . .	.. . . . .

Source: Estimation

Like bamboo management model, four different teak management models are evaluated. The results of benefit-cost analysis are given in Table 20. The FIRRs were not as high as they were in the case of bamboo; the FIRRs hover around 38 to 39% discount rate (Table 20). All projects T1 through T4 are financially feasible up to 30% discount rate. The present value of net benefits per hectare for these totaled Rs.3,320, Rs.3,023, Rs.3,206, Rs.3,815 at 30% discount rate. Other interesting result that emerge from the perusal of teak management models is that with the increased number of selective thinnings allowed the net returns per hectare can be increased. Model T3 and T4, which allow frequent thinnings compared to model T1 and T2, have higher net present value of benefits compared to models T1 and T2. This suggests that with increased numbers of thinnings the teak can be made more attractive to villagers unlike the general belief.

Various possible combinations of teak, bamboo, and other fuelwood and fodder species can be tried under JFM program. Some nine possible combination management models are tested and their benefit-cost analysis is done. The salient results for nine combination management models are given in Table 21. A perusal of Table 21 reveals that FIRRs from all combination models, except models 5 (C5), hover between 46 to 50%. For the first four combination models, C1 through C4, the FIRR is around 50%; while for the last four models, C6 through C9, it is around 46%. FIRR for model 5 is however highest, about 80%. All combination models are feasible upto 30% discount rate and beyond, and their GBCRs are more than 2. It is hence suggested that combination of teak, bamboo, fuelwood and fodder species can be a financially feasible alternative. These combinations will meet both cash and kind needs of the villagers.

### Economics of Benefit Sharing

The economics of benefit sharing is the most important factor to determine the sustainability of JFM as an institution per se. In point of fact, there are two sets of issues which need to be dealt with for analysis of benefit sharing: (1) sharing of benefits between the Forest Department and village community; and (2) sharing of benefits within villagers.

**Table 21: Result of Benefit-Cost Analysis for Different Teak-Bamboo Combination Management Models, Soliya, Gujarat**

Combination Models	10%	20%	30%	40%	50%	60%
<b>Model 1 (C1)</b>						
(B1 + T1)						
NPV (Rs./ha.)	55,156.79	12,042.03	3,784.014	1,133.488	45.30856	-451.635
GBCR	8.82	4.52	2.58	1.59	1.03	0.69
FIRR (%)	..	..	.. (50.66)	..	..	..
<b>Model 2 (C2)</b>						
(B1 + T2)						
NPV (Rs./ha.)	52,159.180	11,317.93	3,665.527	1,113.529	41.64038	-452.377
GBCR	8.59	4.35	2.54	1.58	1.03	0.69
FIRR (%)	..	..	.. (50.61)	..	..	..
<b>Model 3 (C3)</b>						
(B1 + T3)						
NPV (Rs./ha.)	48,889.12	11,218.52	3,738.714	1,145.322	52.28725	-448.940
GBCR	8.28	4.32	2.56	1.60	1.03	0.69
FIRR (%)	..	..	.. (50.75)	..	..	..
<b>Model 4 (C4)</b>						
(B1 + T4)						
NPV (Rs./ha.)	50,634.28	11,944.63	3,981.957	1,232.311	85.27334	-435.786
GBCR	8.37	4.47	2.65	1.64	1.05	0.70
FIRR (%)	..	..	.. (51.20)	..	..	..
<b>Model 5 (C5)</b>						
(B2 + T1)						
NPV (Rs./ha.)	53,311.97	10,870.66	3,048.77	661.52	-265.635	0.00
GBCR	8.77	4.29	2.31	1.35	0.83	0.00
FIRR (%)	..	..	.. (80.37)	..	..	..
<b>Model 6 (C6)</b>						
(B2 + T2)						
NPV (Rs./ha.)	50,314.37	10,146.56	2,930.28	641.560	-265.635	0.00
GBCR	8.53	4.11	2.26	1.34	0.83	0.00
FIRR (%)	..	..	.. (46.15)	..	..	..
<b>Model 7 (C7)</b>						
(B2 + T3)						
NPV (Rs./ha.)	46,938.65	10,043.35	3,003.18	673.32	-258.66	0.00
GBCR	8.15	4.07	2.29	1.35	0.83	0.00
FIRR (%)	..	..	.. (46.27)	..	..	..
<b>Model 8 (C8)</b>						
(B2 + T4)						
NPV (Rs./ha.)	47,702.48	10,661.73	3,232.17	758.10	-226.06	0.00
GBCR	8.15	4.21	2.38	1.40	0.85	0.00
FIRR (%)	..	..	.. (46.83)	..	..	..
<b>Model 9 (C9)</b>						
(B2 + T2)						
NPV (Rs./ha.)	37,743.00	7,615.48	2,202.08	484.67	-199.13	0.00
GBCR	8.54	4.11	2.27	1.34	0.83	0.00
FIRR (%)	..	..	.. (46.12)	..	..	..

Source: Estimation

The current understanding between the Forest Department and villagers is that villagers would reap usufruct benefits such as fodder, fuelwood, etc., without sharing with the Forest Department, but people would be entitled to 25% harvest of bamboo or timber as per the Gujarat Government Resolution of 1991. The bone of contention that can occur between Forest Department and GVM of Soliya is most likely this share in the timber related benefits. Though government policy has changed in favour of giving share to village communities the operationalization of the same is not yet that easy and simple. And, the Forest Department is yet in the process of adopting to new policy changes. For example, the AKRSP initiated discussion on the sharing arrangement with the Forest Department in 1990, after the Government of India circular. The GVM of Soliya submitted an application on January 1991 to the Forest Department seeking permission to harvest first bamboo crop. However, the Forest Department took almost one and half year to grant the permission.

In May 1992, the GVM of Soliya was granted permission to harvest bamboos, with the guidance of local RFO or forest staff. Some 1,25,000 bamboos were marked, of which 56,000 were harvested with the help of staff of Forest Department. The villagers' share thus came to about 14,000 bamboos and the Minister of Forest, Government of Gujarat was invited to hand over this share to villagers to instill confidence in people in what government had promised. However, the event did not get the whole hearted attention and support of villagers for three major reasons (Raju and Vaghela, 1993). One, the AKRSP's efforts to present people's case was perhaps perceived by Forest Department officers as too pushy type of operation. This created a bit ill-feeling. Two, there was a difference of opinions among senior forest officers as to harvesting and sharing of economic benefits with the community. Three, wages given for harvesting were considered too low by villagers (Rs.34 for cutting, cleaning and making stakes of 100 bamboos). People from nearby villages were also hired to cut some crop. This too agonized the local populace.

As mentioned before, the large numbers of villagers expressed their disappointment with their share of 25%. Most villagers confirmed that the 75% share of the Forest Department in timber benefits is too much. Of the 35 participants interviewed, about 57% expressed that this sharing arrangement is unsatisfactory; some 31% considered it satisfactory, and the rest were undecided. However, contrary to this villagers were quite satisfied with the sharing of usufruct benefits. Some 75% of the interviewed participants considered sharing of NTFPs as the satisfactory arrangement (Table 22). It is hence necessary to examine the economics of benefit sharing. Benefit-cost analysis was applied towards understanding the financial feasibility of different sharing arrangements. To this end, the four possible sharing formulas or arrangements are considered:

- (1) 25% cash benefits to the villagers and 75% to the Forest Department (Sharing formula No.1).
- (2) 50% cash benefits to the villagers and 50% to the Forest Department (Sharing formula No.2).
- (3) 75% cash benefits to the villagers and 25% to the Forest Department (Sharing formula No.3).
- (4) 100% cash benefits to the villagers and none to the Forest Department (Sharing formula No.4).

Table 22: Perceptions of Villagers about Benefit Sharing, Soliya, Gujarat							
Sl No.	Statement	Grading Scale					
		S.A.	A	U.D.	D.A.	S.D.A.	Total
1.	Sharing of NTFPs among GVM members is satisfactory	8	18	5	4	0	35
2.	Forest Department selects those species that bring them good cash remuneration but does not benefit us in terms of NTFPs	3	16	12	3	1	35
3.	Benefit sharing with Forest Department in timber products is not satisfactory	4	16	4	8	3	35
S.A - strongly agree; A - agree; U.D.- undecided; D.A.- do not agree; S.D.A - strongly disagree Source: Survey Results							

The current sharing arrangements go in with the Sharing Formula No.1. The other suggested sharing arrangements are thus given by Sharing formula Nos.2, 3, and 4. A comparison of GBCRs and NPVs under 4 sharing options at 30% discount rate for selected bamboo and teak management models are given in Table 23. A perusal of the first four bamboo management models from Table 23 reveals that, under the current sharing arrangement (option A), the net returns to villagers are meager, ranging from Rs.203 for B3 to Rs.552 for B1 model. And, for the intensive bamboo cultivation model B7, the returns are far negative. The situation is worse when we examine the net return from teak cultivation. That is, net returns from teak are negative even under the 50% sharing option (Table 23). By

combining teak and bamboo and other fuelwood growing species, the net returns improved (Table 24). But even under combination models, net returns are negative to villagers under the 25% sharing formula and turn positive certainly under 50% sharing formula, although net returns are not that large and attractive in cash terms. But villagers do get free fuelwood and fodder in ample amount which might compensate for less liquidity.

A comparison of FIRR of different forest management models considered in this study across four types of sharing arrangements are given in Table 25. Note that except a few bamboo management models (B1, B2, B3, ...), all models including teak and different combinations of teak with bamboo and fuelwood/ fodder species have less than 30% rate of return under the current 25% sharing arrangement. This suggests that such arrangement is most likely to be unpalatable to villagers when viewed entirely in terms of liquidity or cash needs of the people. Under 50% sharing option, bamboo becomes attractive and FIRRs range from 40 to 80%, but teak and combination models barely touch the 30 to 35% rate of return (Table 25). Whether people will actually accept the current sharing arrangement with Forest Department or not depends upon what they value the most between liquidity and the kind needs in terms of fuelwood and fodder etc. If fodder and fuelwood needs are sufficiently large so that people do not mind the small or marginal cash benefits coming from the JFM, people's interest in the JFM can be sustained. But sooner or later people would realize the economics of current sharing arrangement and are likely to ask for more share in the cash benefits.

**Table 23: A Comparison of GBCRs and NPVs to Villagers @ 30% Discount Rate Across the Four Sharing Formulas, Selected Bamboo Management Models**

Management Models	Sharing Option (Villagers Share)			
	25%	50%	75%	100%
<b>Bamboo</b>				
1. Model B1				
NPV (Rs./ha.)	552.00	2411.79	4271.58	6137.37
GBCRs	1.42	2.84	4.27	5.68
2. Model B2				
NPV (Rs./ha.)	231.49	1586.20	2940.91	4296.94
GBCRs	1.21	2.41	3.62	4.83
3. Model B3				
NPV (Rs./ha.)	203.39	1513.90	2824.41	4134.91
GBCRs	1.19	2.37	3.55	4.73
4. Model B7				
NPV (Rs./ha.)	-2179.79	8871.58	19922.94	30974.30
GBCRs	0.84	1.67	2.51	3.34
<b>Teak</b>				
5. Model T1				
NPV (Rs./ha.)	-ve	-673.92	1323.14	3320.22
GBCR	<1	0.85	1.28	1.71
6. Model T2				
NPV (Rs./ha.)	-ve	-814.38	1104.80	3024.00
GBCR	<1	0.82	1.23	1.65
7. Model T3				
NPV (Rs./ha.)	-ve	-729.72	1238.62	3206.98
GBCR	<1	0.84	1.26	1.69
8. Model T4				
NPV (Rs./ha.)	-ve	-448.62	1683.24	3815.12
GBCR	<1	0.90	1.35	1.81

Source: Estimation

**Table 24: A Comparison of GBCRs and NPVs to Villagers at 30% Discount Rate under Different Sharing Options, Combination Management Models of Teak Plus Bamboo**

Management Models	Sharing Options (Villagers Share)			
	25%	50%	75%	100%
1. Combination 1 (B1 + T1) NPV (Rs./ha.) GBCRs	-847.38 0.64	696.41 1.29	2240.21 1.93	3784.01 2.58
2. Combination 2 (B1 + T2) NPV (Rs./ha.) GBCRs	-878.53 0.63	634.10 1.26	2152.88 1.90	3665.52 2.54
3. Combination 3 (B1 + T3) NPV (Rs./ha.) GBCRs	-858.22 0.64	674.26 1.28	2206.40 1.92	3738.71 2.56
4. Combination 4 (B1 + T4) NPV (Rs./ha.) GBCRs	-811.19 0.66	786.52 1.32	2384.29 1.98	3981.95 2.65
5. Combination 5 (B2 + T1) NPV (Rs./ha.) GBCRs	-995.67 0.57	365.80 1.15	1707.28 1.73	3048.77 2.31
6. Combination 6 (B2 + T2) NPV (Rs./ha.) GBCRs	-1000.70 0.56	309.62 1.13	1619.95 1.70	2930.28 2.26
7. Combination 7 (B2 + T3) NPV (Rs./ha.) GBCRs	-986.78 0.57	343.20 1.14	1673.19 1.72	3003.18 2.29
8. Combination 8 (B2 + T4) NPV (Rs./ha.) GBCRs	-943.05 0.59	448.67 1.19	1840.43 1.78	3232.17 2.38
9. Combination 9 (B2 + T2) 30% NPV (Rs./ha.) GBCRs	-746.15 0.56	236.59 1.13	1219.33 1.70	2202.08 2.27

Source: Estimation

As sharing with the Forest Department, the equally important is the sharing of benefits among the JFM members. And any kind of discontent can have repercussions for continuation of program. Timber or fuelwood species are not yet ready for harvest and perhaps people will have to wait another 10 to 15 years. But the first harvest of bamboo is made and villagers got their 25% share--14,000 bamboos. These were auctioned later with the help of the Forest Department. The first sale of August 1992 turned out to be a fiasco as buyer failed to lift the bamboo. Thereafter 3,000 bamboos were transported to the AKRSP's field office at Soliya for sale and another 3,000 was sold to Kotwalias of Porbandar (Raju and Vaghela, 1993, p.17). The remaining 2,000 bamboos are to be distributed among villagers at the token rate of Rs.1 or 1.50 per piece. After deducting GVM commission, the net proceeds are taken to be shared among the JFM members. The tentative sharing agreement among members is currently as follows:



- (1) Some 20% of the proceeds would be shared equally among the JFM members.
- (2) Some 5% of the proceeds would be kept on reserve for providing educational facility to desired candidates in the village.
- (3) Other 5% of the proceeds would be used to acquire movable assets generally required for occasions such as marriage and other celebration. The GVM takes possession of such assets and rents them to villagers at a nominal charge.
- (4) Another 10% would be kept as a reserve fund for meeting contingencies.
- (5) The remaining 60% of the proceeds would be used to provide presents to members who have done additional work and/or shown exemplary performance in providing protection. For example, in 1993, the GVM auctioned a plot of Eucalyptus and only a few participated in harvesting. Therefore, the GVM has decided to present a big metal vessel to each participant in this work. Similarly GVM decided to award to those who had participated in the protection on regular basis to the tune of 12 days' wages per person per year.

Table 25: A Comparison of FIRR's under Four Sharing Formulas, for Different Management Models, Soliya, Gujarat				
Management Models	25%	50%	75%	100%
<b>Bamboo</b>				
B1	46.79	78.39	97.74	112.26
B2	36.88	62.55	79.08	91.88
B3	35.78	58.60	72.39	82.35
B4	38.75	67.88	85.78	99.22
B5	30.56	53.84	68.79	80.37
B6	29.87	50.94	63.88	73.45
B7	25.32	43.38	54.32	62.41
<b>Teak</b>				
T1	19.11	27.82	33.67	38.12
T2	18.29	27.20	33.26	37.84
T3	17.98	27.46	33.64	38.23
T4	18.78	28.51	34.69	39.24
<b>Combination</b>				
C1	22.04	35.13	43.93	50.66
C2	21.28	34.88	43.84	50.61
C3	21.39	35.15	44.03	50.75
C4	22.05	35.79	45.56	51.20
C5	21.07	32.62	40.30	46.15
C6	20.44	32.32	40.15	46.06
C7	20.31	32.57	40.40	46.27
C8	20.88	33.25	41.01	46.83
C9	20.47	32.36	40.20	46.12
Source: Estimation				

## Major Conclusions

An intensive study of JFM program in Soliya revealed some very interesting findings. These are enlisted here in brief:

- Forest is integral part of people's life styles in Soliya. Development of forests and its protection in Soliya would surely improve the quality of life of its people.
- The joint forest management as a new institution provides an alternative to regenerate degraded forests and to afforest new areas for fulfilment of various needs of the people such as fodder, fuelwood, liquidity, and other environmental recreational needs.
- The JFM program has enhanced the organizational capabilities of the villagers and has brought forth the leadership qualities of individuals. Villagers have developed their own ways to resolve various issues of conflicts. However, the AKRSP has played parental role in developing organizational and leadership qualities among villagers. The real test of the sustainability of the JFM institution lies in the wake of withdrawal of AKRSP's role. Author's assessment is that the AKRSP should withdraw in phases rather than once-for-all withdrawal. This would obviate crumbling of any institutions such.
- Economic benefits from the JFM program are estimated to be very attractive. Villagers expect a number of benefits from the JFM forests of those that they value most are: fuelwood, fodder or grass, bamboo, and timber. In the short run, that is during the first 7 to 10 years of plantation, they harvest grass--valuable output for rearing of livestock. It is estimated that some 20 to 30% grass requirement of the village is met from JFM forests. Since 10th year or so of the forests, fuelwood in the form of fallen and dead twigs becomes available. Author's estimate is that some ..... tonnes per hectare of fuelwood would be available every year since 10th year onwards. From the fourth year onwards, bamboo crop is ready for harvest and it brings quite attractive returns to villagers. Villagers prefer bamboo crop for it gives quick economic return to them. The Forest Department however prefers growing timber trees such as teak. The average economic life of teak is about 50 years and that of bamboo is about 25 years.
- Financial analysis of bamboo, teak, and bamboo plus teak management models indicated that they all are financially feasible activities upto 30% discount rate. The FIRR for various bamboo management models range between 60 and 112%, indicating very high returning capacity. Similarly, FIRR for teak management models hovered around 38%. By combining bamboo with teak, the FIRR from combination management models can go upto 50%. This suggests that combining quick-returning crops such as bamboo with slow growing teak crop can meet preferences of both villagers and Forest Department.
- Economics of benefit sharing is the most important factor to determine the sustainability of JFM as an institution per se. Two sets of issues are important in this respect: (1) sharing of benefits between the Forest Department and village community; and (2) sharing of benefits within villagers. The latter issue is an internal issue to villagers and is upto them to decide some functional rule so that everybody is satisfied with the internal sharing arrangement. The former issue is however open to public debate and is an important one in making the JFM as financially viable institution. According to current norms, some 25% of the net returns would be shared with villagers and the rest 75% would go to the Forest Department. Different income sharing arrangements were examined using the benefit cost analysis. The results indicated that net returns are more or less very small to negative under different schemes of afforestation of teak and bamboo. Rates of return are pretty low. It is author's estimate that people will sooner or later realize the economics of current benefit sharing and will ask a

larger share. Author personally think that this optional. There of villagers may range between 35 to 50% or so.

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# APPENDIX A: MISCELLANEOUS INFORMATION

Table A-1: Local, Common English and Scientific Names of Various NTFPs Collected in Soliya, Gujarat

Sl. No.	Local Name	Common English Name	Scientific Name
1.	Timru	Tendu Patta	Disopyros Melanoxylon
2.	Khakhara	Palas	Butea Monosperma
3.	Ashitra	Katchnar	Bauhinia Racemosa
4.	Mahudo	Mahua	Bassialatifolia
5.	Amla	Amla	Puyllanthus Amblica
6.	Baheda	Bahera	Terminalea Balerica
7.	Karanja	Karanja	Pongamia Pinaata
8.	Saag	Teak	Tectona Grandis
9.	Modad	Modal	Lannea Coromandelica
10.	Hardad	Haldu	Adina Cardifolia
11.	Vans	Bamboo	--
12.	Khair	Khair	Acacia Catecuu
13.	--	Sewan	--
14.	Tado	Palmyra Palm	Borassus Flabellifer
15.	Ambo	Mango	Mangifera Indica
16.	Kowad	Karaya	Sterculia Urens
17.	Bila	Bael	Aegle Marmelos
18.	Umba	Umba	Milinsa Fomentosa
19.	Khatiumba	Kusum	--
20.	Amli	Imli	Tamarindus Indica
21.	Gorasambli	Vilayati Imli	Pithecolobiumdulci
22.	Al	Al	Morinda Fomentosa
23.	Gugad	--	Xeromphis Uliginosa
24.	Saghad	--	--
25.	Hidodo	--	--
26.	Rangot soyand	--	Tecomella Undulata
27.	Himada	--	--
28.	Alukokad	--	--
29.	Hudpad	--	--

Table A-2: List of Species Grown in Soliya, Gujarat

Local English Name	Scientific Name	Natural Order
Saag or Teak	Tectora Grandis	Verbenaceae
Khakar	Butea Monosperma	Papilionaceae
Amiar	Acacia Leucophloca	Mimosae
Bor	Zizyphus Mauritiana	Rhamnaceae
Kudi	Holarrhena Anridysenterica	Apocynaceae
Alukakar	-	-
Ber	-	-
Umerao	Ficus Glomerata	Moraceae
Asitra	-	-
Siwan	Gmelina Arborca	Verbenaceae
Khair	Acacia Catechu	Mimosae
Siso	Dalbergia Sisoo	-
Limdo or Neem	Azadirachta Indica	Meliaceae
Dhavada	Anogeissus Latifolia	Combretaceae
Modad	Lannea Coramandelica	Ana Cardiacae
Gulmor	Delonix Regia	Caesalpinae
Kavadi	-	-
Bel	-	-
Beval	-	-
Nilgiri	Eucalyptus Hybrid	Myrtaceae
Akar	-	-
Sadad	Terminalia Crenulata	Combretaceae
Gorasambli	-	-
Billi	Aegle Marmelos	Rutaceae
Sitaphal	Anona Squamosa	Anonaceae
Gini	-	-
Aboli	-	-
Vans	Dendrocalamus Strictus	Graminae
Amba	Mangifera Indica	Anacardiaceae
Amla	Emblica Officinalis	Euphorbiaceae
Amla	Tamarindus Indica	Caesalpinae

Source: Survey

Table A-3: Major Characteristics of 35 Participants Interviewed from Soliya, Gujarat

Sl. of No.	Name	Age	Occupation	Marital Status	Land holding	No. of Cattles	Family Size	Fuel	Fodder	NTFPs	Year Joining JFM
1.	Jaysal Jangani	30	Farmer	Married	4	6	5	150	360	125	1991
2.	Ummansingh Vasava	40	Farmer	Married	6	5	6	180	225	0	1991
3.	Dalshuk Bava	25	Farmer	Married	2	0	3	120	0	0	1986
4.	Gambia Vasava	45	Labor	Married	1	3	6	180	150	100	1986
5.	Shantibhai Vasava	23	Farmer	Married	2	6	8	240	240	0	1991
6.	Hasmukh Vechita Vasava	30	Farmer	Married	4	8	4	150	360	0	1990
7.	Gambhirbhai Vasava	24	Farmer	Married	4	2	7	250	100	0	1986
8.	Bhavansingh Vasava	32	Labor	Married	7	1	4	250	45	0	1986
9.	B. Jaysingh Vasava	32	Farmer	Married	2	3	5	160	150	0	1990
10.	V. Ghelabhai Vasava	41	Farmer	Married	2	2	6	200	100	200	1991
11.	Madhavsingh Vasava	36	Labor	Married	1	2	4	225	120	0	1986
12.	Manoharbhai Nagathia	36	Labor	Married	0	3	4	180	150	80	1988
13.	Rambhai Vasava	25	Farmer	Married	4	4	4	100	180	0	1991
14.	Virgira	45	Farmer	Married	7	8	6	320	320	0	1988
15.	Karamsingh Moti	35	Farmer	Married	3	3	6	200	180	0	1986
16.	Gomanarsang	45	Farmer	-	2.5	1	5	75	50	0	1986
17.	Talsinghbhai Vasava	30	Farmer	-	2	2	9	300	100	0	1986
18.	Dalsukhbhai Vasava	30	Labor	-	2	4	7	300	180	0	1986
19.	Gordhanbhai	42	Farmer	Married	5	6	8	120	320	0	1986
20.	Harilal Dhamaniy	30	Farmer	-	1.75	3	4	150	165	0	1987
21.	Lakshman Giriya	35	Labor	Married	2.5	0	10	250	0	0	1990
22.	Divanji Jadiya	62	Farmer	Married	50	12	10	150	200	0	1987
23.	Vestabhai Dugari	45	Farmer	-	9	10	5	90	200	90	1991
24.	Raisinghbhai	45	Farmer	-	3	4	7	150	250	0	1986
25.	Sarojbhai	35	Labor	-	0	0	6	150	0	0	1987
26.	Rambhai	35	Labor	Married	0	0	4	60	0	0	1986
27.	Narsingh	40	Labor	-	0	0	5	90	0	0	1986
28.	Pratapsingh	40	Farmer	-	5	4	8	75	120	0	1987
29.	Jaisingh	40	Farmer	Married	4	4	5	90	240	0	1986
30.	Jhakarsingh	35	Farmer	-	2	3	6	90	210	0	1987
31.	Gambhir Vira	35	Farmer	Married	3.5	8	-	-	-	-	1990
32.	Santibhai	33	Farmer	Married	7	11	8	150	0	0	1988
33.	Jaisolbhai	31	Farmer	Married	6	13	5	120	0	0	1986
34.	Sombhai	32	Farmer	Married	2.5	6	3	150	0	0	1986
35.	Griyadevibhai	34	Farmer	Married	1	2	4	120	0	0	1988

Table A-4: Statement Showing the Sanctioned Rates of Offence Material for the Year 1993-94

Sl. No.	Classification of Timber	Teak, Khair Sissam Rs./cm.	Superior Injalli Rs./cm.	Inferior Injalli Rs./cm.	Remarks
1.	Log and Beam	8,525	3,080	1,430	1. Rates of sawn size should be charged at sanctioned schedule rates.
2.	Rafter Class-I	6,545	2,530	1,320	
3.	Rafter Class-II	5,445	1,980	1,100	
4.	Rafter Class-III	3,993	1,540	1,100	2. Teak, Khair and Sissam firewood of good size round billets primarily for the purpose of sawing should be charged at rates butts.
5.	Post Class-I	5,280	1,650	1,210	
6.	Post Class-II	3,905	1,540	800	
7.	Butts	3,630	1,457	990	3. For charcoal in non standard bags weight of about 40 Kgs. per bag should be adopted.
8.	Loping	25	17	11	
9.	Firewood				
	i ) Cart Load	220	210	210	
	ii ) Head Load	11	11	11	
	iii) Per Quintal	55	55	55	
10.	Charcoal size of bags 112 x 89 cm.	70	65	65	
11.	Manvel Bamboos per 100	535 (As per S.O.P.)-	-	-	
12.	Kartas Bamboos per no.	20 (As per S.O.P.)-	-	-	

Source: Forest Department, Gujarat

Table A-5: Perceptions of Villagers Towards Participation and Protection Under JFM Programme, Soliya, Gujarat

Sl. No.	Question	Oradins					Total
		S.A.	A.	U.D.	D.A.	S.D.A.	
1.	The promise for better economic condition was the main reason for joining JFM.	12	23	0	0	0	35
2.	I had some reservations before joining JFM.	3	9	9	14	0	35
3.	Cooperation and encouragement by Forest Department/AKRSP officials increased participation.	7	17	4	6	1	35
4.	Initiative taken by village chief, elders helped in mobilizing support for JFM.	10	22	3	0	0	35
5.	Literate villagers were the first to participate.	5	15	6	9	0	35
6.	Formation of GVM increased participation.	11	23	1	0	0	35
7.	Youths are participating in JFM enthusiastically.	7	12	5	9	2	35
8.	Women are not keen on participating.	1	18	3	12	1	35
9.	Protection increased with participation.	12	22	1	0	0	35
10.	Protection is consuming lot of time and hence is affecting other activities.	3	10	4	15	3	35
11.	If fuelwood or fodder is not available we will cut the trees we are protecting to meet our needs.	8	4	4	17	2	35
12.	Irrespective of our protection survival of trees depends on a large extent on climatic conditions.	8	14	3	10	0	35
13.	Frequent visits by Forest Department officials promotes proper participation and protection.	12	21	2	0	0	35

S.A. : Strongly Agree  
 A : Agree  
 U.D. : Undecided  
 D.A. : Disagree  
 S.D.A : Strongly Disagree

Source: Based on Survey Results