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**Report No. 13698**

**PROJECT COMPLETION REPORT**

**INDIA**

**NATIONAL SOCIAL FORESTRY PROJECT  
(CREDIT 1611-IN)**

**NOVEMBER 10, 1994**

**Agriculture Operations Division  
India Department  
South Asia Regional Office**

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**PROJECT COMPLETION REPORT**  
**INDIA**  
**NATIONAL SOCIAL FORESTRY PROJECT**  
**(Cr.1611-IN)**

**CURRENCY EQUIVALENTS**

Name of currency (abbreviation) = Indian Rupee (Rs.)

**Currency Exchange Rate:**

Appraisal Year Average (1984/85):	US\$1.00 = Rs.11.89
Intervening Year Average (1985 to 92):	US\$1.00 = Rs.15.94
Completion Year Average (1992/93):	US\$1.00 = Rs.26.41

**FISCAL YEAR**

GOI and all States: April 1 to March 31

**WEIGHTS AND MEASURES**

Metric System

**ABBREVIATIONS**

CSO	Central Support Office
ERR	Economic Rate of Return
FAO/CP	Food Agriculture Organization/Cooperative Program
FD	Forestry Department
FRR	Financial Rate of Return
GOI	Government of India
IDA	International Development Association
M&E	Monitoring and Evaluation
MOEF	Ministry of Environment and Forestry
MTR	Mid-Term Review
NGO	Non-Government Organization
NSFP	National Social Forestry Project
NWDB	National Wasteland Development Board
SAR	Staff Appraisal Report
T&V	Training and Visit
USAID	United States Agency for International Development
WB	World Bank

November 10, 1994

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

Subject: Project Completion Report on India  
National Social Forestry (Credit 1611-IN)

Attached is the Project Completion Report on India: National Social Forestry Project (Credit 1611-IN). Parts I and III were prepared by the South Asia Regional Office and Part II by the four participating Borrower states.

The project was the seventh Bank-assisted social forestry project in India, providing assistance to the Government of India and four states: Gujarat, Uttar Pradesh, Rajasthan, and Himachal Pradesh. The project aimed to increase production of fuelwood, small timber, poles, and fodder; increase rural employment, farmers' incomes, and economic opportunities for landless people; afforest degraded areas and wastelands, and reduce soil erosion; and strengthen forestry institutions.

A majority of project targets were met or exceeded during implementation. Farm forestry has been highly satisfactory, becoming a popular movement in parts of Gujarat and Uttar Pradesh, which had benefitted earlier from Bank support for social forestry. Despite poor coordination of nursery and plantation operations, planting on private, community, and government wastelands made substantial progress, and interest in tree planting was raised. But the project made little contribution to fuelwood or fodder production, and project components aimed at the poor and landless were unsatisfactory. Innovations designed to increase participation by the poor and enhance equity, were stymied by vested interests. Commercially viable components have succeeded, although a degree of market saturation has taken place which may undermine sustainability. Continued financial support for public project components is uncertain. Monitoring and evaluation followed agreed guidelines, but lack of commitment and frequent staff changes reduced its effectiveness. The value of training and technical assistance provided was questionable.

The quality of the PCR is satisfactory. In Part II, the four participating states provide individual accounts of implementation experience of variable quality, but consistent overall with Parts I and III. For Rajasthan and Uttar Pradesh, only summaries are included but the full Part II reports are available in OED's files.

Because of the success of farm forestry and tree planting on wastelands, the outcome of the project is rated as satisfactory. But institutional development has been modest, and sustainability is uncertain. An audit is planned.



Attachment

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**PROJECT COMPLETION REPORT**  
**INDIA**  
**NATIONAL SOCIAL FORESTRY PROJECT**  
**(Credit 1611-IN)**

**PREFACE**

This is the Project Completion Report (PCR) for the National Social Forestry Project (NSFP) for which an IDA Credit of SDR166.4 million (Credit 1611-IN) (US\$165 million equivalent) was approved on June 18, 1985. SDR11.0 million was cancelled on December 1991 as part of the funds redeployment exercise. The Credit closed on March 31, 1993, 27 months behind schedule. Final disbursement from the Credit was made on April 6, 1993, and the revised credit amount of SDR155.4 was fully disbursed.

The Preface, Evaluation Summary, Part I and Part III of this report were prepared by an FAO/World Bank Cooperative Program mission which visited India in September/October 1993. Part II was prepared by Governments of participating states.

The report was based, inter alia, on a review of the Staff Appraisal Report (SAR), the legal documents, supervision reports, correspondence between the Bank and the Borrower, internal Bank memoranda and reports, field visits, and discussions with the officials of Government of India (GOI), and the State Governments of Gujarat, Himachal Pradesh, Rajasthan and Uttar Pradesh as well as the World Bank (WB) staff in New Dehli and Washington who had been associated with the project.



**PROJECT COMPLETION REPORT****INDIA****NATIONAL SOCIAL FORESTRY PROJECT  
(Credit 1611-IN)****EVALUATION SUMMARY****1. Objectives**

1.1 The project aimed at increasing production of fuelwood, small timber, poles, fodder and other minor forest products; rural employment and incomes and opportunities for participation of landless persons; afforestation of degraded areas and wasteland; and strengthening forestry institutions through provision for additional staff, training, research and equipment. It was designed to provide continuing assistance for two of the four states, viz. Uttar Pradesh and Gujarat, to expand and improve social forestry activities started under earlier Bank-assisted projects, and to initiate investments in two other states, viz. Rajasthan and Himachal Pradesh.

**2. Implementation Experience**

2.1 Project activities commenced in 1986. There were start-up delays but at project completion most targets set at its appraisal, Mid-Term Review and extension were exceeded. Farm forestry, community land and government wasteland plantings registered remarkable achievements. Tree tenure plantations (for poor and landless), however, have fallen short of projected targets. All the four project states supported decentralized private nurseries; but progress in Rajasthan and Himachal Pradesh was poor. Coordination of nursery and plantation operations in all participating states was inadequate; seed demand could not be met from the limited number of mature seed producing stands and much of the seed procurement was from uncertified private sources; and seedling grading standards also received little attention. As a result, many seedlings of poor quality were planted, adversely influencing survival and output. No uniform policy was pursued in the project states for pricing and distribution of seedlings. In general, the prices at which seedlings were sold to farmers were lower than costs of production. There has been a progressive increase in selling prices and that all planters are now charged for seedlings distributed, even if full cost recovery is not attained.

2.2 In Gujarat and Uttar Pradesh, which account for 90 percent of achievements under farm forestry, farmers' preference were for timber and pole producing species. Although plantation targets in community wasteland plantations were exceeded, there was little consultation and participation of the local communities in the planning, establishment or management of these plantations, which in the majority of cases have been done by the Forest Department. Further, the appraisal expectation that benefit-sharing arrangements, for both intermediate and final yields, would be formulated prior to plantation establishment has not been realized. In most states, community plantations are still with Forestry Department. In areas where the decision has been taken to transfer protection and management responsibilities to local communities/panchayats, there are concerns about sustained protection and management of these plantations. The vegetational composition and structure of the established stands in government wasteland plantations are as anticipated at appraisal and area targets have been exceeded. The expectations that the project would contribute to improved technical efficiency of plantation operations have not been fully met.

2.3 Project states followed GOI/WB monitoring and evaluation guidelines. Frequent changes in staff, limited feedback into planning, and inadequate staffing and Monitoring and

Evaluation (M&E) training constrained the effectiveness of M&E operations. While overseas training provided for high-level officers enabled them to acquaint themselves with management aspects of social forestry, little practical use was made of the expertise gained. Greater emphasis should have been placed on in-country training and exchange of social forestry experiences between the mid- and field-level officials of the states. Training offered to farmers, representatives of panchayats, non-governmental organizations (NGOs) and nursery operators covered tree planting and nursery techniques. Collaboration between Forestry and Agricultural Departments for extension in the project states was nominal. This was mainly due to lack of: (a) identified nodal authority to ensure joint work program; and (b) appropriate extension messages for farm forestry development and improved post-plantation management. In all the four states, research programming was weak and the involvement of Forestry Department officials to review the research progress in the light of social forestry requirements was minimal. The component to establish a Central Support Office to assist the State Governments in project formulation, M&E and provide a forum for cross-fertilization of experiences did not take off and could not contribute to improving the states' capabilities as expected. At project completion, project costs amounted to Rs. 6,762 million, 17 percent higher than appraisal estimate.

### **3. Results**

3.1 Overall, the project has achieved its main objectives. Estimated aggregate wood production level is expected to match the appraisal estimates, despite lower than expected survival and productivity rates and changes in stand composition and production mix. In contrast to SAR expectations, farm forestry will not substantially contribute to fuelwood and fodder production, since most participating farmers' preference has been for commercial species for cash incomes rather than the species for meeting specifically the subsistence needs for fuelwood and fodder. On the other hand, plantations in public lands generate the highest increases in fuelwood and fodder production. The estimates of economic rate of return (ERRs) for the project as a whole is 22 percent, and for each of the four sub-projects are 12 percent (Rajasthan), 28 percent (Uttar Pradesh), 13 percent (Himachal Pradesh) and 23 percent (Gujarat), as compared with the appraisal estimates of 27 percent, 17 percent, 25 percent, 34 percent and 26 percent respectively.

3.2 The project also has resulted in several other positive developments. It has evoked and widened the interest of the rural population in tree planting and served as a vehicle to bring about some policy changes including removal of restrictions which discourage expansion of farm forestry and introducing rules to enhance community participation and benefit-sharing. The project investments provided substantial employment opportunities to the rural poor. Plantations in degraded areas have helped to conserve soil and water as well as to take the pressure off the national forest resources.

### **4. Sustainability**

4.1 Farm forestry, as popularized by the project, has now become a movement in several parts of Uttar Pradesh and Gujarat. Its favorable impact on incomes has contributed to positive changes in the attitude of farmers towards tree planting. Market saturation for some of the products could impede expanded planting of certain species. In Rajasthan and Himachal Pradesh, farm forestry is not yet well established. Without continued support and resolution of technical issues which affect productivity, sustainability of activities initiated through the project in these states is uncertain. Sustained management of plantations on public lands is not likely unless some radical steps are taken to involve the communities to have larger measure of responsibility to protect and maintain the established plantations. In the absence of continued government financing or follow-up projects, institutional facilities and incremental staff brought in by the project will remain seriously underutilized.

## **5. Lessons Learnt**

**5.1** The key lessons learnt in the implementation of this project include the following:

- (a)** The much stronger performance of the project in Gujarat and Uttar Pradesh (which had already benefited from earlier projects) than in the other two states, suggests that a prolonged commitment (exceeding the conventional project period of five years) is necessary to develop the capacity to manage large-scale social forestry projects.
- (b)** Even resource poor farmers are prepared to commit land and labor to planting slow maturing species of forest trees on a significant scale in spite of the lack of immediate benefits. Plantings for fuelwood production, while possibly of interest to the landless, has little appeal to landholders who can meet their fuel needs from lops and tops or from other on-farm sources.
- (c)** Vested departmental interests and traditional modes of operation are the biggest obstacles to promoting genuine community participation in woodlot management and to encourage the emergence of private-sector run nurseries. The preferred structure for the latter is a pricing policy for seedlings which makes nursery operations pay.
- (d)** Investment in training, especially overseas training, are only warranted if linked to staffing plans which enable those who have been trained to apply their newly-acquired skills.
- (e)** The project would have benefited from highly targeted short-term technical assistance aimed at introducing improved plantation techniques for arid areas and at developing a greater integration between farm forestry and livestock-based farming system.



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**PART I. PROJECT REVIEW FROM BANK'S PERSPECTIVE**

**1. Project Identity**

Project Name : National Social Forestry Project  
Credit No. : 1611-IN  
RVP Unit : South Asia Region  
Country : India  
Sector : Forestry

**2. Project Background and Objectives**

2.1 The National Social Forestry Project (NSFP) is the seventh Bank-assisted project aimed at supporting social forestry development in India. It originated from the proposals prepared in 1984 by four states (Uttar Pradesh, Gujarat, Rajasthan and Himachal Pradesh) with the assistance of the office of the Inspector General of Forests and the World Bank (WB) Resident Mission in New Delhi. The project was jointly appraised by WB and USAID in 1985, and became effective in February 1986. With an estimated total cost of about US\$328 million (Rs. 3,933 million), including an International Development Association (IDA) credit of US\$165 million and United States Agency for International Development (USAID) financing of US\$80 million, this five-year project aimed at: (a) increasing production of fuelwood, small timber, poles and fodder; (b) increasing rural employment, farmers' incomes and opportunities for participation of landless persons; (c) afforestation of degraded areas and wasteland and reducing soil erosion; and (iv) strengthening forestry institutions. The main components of the project included: (a) plantation activities including the development of agro-forestry, tree ownership schemes for the poor and landless, community and government wasteland plantations; and (b) institutional and infrastructure support, providing for incremental forestry staff, housing, offices, equipment, planning, training, extension, research, studies, fuel-saving devices and monitoring and evaluation. Provision was also made under the project to establish a Social Forestry Support Office in the Ministry of Environment and Forestry. This office was intended to play a coordinating, support and policy guidance role in the development of social forestry throughout India.

**3. Project Design Aspects**

3.1 The project, built on the experiences gained from the earlier Bank-financed and other social forestry projects in India, included several new features: emphasis on planting on private lands; an increased role for decentralized private nurseries; the imposition of limits on free seedling

distribution and the introduction of a pricing policy aimed at increasing cost recovery; plantations on common and government-owned wastelands devoted to meeting fuelwood needs of the poor; formation of tree ownership schemes for the landless; enhanced community participation and formulation of written agreements with village panchayats for benefit-sharing and early transfer of responsibilities to the participating communities for protection, maintenance and replantation of community (panchayat) plantations. It also called for increased involvement of existing agricultural extension services in social forestry; and improved operational efficiency through reducing costs and strengthening institutions.

3.2 The project was designed to provide continuing assistance for two of the four states, viz. Uttar Pradesh and Gujarat, to expand and improve social forestry activities started under earlier Bank-assisted projects (Credit 925-IN and Credit 961-IN) and to initiate investments in Rajasthan and Himachal Pradesh. To meet the overall project objectives and to suit the differing requirements of the participating states, flexibility was allowed in plantation models and implementation arrangements. The scope and scale, particularly of the physical component targets, generally corresponded to project requirements. In retrospect, however, the design would have benefited from more emphasis on defining the technological aspects of project operations (e.g. seed collection, processing, nursery and seedling standards and post-establishment plantation management) and elaboration of the modalities of community participation. Some of the more innovative proposals, (e.g. for tree tenure for the landless, and benefit sharing arrangements in public plantations) were based on unduly optimistic expectations over the rate at which fundamentally new concepts would be taken up, as evidenced by reductions in scale adopted during project implementation. Over-emphasis on establishing special units exclusively for social forestry has contributed to recurrent budgetary problems in the post-project period and raised questions over the institutional sustainability of the project.

#### 4. Project Implementation

4.1 Project activities started in 1986. Following the Mid-Term Review (MTR) in 1988, several adjustments were made in the targets, which were further revised in 1990, when the project closing date was extended until 31 March 1993. The USAID financing was utilized only up to the end of the original closing date of the project, and the IDA credit savings arising from the devaluation of the Rupee were utilized to finance project operations during the extended period. Modifications introduced during 1990 revision emphasized aspects relating to seedling pricing, benefit-sharing in public plantations and village level micro-planning, for total land resource development.

4.2 **Plantation activities.** Total area planted under the project (1,857,012 ha) surpassed the targets set at appraisal, MTR and project extension (708,983 ha, 765,560 ha and 1,474,380 ha respectively) but the additional area was achieved by prolonging the disbursement period. As can be noted from Table 4A in Part III, farm forestry, community land and government wasteland plantings registered spectacular achievements, substantially exceeding the targets projected in the SAR. Tree tenure plantations (for poor and landless), however, have fallen short of the relatively modest expectations set for them. Progress, however, was not uniform in all the project states. The following paragraphs review these aspects.

4.3 **Nursery development and production.** Provision was made for the production of 700 million seedlings through project-financed nurseries. It was expected that all four participating states would support the development of large numbers of family operated/private sector nurseries. This expectation materialized in Uttar Pradesh and Gujarat, where 35 percent to 40 percent of total seedlings production was from the private sector, but there was much less progress in promoting private sector nurseries in the other two states where only 15-20 percent of seedlings were produced privately. This is partly explained by the fact that Gujarat and Uttar

Pradesh were in the second phase of Bank-funded social forestry operations and farm forestry was already an established and expanding activity in these states.

4.4 Coordination of nursery and plantation operations was inadequate. Although nursery stock composition, in general, corresponded well with the needs of the plantation program, the lack of information about demand for specific species led to their over-production. In some cases, the mission observed that up to 60 percent of the seedling stock was not lifted from the nurseries. Additionally, nursery seedling production data and mission observations indicated that containerized/polypot seedling production rates in some private nurseries were as low as 50 to 60 seedlings/m<sup>2</sup>, which are below the expected standard production rates of 150 to 200 seedlings/m<sup>2</sup>.

4.5 The project provided individual families, non-governmental institutions and schools with seeds, polythene bags, fertilizers, training and technical advice. However, because of the scale of the private planting program and increased number of non-departmental and public nurseries, technical supervision (in this case by officials of the rank of foresters and deputy foresters) was not as desired. Among private nursery operators, 'kissan' or farmer and 'Mahilla Mandal' (Women's Group) nurseries performed better than some of the other institutional nurseries. Moreover, public nurseries did not become effective extension centers. Forestry Department nurseries, which could have served as demonstrations on technology improvement and management efficiency did not meet these expectations, partly due to the project management's primary concern for meeting seedling production targets for large-scale plantation programs rather than quality seedling production.

4.6 **Nursery technology improvement.** Seedling quality improvement initiatives included identification of 'plus trees' for seed production and collection but there was little management of the candidate plus trees. In all four states, however, seed demand could not be met from these limited number of seed production stands. Further, since many of the tree species raised for the project plantations were newly introduced, the number of mature seed producing stands, inside or outside traditional forest areas of these states, was limited. In general, much of the seed procurement for plantations continued to be from uncertified private sources and with only limited quality control. Establishment of seedling grading standards received little attention, partly due to the scale of the seedling production operations. As a result, many seedlings of poor quality appear to have been planted, adversely affecting survival and output.

4.7 Project nursery and plantation development were generally perceived and organized as separate and mutually exclusive activities. There was no effort to integrate the management of the two operations or to take account of plantation site conditions in deciding upon the nursery management regimes. For example, planting stock for moisture-stressed areas such as semi-arid sites in Rajasthan, or for degraded forest areas, would have benefited from the introduction of high root/shoot ratios to improve their survival probability. Thus, nurseries raising stock for agro-ecological zones or plantation components where moisture stress was the main constraint on plant survival and growth, received identical treatment (watering and fertilization) to those raising stock for other less stressed agro-ecological zones. Site-specific nursery management for raising drought-tolerant planting stock would involve manipulation of seedbed seedling density, polypot size, fertilizer composition and frequency, and applying appropriate root-pruning techniques. In addition, the holding of polypots in the nursery for longer than the desirable period, inadequate shifting in the nursery beds, and the lack of root-pruning, resulted in root-curling, which adversely affected the seedling quality.

4.8 **Private plantations.** Limited numbers of fuelwood, fodder, small timber and fruit producing species were distributed free of cost for private planting on farm boundaries and homesteads. However, in Gujarat and Uttar Pradesh, which represent 90 percent of the achievements under the farm forestry component, farmers' preferences were for timber and pole

producing species which account for 77 percent and 72 percent of the growing stock respectively. As a consequence, the phasing of output and product mix does not correspond with appraisal expectations which called for emphasis on fast-growing fuelwood species. On the other hand, stand composition in Himachal Pradesh and Rajasthan, where fuel is in tighter supply, by and large corresponds to SAR expectations.

4.9 An unexpectedly high proportion (about 60 percent) of the farm forestry plantations in Gujarat was established in blocks, owned by bigger landlords. Surveys undertaken in the State by the Forestry Department indicate that about 18 percent of the farm forestry beneficiaries have raised block plantations accounting for about 60 percent of the planting stock. In the other three states, 80 percent to 85 percent of planting has been done on farm boundaries and in homesteads.

4.10 The survival rates for Rajasthan, Uttar Pradesh, Himachal Pradesh and Gujarat are estimated at 31 percent, 75 percent, 54 percent and 18 percent respectively. On the average, the planting densities range from 1,800 to 2,500 plants/ha as against 1,500/ha recommended in the SAR. In spite of the Bank mission's recommendations, the stand densities were not adjusted to the site factors, in particular, to rainfall. This might have contributed to high plant mortality and reduced growth due to increased inter-plant competition for limited water resources available in high moisture stressed areas.

4.11 Private plantations were also to be established on ecologically vulnerable private lands belonging to economically disadvantaged farmers. However, a review of the selected sites and discussions with beneficiaries indicated that these ecological and socio-economic criteria (i.e. beneficiaries who were poor/belonging to socially-disadvantaged sections of society) were not adequately adhered to. The sites selected neither showed any extraordinary signs of soil erosion or land degradation.

4.12 In Uttar Pradesh, which accounted for the largest share of farm forestry under the project, implementation impact was uneven between the Western and Eastern parts of the state. The slower progress in the Eastern part is largely attributable to its smaller size of land holdings, higher tenancy, relatively less-developed marketing opportunities and greater degree of landlessness. Additionally, social forestry investments in the past were directed to the western part, mainly due to favorable conditions (e.g. relatively well-developed infrastructure and commercial orientation of farmers). The State Government has taken increasingly active role to enlarge and speed up the program in the eastern part through deployment of additional staff, vehicles and equipment and construction of office buildings, all financed under the project. The impact of these investments is expected to be realized well beyond the completion of the project.

4.13 **Community wasteland and woodlot plantations.** Community wasteland plantations were to be established in collaboration with village panchayats. These plantations were intended to augment the supply of fuelwood, fruits and other edible products for the use of the participating communities and the plantation targets were exceeded. However, in the majority of cases, the community involvement was limited to obtaining formal approval of the panchayat for providing community land for plantation establishment by the Forestry Department. There was little consultation or participation of the community in the planning, establishment, or management of these plantations which was done by the Forest Department. The micro-planning surveys conducted in the four states were often carried out after plantations were established. Further, the appraisal expectation that benefit-sharing arrangements, for both intermediate and final yields, would be formulated prior to plantation establishment was not realized. As a result, many of the participating communities still perceive these plantations as a government department activity rather than a cooperative effort by them and Forestry Department, and their future is in doubt. Following GOI's decision to adopt a joint forest management approach for public forestry plantations, steps were taken by the participating states to frame regulations and form management units towards the

later phase of the project. It is too early to assess the operational efficacy and impact of these, since the experiences gained so far are limited.

4.14 In most of the community woodlot plantations, the species mix and planting densities match the SAR expectations. However, the stand structure lacks the expected emphasis on production of fruits, edible flowers and tassar silk. The Arjun (*Terminalia* sps.) plantations established on a small-scale for tassar silk production in Uttar Pradesh initially generated additional employment and income for the communities and individuals involved. However, due to discontinuity in the support provided by the state silk board and inadequate stand management by the project, this activity was abandoned and failed to reach its full potential.

4.15 In Gujarat, Rajasthan and Himachal Pradesh, grass fodder production (along with tree crop production) in these plantations was targeted toward meeting the fodder needs of the village communities, who enthusiastically welcomed it. However, the full potential of this activity was not realised due to the factors discussed in para 4.22.

4.16 Tree survival rates under this component in Rajasthan, Uttar Pradesh, Himachal Pradesh and Gujarat are 64 percent, 63 percent, 51 percent and 61 percent respectively, as against the SAR estimate of 80 percent. The adoption of soil and moisture conservation and harvesting techniques involving contour planting in "V" ditches was encouraged by the Bank missions to improve plant survival and growth. Further, plantations on several sites established towards the latter part of the project emphasized multi-storeyed stand structures to improve site utilisation, soil conservation and to diversify production.

4.17 **Government wasteland plantations.** The project activities aimed at the rehabilitation of government wastelands included establishment of plantations on government forest lands and along roadsides, railway lines and canal banks. These plantations were expected to produce fuelwood, small timber, poles and fodder. The vegetational composition and structure of the established stands are as anticipated at appraisal and area targets have been exceeded. Soil and moisture conservation and harvesting techniques involving contour "V" ditch planting were extensively used. In Rajasthan, Gujarat and Uttar Pradesh, cattle proof trenching has been used as a protection measure against grazing damage by cattle. As against an 80 percent SAR plant survival estimate, the survival rates for Rajasthan, Uttar Pradesh, Himachal Pradesh and Gujarat are 56 percent, 58 percent, 51 percent and 55 percent respectively.

4.18 **Strip plantations** have been established in linear and block forms along roadsides, canal banks and railway strips. In Uttar Pradesh and Gujarat, multi-row strip plantations of fuelwood and ornamental species have been established. However, fruit and edible flower producing species are not well represented in the stand composition. The plant survival rates for Rajasthan, Uttar Pradesh and Gujarat are 52 percent, 62 percent, and 54 percent respectively. The stand densities average about 1,800/ha as against the SAR expectation of 1,300-2,000.

### **Plantation Management and Technology**

4.19 Plantation management activities like weeding, irrigation and fertilization are generally carried out by farmers for eucalyptus, teak and poplar in block plantations in Uttar Pradesh and Gujarat. Such management activities are uncommon in boundary plantations.

4.20 Rajasthan and Himachal Pradesh, broadleaved species like Acacias, Ulmus, Ailanthus, etc. have been planted primarily for fuelwood and fodder. The project has done little to guide farmers in managing these plantations to maximize fuelwood and fodder production. The planting density adopted for these stands was not consistent with the goal of maximizing fuelwood and fodder production.

4.21 All four states have passed orders to facilitate felling and transportation by owners of the most commonly planted social forestry species, but some valuable species (teak and conifers) are still on the restricted list. This could become a major constraint in the future as teak planting is showing an upward trend both in Uttar Pradesh and Gujarat, and continued restrictions on tree felling in Himachal Pradesh could adversely affect the benefits realized from private and community land conifer plantations.

4.22 The project envisaged that established community plantations would be handed over to the villages for management. However, as discussed earlier (para. 4.12), this process has not made much progress and in most states these plantations are still with Forestry Department. In the absence of a well-defined responsibility and benefit-sharing arrangement between Forestry Department and the local communities, post-establishment management in many cases is restricted to protection and in a few cases to harvest scheduling. Lack of silvicultural operations like pruning, topping and thinning has resulted in loss of intermediate benefits of fuelwood and leaf-fodder yields. In areas where decision has been taken to transfer protection and management responsibilities to local panchayats, without adequately consulting and preparing the local communities, there are concerns regarding sustained protection and management of these plantations.

4.23 In contrast, the project has made good use of customary arrangements of fodder-sharing from protected forest and community lands (locally called 'Ghasnis') in Himachal Pradesh. In other states, however, grass fodder management is still determined by administrative regulations rather than technical concerns. For example, fodder grass harvesting in Rajasthan from both community wastelands and degraded forest areas follows the administrative auctioning calendar (i.e. first week of October) rather than the timings of actual fodder availability. Consequently, grass harvesting is restricted to a single harvest, resulting in substantial loss of production. These inadequate efforts to optimize the use of fodder production fail to recognize that the community lands on which these plantations are established were often the only fodder source for the cattle belonging to the village poor, and thus may have contributed to greater social inequity. Moreover, little attention has been paid to promoting the use of tree leaf-fodder, fruit and other non-tree crop production.

4.24 Management of degraded forest areas and strip plantations has been restricted to their protection. The arrangements for sharing intermediary products (twigs, branchwood, leaf-fodder, grass) from these plantations were not worked out prior to their establishment. This apart, regulations governing these forest lands restrict local community access to reserve forest area plantations. Although, in some areas strip plantations serve as an important source of fuel for the rural poor, very little effort has been made to intensify fuelwood production from these plantations.

### **Technological Issues**

4.25 The expectations that the project would contribute to improved technical efficiency of plantation operations have not been fully met. Low plantation survival rates and lower than expected productivity estimates are indicative of this. Except in Uttar Pradesh, where plant survival rates show a marginal upward trend as project implementation progressed, such trends are not evident in the other states. As discussed previously, (para. 4.6, seedling quality), inferior seedling quality is a contributing factor to poor plant survival and growth. The project has not succeeded in promoting the adoption of mulching and early weeding to increase survival rates in arid and semi-arid areas, and the continued practice of advance pit-digging (while fitting in with the availability of labor during the dry season) negatively affects survival rates in moisture-stressed sites. Moreover, there has been no attempt to integrate forestry in these areas with the pastoral-based farming systems; thus, for instance, the low pollarding of *Ailanthus* and other fodder trees,

and the use of improved pruning tools, has not been introduced in Rajasthan where it would have been appropriate.

4.26 Because of administrative and operational constraints, clear-felling and harvesting of stemwood for use as fuelwood has not been possible from the strip plantations. However, harvesting of twigs and branchwood from these plantations does not face such constraints. Therefore, it would be advisable to manage these stands to maximize production of branchwood rather than, as at present, of stemwood by increasing inter-row and inter-plant spacing. Similarly, fruit production (including from *Emblica* fruit trees in community and strip plantations in Gujarat) would be enhanced if adequate attention was given to tree density and pruning of these trees for better fruit setting and maturing.

4.27 The project contributed positively to the introduction of stratified mixed stands in community woodlot and degraded forest area plantations. However, inadequate attention to the location of various species in different strata of the stand, (for instance, underplanting of strong light-demanders without appropriate canopy or stand manipulation) has resulted in unduly high plant mortality. The Bank correctly encouraged planting of grasses, shrubs, trees in a multi-tier stand structure. However, their spatial arrangement at the planting site and management often failed to take full advantage of such stand composition, as each element of the system has been treated independently and in isolation from the other, thereby losing the intended efficacy.

4.28 In addition, management would have to pay greater attention to monitoring soil-nutrient levels, particularly of nitrogen and phosphorous, to ensure stable and sustainable biomass production from government and community wasteland plantations.

### **Institutional Aspects**

4.29 **Training and Extension.** The project placed emphasis on in-service training for Forestry Department staff in all the participating states. In general, it was assumed that the project states would use existing training institutions. Hence, funds were provided primarily for the improvement and utilization of the existing training facilities.

4.30 Provision was made for short-term training courses and workshops and study tours and fellowships within and outside the country. A total of 9,600 forestry personnel -- as against the appraisal target of 6,777 -- received project-funded in-service training in seed collection, nursery operations, extension methodology and preparation of micro-plans. The project also financed participation of 321 Forestry Department staff (mostly from Rajasthan and Gujarat), in various social forestry workshops and study tours organized within the country. Sixty-two forestry officers - as compared to 82 foreseen at appraisal - from the four states attended overseas training/seminars in such fields as social forestry project management and agro-forestry techniques. While this enabled high-level officers to acquaint themselves with latest technological and management aspects of social forestry, little practical use was made of their expertise for improving project implementation. It would have been useful to have given greater emphasis to in-country training particularly for mid and field-level officials.

4.31 In addition, a large number of farmers, panchayat representatives, members of NGOs including women's groups, students and nursery operators (totalling over 1.7 million persons in the project states) were provided with project-funded short-term (1 to 6 days) training in tree planting and nursery techniques. Training courses offered, however, did not place adequate emphasis on technical aspects of project plantation operations. In general, the courses offered reflected social forestry program priorities in the concerned states. Overall, project assistance for training has been well utilized, significantly contributing to improving the existing human resources for an enlarged social forestry operation.

4.32 The project design intended that there should be collaborative efforts between the Forestry and Agricultural Departments for providing extension support for farm forestry operations. Range Officers were expected to serve as Forestry Subject Matter Specialists with the Training and Visit (T&V) agricultural extension system. In some states (e.g. Uttar Pradesh) attempts were made to involve the T&V extension workers for farm forestry operations but with limited success. Overall, the collaboration between Forestry and Agricultural Departments in the project states was nominal and well below expectations. This was due to lack of: (a) an identified nodal authority to ensure development of a joint-work program; (b) prescribed institutional arrangements for field-level coordination between the project staff and extension workers; and (c) appropriate extension messages for farm forestry development. The project extension activities were limited to mass media publicity, publication of pamphlets on planting techniques and organizing farmers' camps and seminars. Although these activities promoted farm forestry, they do not appear to have contributed much to improving post-plantation performance. Moreover, social forestry workers (e.g. forest guards) who were to be the primary extension agents, were taken up with the departmental activities for seedling production, distribution, and plantation protection, leaving little time for extension. In retrospect, for this program to be successful, it would have been beneficial to draw, in advance, an action plan mutually agreeable to the Departments of Forestry and Agriculture and monitor its implementation to see whether any adjustment or exclusive attention by one agency to extension work would be necessary.

4.33 **Research and Studies.** There were a number of deficiencies in the implementation of this component. In all the project states, research programming was weak; research priorities and the institutions/researchers who would be responsible for their execution were not identified on time; there were delays in the release of funds to the contracted institutions; and the involvement of Forestry Department officials to review the research progress in the light of social forestry requirements was minimal. Despite these shortcomings, the project made a useful contribution in supporting several basic investigations. These included wood balance studies, soil and moisture conservation technology and multi-tier plantation trials, evaluation of silvo-pasture models suitable for saline/alkaline areas, and provenance and vegetative propagation trials for social forestry species. Most of the project-supported research work was carried out on a contractual basis by the local universities/research institutions within the states. It may also be claimed that, as a result of the importance given under the project for these and other related areas of study, social forestry has now become a priority area in the forestry research program of the participating states.

4.34 **Monitoring and Evaluation (M&E).** M&E units established in the project states followed GOI/WB M&E guidelines for their monitoring activities. In addition to performing routine but somewhat restricted physical and financial monitoring, these units also undertook and organized a number of studies. These included surveys on farm forestry, community land plantations, degraded forest areas, and strip plantations. In some states, these units also undertook preparation of forest product price bulletins.

4.35 The main constraints which limited the effectiveness of M&E operations in project states included: (a) frequent changes in senior staff; (b) limited feedback into planning; (c) lack of M&E training for staff; and (d) inadequate staffing of these units.

4.36 **Seedling Pricing and Distribution Policies.** No uniform policy was pursued in the project states for the pricing and distribution of seedlings. In general, the prices at which seedlings were sold to farmers were lower than cost of production, which in all cases were very much lower in private nurseries than Forest Department nurseries. Increased subsidies were available to members of selected castes and tribes.

4.37 A positive feature of the pricing policy in all the four states is that there has been a progressive increase in selling prices and that all planters are now charged for seedlings distributed, even if full cost recovery is not attained. This promotes better species selection, care of plants, and less wastage, while providing opportunities for private nurseries to market their seedlings and continue their seedling production activities.

4.38 Tree tenure schemes under the project constituted an important means to benefit the poorer sections of the population. The implementation experience of this component indicates that it was unsuccessful. The main reasons for this include: (a) the long gestation period to obtain benefits from tree plantations; (b) allocation of worst available land, land subject to claims by local elite; and (c) delays in issuance of pattas due to lack of coordination between Forest Department and Revenue Department.

4.39 It may be worth noting in this context, that the equity issues and the implementation arrangements for other minor components, e.g. woodsaving devices, received peripheral importance in the project and consequently their implementation was below expectations. Part of the problem was that Forestry Department, preoccupied with its forestry activities, was ill-equipped to fully handle equity and other social issues and the involvement of other agencies was also minimal.

4.40 **Central Support Office.** A sum of US\$5 million was provided under the project to establish a Central Support Office (CSO) within the Ministry of Environment and Forestry (MOEF). This office was to assist the state governments in formulation of projects, monitoring and evaluation of the program, provide a forum for cross-fertilization of ideas and experiences, conduct problem-specific studies relevant to afforestation, and play a coordinating and policy guidance role in the development of social forestry throughout India. The National Wasteland Development Board (NWDB) of MOEF initially took over all the tasks assigned to CSO.

4.41 This component did not result in the anticipated benefits. First of all, there is little evidence that the Office helped to improve capability of the participating states to formulate and evaluate projects. Many of the state-level senior staff responsible for project implementation were unaware of the unit's existence.

4.42 CSO engaged seven regional institutions to carry out monitoring, training, and studies on such subjects as role of women and peoples' participation in social forestry. These regional centers were carrying out these tasks in isolation and no attempt was made to feed the results of their investigations into the policy-making mechanism of the states. As a result, they did not contribute to improve the states' capabilities for effective project implementation. CSO continues to suffer from an identity crisis and many of the MOEF posts established to implement the component have now been reassigned to another department (Rural Development Ministry).

4.43 **Cost Control.** The project has envisaged several ways of reducing the cost of social forestry plantation. These included reducing costly barbed wire fencing, earlier handover of management of community woodlots to beneficiaries and decentralised seedling production and distribution. There has been some progress on each of these themes, although degree of success varied between states. Another source of cost reduction was the emphasis given to farm forestry which provided the lowest cost model as set out below:

Plantation Type	Cost per Hectare in 1992/93 Prices			
	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
	----- Rs/ha -----			
Farm forestry	6,267	4,631	2,898	7,185
Community woodlot	11,000	14,911	5,987	23,613
Rehab. of degraded areas	6,500	13,808	6,025	11,077
Strip plantations	15,900	11,276	-	32,322

4.44 At credit closing date, the farm forestry model has remained dominant in all states. It is noteworthy that the involvement of 'kissan' nurseries has helped keep the cost of seedling production close to levels predicted at appraisal.

### **Project Cost**

4.45 At appraisal, the project was estimated to cost Rs. 3,933 million (US\$328 million) or Rs. 5,547/ha over a planting area of 708,983 ha. The actual cost of implementing the project over 1,857,000 ha of planted area was Rs. 6,762 million (US\$384.5 million) or Rs. 3,641/ha, representing expenditure per ha equivalent to 72 percent of the original estimate in rupee terms. A combination of the extension in planted areas, the lower unit costs and the depreciation of the rupee against the US dollar led to a cost overrun of only 17 percent. Among the states, Himachal Pradesh recorded the highest increase in expenditure of 113 percent, followed by Rajasthan (111 percent), Uttar Pradesh (78 percent) and Gujarat (29 percent) - see Part III/5A. These cost increases in Himachal Pradesh and Rajasthan are largely attributable to a lower proportion of farm forestry (the lowest cost model) in the total planted area - 31 percent and 56 percent, compared to appraisal targets of 47 percent and 66 percent respectively and to the continued heavy dependence on the departmental production of seedlings.

4.46 As expected, about 66 percent of total costs (compared to 64 percent at appraisal) were absorbed by plantation activities. The organization and management component absorbed 27 percent and the remaining 7 percent were distributed among research, extension, training, planning, monitoring and evaluation, and central support office. Project costs at appraisal and completion are given in Part III/5A. The project cost increase (in Rupees) was caused by extended plantation targets, escalating prices and costs, especially labor costs, and quantities higher than appraisal estimates. Appraisal estimates of local price and physical contingencies proved to be underestimates.

## **5. Project Results**

5.1 Overall, the project has achieved its main objectives. However, there have been some deficiencies in project performance. As discussed in paras. 4.6, 4.10, 4.13 and 4.22, these deficiencies mainly relate to nursery technology, adjustment of plant densities to site factors, community participation in the planning, establishment and management of public plantations, and transfer of such plantations to local communities. Although there had been shortfalls in survival rates and productivity, as well as changes in stand composition, estimated aggregate production level is expected to match the appraisal estimate. This output level is possible because of: (a) the increase (17 percent) in the effective production area from 550,512 at appraisal to 642,414 ha at completion, comprising farm forestry (5 percent), community woodlot (2.4 percent) and government wastelands (86 percent); and (b) higher than recommended initial planting densities in the farm forestry component.

5.2 **Production mix.** The project objectives emphasized increasing of fuelwood and fodder production: as shown in the following table, it was estimated that at full production 89 percent of tree biomass production would be in the form of fuelwood, and 11 percent in the form of poles, small timber and stemwood.

	Project Product Distribution (%)	
Product	SAR Estimate <sup>a/</sup>	PCR Estimate <sup>b/</sup>
Fuelwood	89	38
Timber <sup>c/</sup>	11	62

<sup>a/</sup> Based on SAR production estimates at full production.

<sup>b/</sup> Based on full 32-year production cycle.

<sup>c/</sup> This includes poles, small timber and stemwood.

In contrast, the PCR estimates show that about 38 percent of biomass production would eventually be in the form of fuelwood, and 62 percent would be in poles and stemwood.

5.3 In contrast to SAR expectations, farm forestry will not substantially contribute to fuelwood and fodder production. In states like Gujarat and Uttar Pradesh, which account for 90 percent of the total project area covered under farm forestry, the production is primarily in the form of timber and poles, as the farmers' priority was for cash/incomes rather than for meeting the subsistence needs of fuelwood and fodder.

Production Distribution (%) <sup>a/</sup>

	Rajasthan			Uttar Pradesh			Himachal Pradesh			Gujarat		
	Fuel-wood	Timber	Leaf Fodder	Fuel-wood	Timber	Leaf Fodder	Fuel-wood	Timber	Leaf Fodder	Fuel-wood	Timber	Leaf Fodder
Farm forestry	44	22	24	18	73	9	52	46	2	12	71	2
Community wasteland planting	68	6	13	36	30	30	63	11	21	37	30	18
Rehab. of degraded forests	90	-	9 <sup>b/</sup>	40	51	9	24	70	6	64	26	9
Strip plantations	57	14	7	51	40	9	-	-	-	47	33	19

<sup>a/</sup> Based on tree crop biomass production over a 32-year cycle.  
<sup>b/</sup> This includes seed pods.

The table above shows production distribution in different states by different plantation components. It indicates that production of fuelwood ranges from 12 percent in Gujarat to 52 percent in Himachal Pradesh. Leaf-fodder production ranges from 2 percent to 24 percent between states. On the other hand, plantations on the government public lands, generate the higher proportions of fuelwood and fodder. This suggests that any substantial increase in fuelwood and fodder production would have to come from public lands, in particular the traditional forest lands.

5.4 The project, over a production cycle of 32 years, is expected to generate about 34.5 million mt fuelwood, 1,178 million poles and 25.6 million m<sup>3</sup> stemwood. Farm forestry yields are based on hectare equivalent, i.e. the total number of seedlings issued to farmers divided by the average number of plants recommended for planting per hectare.

5.5 **Financial returns.** The cash flows for various plantation models over a 32-year production period indicate that the farm forestry model is financially the most attractive component, followed by degraded forest lands and community woodlots. Strip plantation models provide, on average, lowest financial rates of return due to their high investment costs. The details are shown in Tables 1A-D to 4A-D, and the results are summarized below:

Plantation Type	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
	..... (FRR - %) .....			
Farm forestry	18	41	26	31
Community woodlot	14	14	21	9
Rehab. of degraded areas	16	14	15	20
Strip plantation	7	10	-	2

Costs are calculated per ha and 1992/93 prices are used for both costs and returns. Farmers' labor inputs and products accruing to rural households have been valued at imputed prices equal to market wage rate and output prices at stump. Returns are sensitive to the market wage per person-day which is taken at Rs. 40 (Rajasthan), Rs. 25 (Uttar Pradesh), Rs. 30 (Himachal Pradesh) and Rs.32 (Gujarat). Output prices are summarized in Annex 1, Table 5. Opportunity cost of land has been estimated both for agricultural fields (Rs.1,000/ha/yr) and for grass in government wastelands (Rs. 100/ha/yr).

**5.6 Economic Returns.** An economic re-evaluation has been carried out for the project as a whole and for each of the four state sub-projects. No benefits have been included for production from minor components (tree fodder plantations in Gujarat, silvo-pastoral plantations in Himachal Pradesh and household farm forestry) which together accounted for less than 1 percent of the total planted area.

**5.7** The analysis has been carried out in 1992/93 prices, with past expenditures adjusted using wholesale price indices. Phased investment costs in financial and economic values are shown in Annex 1, Table 1-4F. The details of planted area are presented in Annex 1, Tables 1-4G. The cost of labor has been adjusted by a factor of 0.7 to reflect its real value. Local costs, including labor, have been converted to border prices by applying a standard conversion factor of 0.8.

**5.8** A cost of Rs.1,000/ha/yr has been included for farm forestry to impute foregone income from crops on land displaced by block planting. Departmental plantations, which are generally on 'wasteland', are also expected to have opportunity cost for grass on lands subject to grazing and a value of Rs.100/ha/yr has been included in the analysis.<sup>1</sup> A 40-year period of analysis has been used for the purpose of estimating economic rate of returns (ERRs).

**5.9** The estimates of ERRs for the project as a whole is 22 percent, and for each of the four sub-projects are 12 percent (Rajasthan), 28 percent (Uttar Pradesh), 13 percent (Himachal Pradesh) and 23 percent (Gujarat), as compared with the appraisal estimates of 27 percent for the project as a whole and, 17 percent, 25 percent, 34 percent and 26 percent respectively. The special factors responsible for lower ERRs for Rajasthan and Himachal Pradesh are the higher cost increases (partly in response to higher labor costs) of 111 percent and 113 percent compared to other states which had cost increases of 78 percent (Uttar Pradesh) and 29 percent (Gujarat). The other principal factors which have contributed to the lower ERRs, as compared with appraisal estimates, are the following:

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<sup>1</sup> The 'without' project situations have been considered for all planting activities (see Annex 1).

- (i) lower yield expectations due to lower than expected plantation survival rates;
- (ii) changes in species mix and rotation length;
- (iii) overly optimistic MAI estimates at appraisal, in particular in Rajasthan and Gujarat.

Increased planted area and the higher value of the product mix were not strong enough to fully offset these negative influences.

5.10 Sensitivity analysis was carried out for the project as a whole. The results show that a reduction in benefits by 20 percent or 50 percent would lower ERR to 18 percent or 12 percent respectively; while an increase in cost by 20 percent or 50 percent would lower the ERR to 19 percent or 16 percent respectively. The project is thus not particularly sensitive to variations in either costs or revenue. The results are presented in Table 7.

5.11 Despite some of its shortcomings, the project has therefore remained economically viable and resulted in several positive developments. It has evoked and widened the interest of the rural population in tree planting. This is reflected in enhanced private interest in farm forestry and nursery operations as well as increasing demand for seedlings. Further, the project has served as a vehicle to bring about some policy changes, e.g. removal of restrictions on felling and transportation of certain species by private growers, thus encouraging them to expand farm forestry operations; and changes in forestry rules to enhance local peoples' participation and introduce benefit-sharing arrangements. The project investments, among other benefits, provided massive employment opportunities (260 million labor days) to the rural poor. Plantations established in degraded areas have helped to conserve soil and water, as well as to take the pressure off the natural forest resources.

## 6. Project Sustainability

6.1 Farm forestry, as popularized by the project, has now become a movement in several parts of Uttar Pradesh and Gujarat. Its favorable impact on farm incomes has contributed to noticeable changes in the attitudes of farmers towards tree planting. Their demand for seedlings, especially of species which have commercial value, remains strong. Termination of subsidized seedling distribution has hardly affected demand. The increase in incomes and capital build-up as a result of project investments, including the subsidized distribution of seedlings in the initial stages, have provided farmers with a means to continue and expand their farm forestry. Market saturation for some of the species/products, however, could become a major impediment to the sustainability of these operations. In most parts of Rajasthan (semi-arid areas) and Himachal Pradesh (hilly regions), however, farm forestry is not yet well established. Without continued support and attention to technical issues which affect productivity, sustainability of the farm forestry activities initiated through the project in these states is uncertain.

6.2 Many of the community plantations established with project support continue to be under the control and management of the Forestry Department. Except in some parts of Gujarat, the process of transferring the management responsibilities to the communities has been very slow. For many plantations, benefit-sharing arrangements have not yet been worked out and the communities themselves are unaware of their usufruct rights. Sustained management of these plantations is not likely unless some radical steps are taken to involve the communities to have a larger measure of responsibility to protect and maintain the established plantations. Furthermore, in Rajasthan and Himachal Pradesh where farm forestry has made little progress, private nurseries supported under the project are not expected to continue their operations for lack of demand for

seedlings in the post-project period. Moreover, in the absence of follow-up projects, or continued government funding, institutional facilities and incremental staff brought in by the project will remain seriously underutilised.

## **7. Bank Performance**

7.1 Recognizing the fact that the first phase project intervention was short and limited in relation to the large scope for expanded social forestry operations in Uttar Pradesh and Gujarat, the Bank agreed to a follow-on project for these states. This helped to expand and intensify their tree planting operations and set a stage for continuing large scale farm forestry operations in these states. Similarly, the decision to support social forestry programs in Rajasthan and Himachal Pradesh was also timely and has helped these states to develop an organizational framework and expertise for implementing large-scale social forestry projects. Bank supervision missions were adequately staffed in terms of expertise required. There was staff continuity and supervision frequency was satisfactory. The project has benefited from the technical advice given and flexibility applied by these missions. This was manifested in the adoption of both vegetative and physical/engineering measures aimed at soil and moisture conservation and changes in the component targets, restructuring of the tree tenure component activities, and adjustments in disbursement percentages.

## **8. Borrower's Performance**

8.1 The project was executed largely as planned. Most of the implementation arrangements proved appropriate. The overall success of the project has demonstrated the organizational capacity of the participating state governments and managerial ability of the forestry personnel to promote large-scale tree planting activities in lands outside the traditional forest areas.

## **9. Lessons Learned**

- (a) The much stronger performance of the project in Gujarat and Uttar Pradesh (which had already benefited from earlier projects) than in the other two states, suggests that a prolonged commitment (exceeding the conventional project period of five years) is necessary to develop the capacity to manage large-scale social forestry projects.
- (b) Even resource poor farmers are prepared to commit land and labor to planting slow maturing species of forest trees on a significant scale in spite of the lack of immediate benefits. Plantings for fuelwood production, while possibly of interest to the landless, has little appeal to landholders who can meet their fuel needs from other on-farm sources.
- (c) Project objectives to benefit the poor could seldom be achieved through farm forestry, which is, as evidenced by the project experience, predominantly influenced by market forces. Plantations in community/public lands offer most promising opportunities to realizing these objectives.
- (d) Vested departmental interests (and traditional modes of operation) are the biggest obstacles to promoting genuine community participation in woodlot management and to encourage the emergence of private-sector run nurseries. The best structure for the latter is a pricing policy for seedlings which makes nursery management pay.

- (e) Investment in training, especially overseas training, are only warranted if linked to staffing plans which enable those who have been trained to apply their newly acquired skills.
- (f) In a well decentralized country such as India, investment in the development of specialized central institutions without hierarchial links with the state-level organizations for project management are probably not warranted.
- (g) The project would have benefited from highly targeted short-term technical assistance aimed at introducing improved plantation techniques for arid areas and at developing a greater integration between farm forestry and livestock-based farming system.
- (h) Ideally, projects of this nature should have been preceded by a forestry sector study. It would have helped to incorporate critical policy changes including institutional reforms. In this project, the changes in the Government policies on timber transit, transfer of woodlot and strip plantation to the local people, price of seedlings, etc. came when the project was well near its completion. The project therefore did not benefit from the changes it could have, if the changes were made in advance.

## **PART II. PROJECT REVIEW FROM BORROWER'S PERSPECTIVE**

### **GUJARAT**

#### **1. EVALUATION OF BANK'S PERFORMANCE AND LESSONS LEARNT**

Bank's personnel are generally recognized as highly qualified professional experts in their respective fields. Their visits to the project have always been very informative, objective and rewarding. On their suggestions, new technological upgradations and concepts such as use of V-ditches and vegetative contour technology for Soil & Moisture Conservations, microplan approach for planning at the village level were introduced. Studies like impact assessment, Marketing of social forestry produce were initiated and linkages with Agriculture Department for Forestry Extension and with State Agriculture Universities for Agro-forestry Research were sought to be established.

We were greatly benefitted by discussions and suggestions on issues such as Tree improvement and use of better cultivars for raising seedlings, providing extension training to staff, encouragement to Women Nurseries and Women's overall involvement; Participatory Management, greater interaction between territorial and community forestry staff, and about Monitoring and Evaluation of the project. The Bank also took keen interest in having a new strategy for pricing of seedlings evolved and involvement of panchayats by preparation of harvesting plan of plantations and sharing the benefits with them.

With a view to maintain consistency of opinion of the team members visiting the state, it was good that there was one member, who continued to accompany almost all the Bank

Missions to the project. This has helped maintain uninterrupted continuity in the process of evolution of dialogue and discussions and therefore there were not many issues with divergent views or disagreements.

The project started in 1985 and was scheduled to complete in the year 1990. However at the end of 1990, considerable amount of SDR was still unutilised particularly due to less allocation of funds by the State Government in view of severe drought conditions in the state and because of devaluation of the rupee. The Bank was very sympathetic and considerate in giving extension to the project by three years i.e. upto March 1993. Thus the SAR targets which could not be achieved within the period originally prescribed, were not only achieved but exceeded at the end of the extended period.

## 2. EVALUATION OF BORROWER'S OWN PERFORMANCE AND LESSONS LEARNT

The project started in the year 1985 and came to a close in March 1993. Originally the project was scheduled to last 5 years i.e. from 1985 to 1990 at an estimated cost of Rs. 1296.4 Million. However due to less allocations to forestry sector particularly due to severe drought conditions in Gujarat during the years 1986, 1987 and 1988, the expenditure on project till the end of March 1990 was only Rs. 722 M. In terms of US\$, against the original allocation of US\$ 92.34 M, the expenditure was US\$ 38.34 M and there was an undisbursed balance of US\$ 54 M as on 31-3-1990. Devaluation of the rupee also partially contributed to the undisbursed credit. The bank approved our proposals to extend the project till March 1993. During this period efforts were made to utilise the available credit by boosting up the plantation targets. With further devaluation of rupee it was not possible to utilise the entire credit in terms of US\$. In terms of

rupees, total expenditure on social forestry project is 2206 Million out of which expenditure on project is Rs. 1673 M out of which reimbursement claims for the project have processed for Rs. 1624 M.

The major activity of the project is the plantation programme under various components. A bird's eye view of the targets and achievements during the full period of the project is as under :

Category.	Targets (ha.)		Actual Extn.	Actual Achievement.	Actual Ext. %	Actual SAR %.
	SAR	MTR				
Strip	15000	9116	17800	21010	118	140
VF (Irr.)	5000	3287	6050	6888	114	138
VF (RF)	20000	12235	31000	31057	100	155
R.D.A.	30400	23544	63850	63961	100	213
Fodder	10000	300	2500	1278	51	13
Fuelwood	2500	835	850	835	98	33
plantation						
Environmental	-	-	-	411	-	-
planting						
R.D.F.L.	30500	16541	42060	44088	105	145
Seedling	200000	265128	730800	1040196	142	520
distribution						
Total :	313400	330986	894910	1209724	135	386

It can be seen from the above table that the achievement during the project has been substantially larger than the SAR targets proposed in the project, barring an exception for the component of Fodder Plantation. For all the plantation models put together the achievement is 135% of

the project extension target. The progress in terms of distribution of seedlings has been a runaway success. This is commendable and is the result of the untiring efforts of the field personnel engaged in implementing this programme and also the result of the cooperation of the people of the State. Credit goes to the farmers of Gujarat who have readily accepted the tree planting programme. The farmers of Gujarat are known to accept innovations and respond favourably to the extension programmes. Qualitatively, the results are very satisfactory. The state looks much greener now than it used to look before the start of the project. The forest department has endeavoured to maintain high quality of plantations through a system of self corrective procedures. For this purpose particularly during the years towards the end of the project, the monitoring and evaluation activities had been accelerated and the results threw open certain questions which were deliberated amongst the implementing officers to have the shortcomings, whatsoever, corrected within the organisation. Evaluation has also been got done through external agencies such as the Indian Institute of Public Opinion, VIKSAT. Their reports also have shown excellent performance by the Gujarat Forest Department. By and large the quality of the plantations have been very satisfactory. The performance of the borrower in respective components and lessons learnt componentwise are indicated in the following paragraphs.

#### STRIP PLANTATIONS :

This is one of the models which is most visible to general public and as such goes a long way to build up the image of the Social Forestry Programme of the State. Gujarat has been the pioneering state in starting strip plantations as early as the 1970 even before the World Bank stepped in the Social Forestry Programme. In fact this is the component which was first started under social forestry in the state.

Looking to the success along the roadsides plantings, the irrigation department and the railways came forward to spare the land for strip planting in the state in a big way. It is heartening to note that against the project extension targets the achievement has been 118%. Apart from aesthetic value of the trees, providing shade and comfort particularly during the scorching heat of summer months in Gujarat to the travellers along roads and rails, the farmers of Gujarat particularly have liked the strip plantations primarily due to the shelterbelt effect on their agricultural crops, thus protecting their crops against hot desiccating winds, though there has not been very active involvement of theirs in protecting the plantations.

The Indian Institute of Public opinion have shown 70% success under this component. Internal evaluation of one to eight years old plantations under this model has indicated that the survival gradually reduces from 68% for one year old plantation downwards upto eight year old plantation indicating removal of trees due to varied reasons such as widening of roads, drought, unauthorised removal etc, but even then the existence of trees along the strip has been appreciated by one and all within the state and outside.

The technical quality of plantations and the species mix of the plantations to suit the people, has generally been excellent.

Farmers whose lands lie close to the strip plantations have not involved themselves much in protecting the strip plantations. The endeavour of the department in planting grafted bor plants (*Zizyphus mauritiana*) along the roads has been greatly liked by the local people. Grass collection, though free has not been a major incentive for protection. It is true that harvesting of the strip

plantations and sharing the produce with the local people would have gone to ensure better involvement of people both in terms of better protection and better use of the plantations. We hope that with our starting of harvesting of the strip plantations now and eventually benefit sharing with the Taluka Panchayats (Body of the people), much better public involvement will be ensured. People in Gujarat have known that during the scarcity years, leaf fodder from the trees along strip plantations and from other plantations have helped the cattle tide over the most difficult periods of availability of fodder. Now since the harvesting of the strip plantations has already started and benefit distribution to people is to follow shortly, better involvement of public is anticipated.

#### VILLAGE WOODLOTS (IRRIGATED & RAINFED)

The physical achievement under village woodlot (Irr.) is 114% of the project extension targets and that under village woodlot rainfed is 100% of the project extension Target. The programme has been liked by the panchayats very much. Though 4 ha. limit of afforestation in a village has been a bottleneck, it has not seriously affected the performance. There is a general awakening amongst the panchayats regarding flow of benefits at the time of harvesting of these plantations. During the last couple of years, a substantial number of village panchayats have received their share of the income and material from village woodlots. However barring the option of harvesting of the crop, by and large Panchayats have preferred that the Forest Department should manage the woodlots in consultation with them rather than Panchayats themselves managing the woodlots. Having received the benefits from the harvested village woodlots, the Panchayats are now more keen to participate in raising, and managing the village woodlots. Insisting on some particular species and participating in the decision making both in inputs and the

overall after care of the plantations which is an indicator of the level of awakening about the village woodlots. It is heartening to see that some village panchayats have arranged on their own to manage the woodlots on sustained basis (by selling twigs to be used as tooth-brushes etc.) and also that some village panchayats have planted up village woodlots on their own and harvested and used the benefits on their own without much of intervention by the forest department except for the technical guidance and plants from the forest department.

The experience of raising woodlot by the forest department is quite old. The first rainfed village woodlots were raised in Gujarat during the year 1974 with the involvement of Panchayat. The initial attempts were so pleasing to Panchayats that some Panchayats not only promised to allocate more land for this purpose but also offered to extend all help to forest department not only for the purpose of the plantations such as providing water supply for watering the plantations but also for allocating land for the construction of residential houses for the staff free of charge.

On the technical front, the species combination and technical quality of plantation has generally been very good. In irrigated plantation, the species choice which used to rest on Eucalyptus largely in the beginning of the project, has now become more varied and many species such as Neem (*Azadirachta indica*), Teak (*Tectona grandis*), Desibaval (*Acacia nilotica*) and other miscellaneous species and fruit species have now been preferred by the Panchayats. To match the species requirement to the space required by a plant in irrigated plantations, the plant population per hectare of area was reviewed and was reduced.

**REFORESTATION OF DEGRADED (FOREST) AREAS (RDA) :**

RDA plantations have largely been taken up in Forest lands. These lands have been degraded due to excessive exploitation and grazing. The component was initially designed for essentially three districts in Gujarat namely Panchamahals, Sabarkantha and Surat. The component has been given a fair trial in other areas under social forestry programme and it is doing equally well else where also.

The physical achievement under this model has been 63961 ha which is 100% of the project extension targets.

On technological front, there has been a technological upgradation in the soil and moisture conservation technique under this model. A variety of techniques such as V-ditches, vegetative contours, gradonies contour trenches Sapar technique (Square mound) have been tried out. Almost all models did well but largely contour trenches or a combination of V-ditches and vegetative contour is currently being followed. Multicanopy approach so as to optimise the land utilisation, has been adopted in a large number of cases and the results are very satisfactory.

Participatory forest management involving village protection committees in protecting the plantations and ultimately sharing the benefits from these plantations has been tried out in Gujarat in over 257 villages covering an area of 55000 hectars with good success. Government of Gujarat has already come out with the policy resolution involving village forest committees in protecting the plantations. The concept of participatory forest management has picked up very well particularly in those areas having good root stock so that with some protection. There is good natural regeneration coming up in the area but the concept does not seem to go equally well in other areas which are totally devoid of root stock. However the

concept has been found to be very effective in protecting and managing degraded forest areas. The efforts to involve village protection committees in protecting and managing these areas have to continue, albeit with a little change here and there.

Assessment of the plantation under this component have shown that success from one year to 8 year old plantations tapers off from 69 to 22 percent. Looking to the factors which were responsible for the degradation of the land where such plantations are taken up, the performance is really good. The species combinations to suit local needs and the technical quality of the plantation generally has been of a good order.

For RDA plantation, the Forest department had an innovative scheme of social security through forest plantation wherein local people were employed permanently to take care of the plantations in 1.5 ha area, instead of employing people on daily wages. In addition there is a sharing mechanism with these people permanently employed on the plantation works. This ideology has continued during the present project also. However with the new resolution on participatory forest management, the social security scheme is not being expanded.

#### FODDER PLANTATION

Fodder is a free demonetized commodity in most of the rural areas in the state except during scarcity years when there is generally a high demand of fodder. Grass starts growing up naturally due to protection provided to the area planted up under any component. People collect fodder from these areas free. Leaf fodder is also collected by people free of cost. Accordingly there is not much of felt need among panchayats to spare village grazing lands for the purpose of raising fodder plantations. Achievement under this

model has therefore fallen short of the SAR targets. Efforts are called for to improve the performance by making necessary changes.

#### FUELWOOD PLANTATIONS

The plantations under this model were being carried out in the Panam Command area. The scheme was reviewed during the MTR and it was decided that the scheme being highly capital intensive, should be discontinued from the project. As such no plantation under this model after the MTR have been taken up. The scheme stands transferred to Gujarat State Forest Development Co. Ltd.

#### FARM FORESTRY

Under this programme, seedlings are distributed to people for planting in their farm lands. This programme is a grand success in the state. Against the SAR target of distribution of 2,00,000 ha. based on a notional planting of 1500 plants per hectare the actual distribution has gone far beyond the expectations to a level of equivalent area 10,40,196 ha. following the same standard of 1500 seedlings. This is also much higher than the targets fixed (area 7,30,800 ha.) for the extended project period. The total seedling distribution is 1560 M.

This very cost effective component has caught up the imagination of millions of farmers in the rural areas. In addition to its big utility to farmers, the programme has proved to be extremely useful to the rural masses in meeting their requirements of fuel, fodder and fruits. Crux of the scheme has been that it has helped bringing about the marginally productive lands under more productive land use system and created assets worth crores of rupees.

As essential yardstick to measure the success of the

programme is number of seedlings distributed. Though this cannot be the only yardstick, there is ample evidence to show that the programme has been accepted by the people in a very desirable manner. It is not only the farmers who are participating in the programme but also a number of industrial units, educational institutes, Government and Semi-Government departments, religious bodies etc. who have taken to planting of trees. Not only that, people having no land have also planted up trees on backyards of their homesteads.

In the state 127 Tree Growers Cooperative Societies have been set up who promote tree planting by their members.

Internal evaluation of the farm forestry programme (covering the period 1980 to 1988) has shown that the major section of the beneficiaries are the small and marginal farmers. This is the desired target group. Out of the total participants in the programme, small and marginal farmers contributed 74% of the participant group whereas 20% were big farmers and remaining 6% though had no land participated in the programme by planting on their homesteads etc. Of the total participants 7% were scheduled castes and 20% were scheduled tribes. The figures being close to the population percentages shows an even acceptance of the programme by people. 73% of the farmers planted 58% of total number of seedlings on peripheral bunds or as row planting along water channels etc. Homestead plantings, which is important for meeting the needs of fuel, fodder and fruit at the doorsteps has been resorted to by 10% of the marginal farmers 4% of small farmers and 2% of the big farmers apart from almost all persons who do not own farmlands.

There has been a wide range of demand of tree species for supplying to people. Planting of Eucalyptus, which during early eighties, was as high as 84% came down to only 26% by

1988. Many more species such as Neem (*Azadirachta indica*), Desibaval (*Acacia nilotica*), Teak (*Tectona grandis*), Jambu, Sevan (*Maligna arborea*) are in great demand and the department made endeavours to supply whatever is the most preferred species by the people. Fruit trees are also in very great demand.

Survival rate has been 18.5% covering a period 1980 to 1988. The performance is satisfactory. The performance is to be viewed in light of the fact that there were three major scarcity years during 1986, 1987 and 1988 and also that 60% of the quantity of seedlings have been planted on peripheral bunds, water channels, on fallow lands and homesteads by majority of the farmers.

The department adopted an approach that people should plant trees on land not used for agriculture. The success of the extension approach can be seen in light that 89% of the farmers planted over 68% of the total seedlings on land either previously fallow or along bunds, boundaries or homesteads.

Decentralisation of nurseries has been an innovation of the forest department of Gujarat State. As early as 1976-77, the forest department started two decentralised nurseries first at Sandhana in Kheda district and the other in Panchmahal district. The programme of decentralisation increased so fast that in the next year itself the number increased almost 33 folds. Since then, the number of decentralised nurseries has been on the increase steadily. By the year 1991-92, there were 6448 decentralised nurseries raised by Kissan and Schools in addition to only 869 nurseries managed by the forest department. While the department raised 94.3 Million seedlings for distribution the Kissan and school nurseries raised 94.0 M seedlings. Thus at least half of the total number of seedlings were being raised by the decentralised nurseries. The

decentralised nurseries are smaller in size the average size of a Kissan nursery or a School nursery is about 15000 plants. With smaller nurseries, the department has endeavoured to reach the remotest parts of the state and also has succeeded in cutting down the distance of transport to only 6 Km.

A number of small depots (trading centres for wood) have come up during recent years in the state. Though the organised marketing system on proper lines is yet to develop within the state, the department does disseminate information on prevailing market price in the state. A study given to Operations Research Group - a leading marketing research organisation on marketing of forest produce is likely to be completed shortly and will address the issues of marketing of forest produce in a detailed manner. After which corrective measures as required will be taken in this direction.

With a view to improve the quality of plants for supply to people, the department has followed a three pronged strategy. One, the gradual reduction of number of seedlings that could be provided free to people (From a number of 5000 seedlings before 1985-86, the free seedlings number was gradually brought down to 200) Secondly, the price of seedlings kept on going up. In 1992-93 the free supply of seedlings to public was totally stopped, with some relaxations in certain cases; and thirdly, improving the seed quality being used in raising the seedlings by establishing over 278 seedstands in the state.

Linkages with the agriculture department regarding using their T & V network for forestry extension has not developed very satisfactorily but the attempts are on and now there is a better interaction between the agriculture and the forest department. We hope that this will develop well in future Linkages with Agricultural Universities

particularly for agro-forestry research is in the stage of infancy.

#### REHABILITATION OF DEGRADED FARMLANDS

This is in true sense one of the most significant models of the social forestry aimed at involving the society in forestry sector and the proper model for bringing degraded farmlands to proper land use system. Since the productive potential of the land for producing agricultural crop is much less, putting such lands to forestry use is the right approach. The scheme is limited to the degraded farmlands of small and marginal farmers who are generally very poor and as such cannot be expected to invest in relatively long term forestry crop. Payment of compensation therefore, is essential.

In terms of the quantitative achievement of targets, the performance has been 105% of the project extension targets. However since the land put to use are generally highly degraded, qualitative performance in terms of survival and growth of plants are generally not good. In the initial years, the survival and growth of plants is of good order but due to grazing or other pressures and lack of care by the participating farmers, the survival and growth of plants dwindles sharply. Forest department has decided to take up farmers in a more concentrated manner. The preliminary results have shown that in microplanning villages where larger number of farmers have been included in the same village, the performance is fairly good. Efforts are on to train more farmers and take many more villages under the microplanning approach.

#### FUEL SAVING DEVICES

The department of Non-Conventional Energy had initiated a large programme of popularising smokeless stoves in Gujarat

State. To avoid the duplication of initiatives, given the limited state budget, the programme was dropped from the project.

Regarding improved crematoria, the achievement in terms of number of crematoria installed is 30%. There is a constraint of procurement of such crematoria because forest department is the only purchaser and there are not many manufacturers of such crematoria. The result is that the supply against the purchase order of the forest department is often delayed considerably. However, an evaluation survey of crematoria conducted for the earlier phase of the social forestry project have shown that such crematoria are being used very efficiently. A general feedback from Panchayats is that they are very keen in getting crematoria installed in their villages.

**HIMACHAL PRADESH**

(a)&(b): Part I and Part II which was to be written by Bank has not been received so far, therefore, no comments can be offered on this.

(c) Evaluation of the Bank's performance by the borrower:-

The National Social Forestry Project was started in Himachal Pradesh in 1985-86 with the objective of increasing production of forest products like fuel wood, poles, small timber and fodder, besides increasing the farmers income and opportunities of participation of female and weaker sections. It also sought to strengthen the forestry institutions for facilitating implementation and improving support activities including research, training, extension, monitoring, evaluation. The project has been in operation in the State for over seven years. Its Original closing date was December 3, 1990, which was extended upto March 31, 1993.

In order to achieve these objectives several project components were envisaged which are mainly as under:-

1. Agro-Forestry (a) Farm Forestry, (b) Private Waste land planting,
2. Tree Tenure for poor and landless Group Farm Forestry on Govt. land.
3. Community plantation: (a) Community wood lots-self help (b) Community wood lots- Rainfed.
4. Departmental plantation : Rehabilitations of degraded forests.
5. Establishment of Nurseries :Kisan and Govt.
6. Institutional Support.

Out of the above components the farm forestry component was being reviewed and discussed very widely. Himachal being a hilly state, the average land holding are very small i.e. 1.30 ha. The population of small and marginal farmers i.e. holdings upto 2 ha. is 82.18% and areas under these holdings is only 43.17% which indicates that holding are predominately of small size. Trees are raised by farmers on the marginal land only i.e. grass-land, barren land and land wasted on borders and paths of the fields. From the very beginning of the project this component remained controversial and targets had to be revised. People's participation in planting on their marginal land could not pick-up so well, because average land holdings are very

small in this state. This component in the project always was a great strain on the forest department, since people's participation was not easily forthcoming.

The second most important objective was to ensure large scale people's participation in the project. But this important objective only remained suppressed under another objective of achieving physical and financial targets. For achieving people's participation under this programme a tremendous effort was required to bring about attitudinal changes in forest department field functionaries. But a department which had a policing role since last century, it was difficult to bring about this change in a short span of time.

Himachal being a hilly state extension activities are not very simple due to poor accessibility of the areas. Impact evaluation study has revealed that about 40-45 % of the sampled respondent either knew the project or participated in the project. But this data is based upon a small sample ~~of the~~ ~~state~~ size. If the optimum sampling intensity is adopted, the figures will be entirely different. Similarly people's participation could not be achieved to the satisfactory level during project period.

Bank was always insisting on phasing out Govt. sponsored subsidies on supply of seedlings to the farmers. But in reality if objectives of the project were to reach small and marginal farmers, this appears to be conflicting. Since the per capita income of the small farmers are very low, if the trees were to be supplied to them on cost, this could have been a major disincentive to the farmers. First midterm review of the project was done in February, 1988 and the mid course changes in the project implementation was discussed between the mission and the State. The important mid term changes agreed upon were:-

- i) Under the component private waste land planting Alternative I was to be phased out during the year, 1988 planting season and only Alternative II used thereafter.
- ii) To prepare note on legal status procedure and costs on the component tree tenure.
- iii) To develop low cost models for silvopastoral subcomponent.
- iv) Study on establishment of Gosadan.

Later, the component of tree tenure for poor and landless was discontinued as it violated the Forest Conservation Act,

I was discontinued. During the extended period of the project from 1990-91, the component of silvopastoral treatment of land was incorporated. And the establishment of Gosadans were also incorporated in the project from 1991-92. The silvipastoral models were highly appreciated by the Bank due to its wide success.

(d) Evaluation of borrowers performance.

Social Forestry was a totally new experience to the Forest Department. The objectives, although, were very simple but the components through which these objectives were to be achieved were large, unexplicit, and were not transparent, lesser the number of components, more is the clarity for implementing agencies of the project. Theoretically they were conceived well.

The Borrower could do very little when it really came to understand these major problem issues. No baseline survey was carried in the the start of the project. It would have been proper if the project components were tested on pilot scale and later on picked up and modified according to the actual field experience.

HP Forest Department had not undertaken any massive extension forestry activities before this project was launched. Although village Development Communities were constituted during the initial stages of the project but in reality nothing concrete could be achieved from them on the subject of the involvement of local people. Since the targets under departmental planting were large enough, the extension activities therefore, got neglected. Although the people in hills are fully aware of the advantages of Farm Forestry but as stated in Section (e) of the report, Farm Forestry activities could not be brought in the Crop Land and it remained in marginal lands only. Closures of the plantation areas were done in many cases without people's consent and this has resulted in damage of the plantation areas by indiscriminate grazing. Therefore, IRMPs should have been prepared in the beginning of the project for the involvement of the people.

During the extended period of the Project it was felt by the borrower that people's participation in the programme was not forthcoming upto the desired level. After great deliberation a totally ~~innovative~~ innovative scheme 'Van Lagao Rozi Kamao'

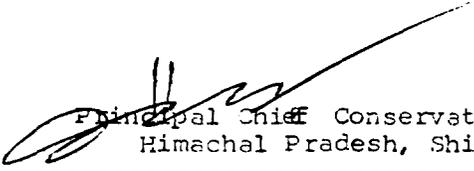
was initiated during 1990-91, the scheme picked up its momentum during subsequent two years. The Bank in its Oct, 1992 review mission report conveyed many valid apprehensions about the efficacy of the scheme & its future repercussions. Since the Project has already culminated on 31st March, 1993, time will tell about the repercussions of the Scheme as apprehended by the Bank.

Himachal being a hilly state, the staffing requirements for extension activities is more than the normal terrain. Activities, like; extension, training, publicity and research etc. although were being given priorities during implementation of the project, the success rate is a question mark. Departmental plantation on wasteland were achieved with good survival rates but the supporting activities required more inputs.

The Bank was reviewing progress of the project periodically and valuable suggestions were given by the various Missions. Serious efforts were made by the Department to strictly adhere to the guidelines given by the Bank from time to time.

(e) The relationship of the bank and the department was extremely cordial and there were no major hassles during the implementation of the Project.

(f) USAID Participated as co-financer upto 1990 and they provided very useful financial and technical help during that period.

  
Principal Chief Conservator of Forests,  
Himachal Pradesh, Shimla-1.

## RAJASTHAN

### Summary and Conclusions

1. It is essential to evaluate the impact of various project activities carried out since the starting of the project. Most important is the effect of motivation on departmental personnel and the community at large for Joint Forest Management (JFM). The effect of additional production of fodder and fuel on the economy is also assessed.
2. The project was designed to grow fuelwood and fodder to meet the needs of the rural population. Fodder supplies increased substantially. Grasses and leaf fodder was distributed to poor sections of society free of cost. Waterponds were dug in silvipastoral plantations to harvest and store water for drinking by animals and improve moisture regime for plants.
3. In 1990-91, Government issued suitable instructions regarding people's participation, constitution of VFPMCs (village forestry protection committees), sharing of forest produce, relaxation in rules governing cutting of trees on private lands and their transit to the market centers, pricing of seedlings to be distributed as a part of farm forestry, etc. As a result of all these measures a climate has been created in the state where individuals, communities, voluntary agencies, etc., are coming forward in raising the plantations in consultation/collaboration with the Forest Department.
4. The project objectives were highly oriented towards environmental improvement, ecological stabilization and conservation of important natural resource base. The plantation activity itself has generated three hundred lac mandays for the rural poor, improving their income. Particular attention has been paid to the needs of the women and other disadvantaged groups. While sharing the forest produce from the plantation areas, the weaker sections of the society are given a preferential treatment.
5. The afforestation activity under the project has created beneficial effect on agricultural production by releasing more cowdung for farm yard manure, improving moisture regimes and sub-soil water table, reducing soil erosion and effect of desiccating winds. The increase in agricultural production together with increase in forest produce raised on farmlands has enhanced the income of the farmers and community at large which in turn has led to the economic growth of the rural areas.
6. The activities like strip plantations, rehabilitation of degraded forests and development of wastelands have proved to be an attempt to bridge the gap between supply and demand of the forest produce. Bulk of the population in the rural areas are poor farmers who do not purchase firewood and other forest produce. Most of the fuelwood, lops and tops and fodder would be consumed by the tree-growing households, substituting part of the supplies of firewood and fodder, otherwise collected from the forests.
7. The intangible benefits to the society in terms of better environment and improved health could not be quantified. The value of benefits such as improvement in agricultural production and other secondary benefits are expected to be much greater than those revealed by the project.
8. Rajasthan has definitely moved ahead of other states in participatory forest management in the project. Institutional reforms have included the removal of restrictions on felling and transit of the major social forestry tree species, institutionalizing procedures for people's share in forestry produce and their participation in the management of afforested area, and drawing up concrete

propoals for the carrying out of micro-planning exercise.

9. The result of a study funded under the project revealed that while social forestry provided employment and income opportunities for women in the traditional areas of nursery raising, tree planting, watering, etc., these opportunities could be enhanced by widening women's participation in other social forestry activities like fruit collection, seed/tendu leaves, etc. The study recommended that women should be represented in traditional decision-making bodies like the village panchayats; women's groups, like women's cooperative societies, should be given priority in allotment of revenues from forest and wastelands developed for social forestry; and women should have the right to own land.

10. The voluntary agencies and non-governmental organizations have been observed to play an effective role as catalysts for involving people to participate actively in the development process of promoting social forestry. However, their performance was far from satisfactory for the following reasons:

(a) One of the major problems faced by the NGOs is not one of participatory development but more of participatory management. It is generally observed that it is easy to involve people in community action for programs like wastelands development and afforestation, but it is an extremely difficult task to organize them in community resource management. This results in the plantation not being adequately protected from cattle grazing and other such hazards.

(b) The controversy of agriculture versus forestry is another impediment affecting successful promotion of afforestation programs. The question whether agriculture is economically viable or forestry has better economic advantages, affects NGOs efforts in making people adopt forestry as a profitable proposition. People are not convinced about the sustainability of the forestry sector vis-a-vis agriculture.

(c) It is paradoxical to note that number of NGOs working mainly for rural development are found to be urban based. Many have their head offices in the district or state capital headquarters. There are others whose headquarters are even located in Delhi. Such organizations have a great scope to procure a lion's share of the government grants which are spent on non-field activities items like maintenance of office, vehicles and arranging meetings.

(d) Most NGOs have no definite mechanism for monitoring and evaluation of the work through some independent agency.

(e) Barring few, there are no organizations which are truly engaged in meaningful micro-planning activity. They have neither the infrastructure nor technically competent persons to design micro-plans scientifically and they have no proper mechanism for successful implementation.

11. An analysis to assess the financial viability of the project as a whole was carried out and revealed that project cash flow for individual project components was quite positive and the internal rate of return for the project cash flow was 12.92%. The project cash flow includes costs incurred by and return accruing to project authority and other participants. It also takes into consideration value of all forest produce. Based on these assumptions the National Social Forestry Project has been viable.

12. In addition to this, benefit/cost ratio has been calculated by discounting the total costs and benefit of the project life (32 years) at 12%. The benefit/cost ratio for the project is 1.11.

## UTTAR PRADESH

### Inferences, Conclusions and Summary

1. The program has been a mixture of success and failures. Social Forestry Program has proved to be a dynamic phenomenon gaining momentum in a number of directions which was not anticipated originally.
2. On the positive aspects the project has resulted in successful plantations in large area in private farms, community and public lands. The flexibility built into project design and its implementation facilitated refocussing of policies and targets which were in consonance with emerging trends manifested in the increased emphasis on farm forestry, the creation of linkages between Forestry and Agriculture Extension and establishment of decentralized nurseries. The Social Forestry Department has undergone transformation and have definitely become more responsive to the needs of the farmers. An ongoing detailed scrutiny of current strategies is also gradually enabling the corrective measures to be taken.
3. On the other hand, the failure can be narrated as the absence of concrete ways for local participation. In absence of concrete package in the project for generating the local participation, the participation did not materialize in the beginning of the project. Secondly, technical recommendations were not adequately developed to meet the emerging requirements of planting under varied conditions which was the special needs for the small farmers. It further did not generate models for sustained production in the long run. Again benefits could not be distributed equitably amongst different segments of the population with the result that fuelwood and other needs of the poor could not be projected or met to the extent anticipated. Further, the environmental aspects were neither emphasized nor addressed adequately resulting in abject failure on this score. Support activities in shape of Research and Training have proved to be a great laggard hampering the quality of extension.
4. The most important inference which has been learnt is the need for regular monitoring of emerging trends and existing objectives and aims. Newness of the experiences and unexpected emerging directions highlighted these aspects. However meticulous planning may be done at project design, new trends shall have to be considered as the project advances as has occurred in this phase, unprecedented demand of farm forestry, and then the sudden decline in the demand of Eucalyptus seedlings. Corrective measures were initiated and implemented in the shape of tree tenure schemes, involvement of NGOs microplanning etc., but these are not sure solutions and require an ongoing systematic search for answers and regular reassessment in the future. For the present probably the solution may be found partly in restructuring of the department. The new role of the Forest Corporation will have to include a new thrust on research areas encompassing forest genetics, tissue culture, embryo genes, nursery technology, cloning technology, etc. issue of biodiversity, and the use of video technology for imparting training and proper communication for motivation of the target group. People's behaviour is a key to success for such programs and it has to be changed through regular reassessment of trends and sustained efforts, villages as eco-development unit for treatment, and myriads of other things interlinked with success of the project. The issues raised can be answered only through sustained commitment and intensive efforts by the Bank, Government and the Forestry Department in general. Short cuts do not exist.

## PART III. STATISTICAL INFORMATION

### 1. Related Bank Loans and/or Credits

Credit Title	Purpose	Year of Approval	Status
Uttar Pradesh Social Forestry Project (Cr.925-IN)	To increase the supply of fuelwood in rural areas, to provide poles, bamboo, small timber, fodder grass and minor forestry products and strengthen the social forestry organization to carry out project works.	1978	Completed
Gujarat Social Forestry Project (Cr.961-IN)	" " "	1979	Completed
West Bengal Social Forestry Project (Cr.1178-IN)	" " "	1982	Completed
Jammu and Kashmir and Haryana Social Forestry Project (Cr.1286-IN)	" " "	1982	Completed
Karnataka Social Forestry Project (Cr.1432-IN)	To augment fuelwood supplies in priority rural areas and semi-urban areas and to provide small timber, fodder and other related forest products.	1983	Completed
Kerala Social Forestry Project (Cr.1514-IN)	To increase the supply of fuelwood in rural areas, to provide poles, bamboo, small timber, fodder grass and minor forestry products and strengthen the social forestry organization to carry out project works.	1984	Completed
Maharashtra Forestry Project (Cr.2328-IN)	To support restructuring and rationalization of the State's forestry department and its investment programmes, and to foster a greater role in forestry and development for village communities, non-government institutions, cooperatives and the private sector.	1992	On-going
West Bengal Forestry Project (Cr.2341-IN)	To support Government of West Bengal Forestry Development Programme through installation of a sustainable protection system in all regions of the State, enhancement of forest productivity and conservation of biodiversity.	1992	On-going

### 2. Project Timetable

Item	Date Planned	Date Revised	Date Actual
Preparation	-	-	1984
Appraisal	-	-	Oct/Nov. 1984
Negotiation	-	-	May 6-16 1985
Board Approval	-	-	June 18 1985
Credit Signature	-	-	Sept. 24 1985
Credit Effectiveness	-	-	Feb. 24 1986
Closing Date	31 Dec. 1990	31 Dec. 1991 31 March 1992	March 31 1993

### 3. Credit Disbursements

IDA Fiscal Year	Cumulative in SDR million		
	Appraisal Estimate	Actual <sup>1/</sup>	Actual as a % of Appraisal Estimate
1985	-	-	-
1986	22.7	10.7	47
1987	56.9	24.7	49
1988	84.7	43.1	51
1989	123.1	63.3	51
1990	153.1	79.8	52
1991	166.4	106.3	64
1992	166.4	140.7	85
1993	166.4	155.4	93

<sup>1/</sup> As part of the funds redeployment exercise in December 1991, SDR11.0 million was cancelled. The credit closed on March 31, 1993. Final disbursement from the credit was made on April 6, 1993 utilizing the full revised amount of the credit of SDR155.4 million.

#### 4. Project Implementation

##### A. Physical Targets and Achievements

	Rajasthan			Uttar Pradesh			Himachal Pradesh			Gujarat			Total							
	Appraisal	MTR <sup>1/</sup>	Estn <sup>2/</sup>	Actual <sup>3/</sup>	Appraisal	MTR	Extension	Actual	Appraisal	MTR	Extension	Actual	Appraisal	MTR	Extension	Actual	Appraisal	MTR	Extension	Actual
<b>A. PLANTATION ACTIVITIES (ha)</b>																				
<b>1. Agro-Forestry</b>																				
Farm Forestry	83,000 (66.2)	62,638	75,700 (55.3)	83,363 (55.9)	134,000 (62.7)	191,667	218,050 (75.4)	236,700 (70.9)	53,000 (47.0)	37,000	48,300 (31.5)	50,401 (30.7)	200,000 (63.8)	265,128	730,800 (81.6)	1,040,196 (86.0)	467,000 (65.9)	556,433	1,072,850 (72.8)	1,410,657 (76.0)
Private Waste- land Planting	-	-	-	-	-	-	-	13,000 (11.5)	13,000	16,000 (10.4)	13,297 (8.1)	30,500 (9.7)	16,541	42,060 (4.7)	44,088 (3.6)	43,500 (6.1)	29,541	58,060 (3.9)	57,365 (3.1)	
Improved (grafted) Orchards	4,000 (3.3)	4,800	4,500 (3.3)	3,570 (2.4)	-	-	-	-	-	-	-	-	-	-	-	4,000 (0.6)	4,800	4,500 (0.3)	3,570 (0.2)	
<b>2. Community Wasteland Planting</b>																				
Community Woodlots (rainfed)	5,000 (4.1)	6,924	18,600 (12.1)	19,477 (13.0)	14,000 (8.6)	10,117	18,900 (6.5)	27,294 (8.2)	41,000 (36.3)	49,000	58,400 (38.1)	78,946 (48.1)	20,000 (6.4)	12,235	31,000 (3.5)	31,468 (2.6)	80,000 (11.3)	78,276	124,900 (8.5)	157,185 (8.5)
Community Woodlots (irrigated)	-	-	-	-	-	-	-	-	-	-	1,300 (0.8)	5,000 (1.6)	3,287	6,050 (0.7)	6,888 (0.6)	5,000 (0.7)	3,287	8,050 (0.4)	8,188 (0.4)	
Tree Fodder Partitions	-	-	-	-	-	-	-	-	-	-	-	10,000 (3.2)	300	2,500 (0.3)	1,278 (0.11)	10,000 (1.4)	300	2,500 (0.2)	1,278 (0.07)	
<b>3. Government Wasteland Planting</b>																				
Rehabilitation of degraded forests	20,000 (16.6)	16,653	37,150 (27.2)	39,414 (26.4)	-	20,000	35,700 (12.4)	44,522 (13.3)	5,000 (4.5)	9,000	12,785 (8.3)	13,710 (8.3)	30,400 (9.7)	23,544	63,850 (7.1)	63,961 (5.3)	55,400 (7.8)	69,197	149,485 (10.1)	161,607 (8.7)
Strip Plantations	4,300 (3.6)	2,122	2,000 (1.5)	2,478 (1.7)	740 (0.5)	4,370	9,800 (3.4)	24,414 (7.3)	-	-	-	15,000 (4.8)	9,116	17,800 (2.0)	21,010 (1.7)	20,040 (2.8)	15,608	29,600 (2.0)	47,902 (2.6)	
Fuelwood Partitions	-	-	-	-	-	-	-	-	-	-	-	2,500 (0.8)	835	850 (0.1)	835 (0.06)	2,500 (0.3)	835	850 (0.05)	835 (0.04)	
Semi-pastoral Plantations	-	-	-	-	-	-	-	-	-	4,000	7,565 (4.9)	5,908 (3.6)	-	-	-	-	4,000	7,565 (0.5)	5,908 (0.3)	
<b>4. Tree Tenure - Poor and Landless</b>																				
Strip Plantation	-	-	-	-	1,210 (0.8)	)	-	-	-	-	-	-	-	-	-	-	1,210 (0.2)	-	-	
Household Group Farm Forestry	7,500 (6.2)	950	850 (0.6)	846 (0.6)	11,000 (6.8)	)	1,500 (2.3)	6,670 (0.3)	833 (0.7)	833	10,500 (6.8)	716 (0.4)	-	-	-	-	19,333 (2.7)	3,283	18,020 (1.2)	2,497 (0.1)
Arjun Plantation	-	-	-	-	1,000 (0.6)	)	-	-	-	-	-	-	-	-	-	-	1,000 (0.1)	-	-	
<b>Total Area Planted</b>	<b>120,800 (100)</b>	<b>94,087</b>	<b>136,800 (100)</b>	<b>149,145 (100)</b>	<b>161,960 (100)</b>	<b>227,694</b>	<b>289,120 (100)</b>	<b>333,865 (100)</b>	<b>112,813 (100)</b>	<b>112,833</b>	<b>153,550 (100)</b>	<b>164,278 (100)</b>	<b>313,400 (100)</b>	<b>330,916</b>	<b>894,910 (100)</b>	<b>1,209,724 (100)</b>	<b>708,983 (100)</b>	<b>765,560 (100)</b>	<b>1,474,300 (100)</b>	<b>1,857,012 (100)</b>
<b>B. FUEL SAVING DEVICES (No.)</b>																				
Stoves/Crematoria	160	-	179	162	-	-	-	-	25	-	358	189	1,000	-	1,550	560	-	-	-	
Pressure cookers, chulas	-	-	-	-	-	-	-	-	7,560	-	15,317	10,707	10,000	-	10,000	118,488	-	-	-	

<sup>1</sup> Mid-Term Review (MTR) of the project was carried out in February 1985.

<sup>2</sup> The project was extended for 27 months in December 1990.

<sup>3</sup> Activity achieved on closing date, i.e. March 31, 1993. farm forestry areas are national areas based on seedlings issued, which are divided by recommended seedling per ha.

**B. Staffing, Civil Works and Vehicles - Physical Targets and Achievements**

	Rajasthan			Uttar Pradesh			Himachal Pradesh			Gujarat		
	Appraisal Estimate	Sanction	Actual	Appraisal Estimate	Sanction	Actual	Appraisal Estimate	Sanction	Actual	Appraisal Estimate	Sanction	Actual
<b>1. Staffing (no.)</b>												
Chief Conservator of Forest	1	1	1	-	-	-	-	-	-	-	-	-
Addl. Chief Conservator of Forest	-	-	-	2	2	2	1	1	1	1	1	1
Conservator of Forest	1	1	1	9	6	6	1	1	1	2	-	-
Deputy Conservator of Forest	10	18	18	28	19	19	5	3	3	14	1	-
Asst. Conservator of Forest	6	6	6	88	54	54	41	38	38	9	-	-
Range Forest Officer	60	63	63	712	444	444	84	74	74	37	37	10
Deputy Ranger	22	13	13	343	152	152	79	20	20	-	-	-
Forester	137	145	145	1,329	494	494	-	-	-	22	32	15
Social Forestry Worker (all guard level)	657	486	486	1,013	540	540	364	213	213	78	129	128
Others (Accountants, etc.)	-	-	-	-	-	-	-	-	-	-	61	61
<b>TOTAL</b>	<b>894</b>	<b>733</b>	<b>733</b>	<b>3,524</b>	<b>1,711</b>	<b>1,711</b>	<b>575</b>	<b>350</b>	<b>350</b>	<b>163</b>	<b>261</b>	<b>213</b>
<b>2. Civil Works (no.)</b>												
Non-Residential Buildings	39		31	984		806	29		27	113		73
Residential Buildings	198		141	1,000		945	582		608	716		466
<b>3. Vehicles (no.)</b>												
Car	2		3	6		13	6		5	6		4
Jeep	27		29	51		85	34		26	26		14
Truck	20		14				11		7	2		2
Bus/Van	2		2	6		21	25		11	3		1
Tractor	52		37	113		157	-		-	2		2
Publicity Van	2		2	-		-	-		-	-		-
Motorcycle	92		92	260		-	191		-	132		15
Bicycle	800		800	-		-	-		-	-		-

## 5. Project Cost and Financing

### A. Project Cost (Rp million)

	Rajasthan		Uttar Pradesh		Himachal Pradesh		Gujarat		All Four States	
	Appraisal <sup>1/</sup>	Actual <sup>2/</sup>	Appraisal <sup>1/</sup>	Actual <sup>2/</sup>	Appraisal <sup>1/</sup>	Actual <sup>2/</sup>	Appraisal <sup>1/</sup>	Actual <sup>2/</sup>	Appraisal <sup>1/</sup>	Actual <sup>2/</sup>
1. Organization & Management	89.5	155.7 (174)	641.2	1,201.5 (187)	158.5	356.6 (225)	119.9	111.4 (95)	1,009.1	1,825.2 (181)
2. Physical Targets	266.3	609.6 (229)	753.8	1,547.9 (205)	365.8	826.1 (226)	1,151.0 <sup>1/</sup>	1,504.5 (131)	2,536.9	4,488.1 (177)
3. Research	2.8	8.9 (318)	8.1	27.5 (340)	7.1	3.3 (46)	5.1	7.4 (145)	23.1	47.1 (204)
4. Extension	12.1	19.3 (160)	80.1	16.6 (21)	5.6	11.8 (211)	3.6	31.5 (875)	101.4	79.2 (78)
5. Training	9.4	10.2 (119)	116.3	41.2 (35)	15.4	5.8 (38)	8.9	8.9 (100)	150.0	66.1 (44)
6. Planning	-	-	4.2	7.5 (178)	-	-	2.0	2.5 (125)	6.2	10.0 (161)
7. Monitoring & Evaluation	11.8	22.0 (186)	7.9	21.3 (270)	20.5	15.2 (74)	6.0	7.4 (123)	46.2	65.9 (143)
All Four States	391.9	825.7 (211)	1,611.6	2,863.5 (178)	572.9	1,218.8 (213)	1,296.5	1,673.6 (129)	3,872.9	6,581.6 (170)
8. Central Support Office	-	-	-	-	-	-	-	-	60.3	180.3 (299)
<b>Total Project Costs</b>	<b>391.9</b>	<b>825.7 (211)</b>	<b>1,611.6</b>	<b>2,863.5 (178)</b>	<b>572.9</b>	<b>1,218.8 (213)</b>	<b>1,296.5</b>	<b>1,673.6 (129)</b>	<b>3,933.2</b>	<b>6,761.9 (172)</b>

Note: Figures within brackets indicate actual cost as a percentage of appraisal estimate.

<sup>1/</sup> Includes physical and price contingencies.

<sup>2/</sup> Actual cost as on March 31, 1993.

**B. Project Financing**

	Planned (Credit Agreement)		Actual	
	SDR million	(%)	SDR million	(%)
IDA	166.1	50	155.4	
USAID	80.5	24	n.a. <sup>2/</sup>	
Domestic Funds <sup>1/</sup>	83.6	26	n.a. <sup>2/</sup>	
<b>Total</b>	<b>330.2</b>	<b>100</b>		

<sup>1/</sup> Contributed by GOI and State Governments of Rajasthan, Uttar Pradesh, Himachal Pradesh and Gujarat.

<sup>2/</sup> Figures not available at time of PCR preparation.

Source	Planned (Credit Agreement)	Revised Allocation December 5, 1991	Final Amount	Final Percentage
	..... SDR '000 .....			
<b>Expenditure/Categories</b>				
<b>IDA Credit</b>				
Field activities	119,900	118,900	120,867	73
Incremental staff salaries	13,500	13,700	12,361	7
Travel allowances	5,400	3,500	3,255	2
Civil works	12,300	10,000	9,679	6
Vehicles, equipment and furniture	2,000	3,500	3,309	2
Vehicle operating cost	2,200	2,300	2,625	1
Consultant services, training	3,000	3,500	2,953	2
Unallocated	8,100	-	-	
Difference due to cross exchange rates on special account disbursements			351	0.2
<b>Total Disbursement</b>			155,400	93
Cancellation (December 5, 1991)		11,000	11,000	7
<b>TOTAL CREDIT AMOUNT</b>	<b>166,400</b>	<b>166,400</b>	<b>166,400</b>	<b>100</b>

## 6. Project Results

### A. Direct Benefits <sup>1/</sup>

Unit	Rajasthan		Uttar Pradesh		Nimochal Pradesh		Gujarat		Total		
	Appraisal Estimate	PCR Estimate									
Fuelwood	mt	491,000	5,340,000	740,000	8,770,000	-	-	3,900,000	13,950,000	5,131,000	28,060,000
- Conifer	mt	-	-	-	-	26,200	760,000	-	-	26,200	760,000
- Broadleaf	mt	-	-	-	-	2,700,000	5,650,000	-	-	2,700,000	5,650,000
Poles	no.	6,700,000	61,000,000	14,800,000	578,450,000	-	35,350,000	22,000,000	503,000,000	43,500,000	1,177,800,000
Small timber	m <sup>3</sup>	38,300	-	89,000	-	-	-	-	-	127,300	-
Bamboo	no.	-	-	-	-	-	-	6,800,000	541,360,000	6,800,000	541,360,000
Grass	mt	8,110	2,420,000	67,000	4,170,000	180,000	4,800,000	82,000,000	1,900,000	82,255,110	13,290,000
Leaf fodder	mt	800	1,106,000	-	2,941,000	2,900,000	2,660,000	860,000	1,860,000	3,760,800	8,567,000
Dry fodder	mt	-	-	-	-	-	-	50,000	-	50,000	-
Stemwood	m <sup>3</sup>	-	407,600	-	15,390,000	520,000	5,800,000	-	4,050,000	520,000	25,647,600
Edible flower	mt	-	-	8,000	-	-	-	-	-	8,000	-
Fruit (incl. ber)	mt	12,000	305,300	5,600	1,740,000	-	-	13,350	2,620,000	30,950	4,665,300
Neem seeds	mt	-	-	-	-	-	-	2,250	-	2,250	-
Bidi leaves	mt	-	-	-	-	-	-	304	-	304	-
Seed pods	mt	59,000	474,600	-	-	-	-	-	-	59,000	474,600
Fallen wood/tops	mt	8,200	-	-	-	-	-	-	-	8,200	-
Oilseeds	mt	-	-	5,000	-	-	-	-	-	5,000	-
Cocoons	'000	40,000	-	60,000	-	-	-	-	-	100,000	-
Other tree by-products	mt	40,000	-	-	-	-	-	-	-	40,000	-
Number of beneficiaries (million)										6 - 8	10
Employment generated											
- from plantation	man-days									100 million	142 million
- in forest departments	jobs									5,156	3,007

<sup>1/</sup> PCR production estimates are based on full 32-year production cycle. However, no regeneration or replanting is assumed. Production estimates at appraisal are not based on full production cycle and therefore not directly comparable with PCR estimates.

## B. Economic Impact

	Rajasthan		Uttar Pradesh		Nimchal Pradesh		Gujarat		Total	
	Appraisal Estimate	PCR Estimate								
Economic Rate of Return (%)	17	12	25	28	34	13	26	23	27	22
Assumptions:										
Project life (years)	30	40	30	40	30	40	30	40	30	40
Standard conversion factor	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Conversion factor for unskilled labour	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7

## C. Financial Impact

Financial Rate of Return of Model (%)										
1. Farm forestry	23.5	18.4	58.0	41.3	33.8	25.7	31.6	31.1	-	-
2. Community Woodlot - Rainfed	12.8	14.0	19.2	13.8	35.3	20.9	20.1		-	-
3. Community Woodlot - Irrigated	-	-	-	-	-	-	34.8	9.2	-	-
4. Rehabilitation of Degraded Forest Areas	31.4	15.7	-	13.9	22.4	14.9	15.7	19.9	-	-
5. Strip plantations	3.7 - 23.1	6.6	10 - 10.9	10.2	-	-	5.9	1.7	-	-

## D. Studies

### Monitoring and Evaluation Studies

#### I. Gujarat (The M&E unit has carried out the following studies:)

1. Survey of Strip plantations (1980-87)
2. Survey of village woodlots (1985-90 Irrigated and 1980-87 Rainfed)
3. Survey of Rehabilitation for Degraded Forests (1980-87)
4. Survey of 1988/89 Plantations
5. Preparation of volume table of *Casuarina equisetifolia*
6. Survey of Farm Forestry (1980-88)
7. Review of Plantation Registry (1980-81)
8. Survey of Rehabilitation of Degraded Farmlands (1985-90)
9. Price Bulletins of SF Products (1990-92)

#### II. Himachal Pradesh (M&E unit undertook the following investigations/studies:)

1. Farm Forestry Surveys
2. Community Woodlot Surveys
3. Strip and Government Land Plantation Surveys
4. Institutional Forestry Survey (1991)
5. Semi-annual Price Collections
6. Evaluative Studies on:
  - (a) Fuelwood Saving Devices (1988)
  - (b) Extension and Publicity (1991)
  - (c) Kissan Nursery (1988)
  - (d) Seedling Pricing (1990)
  - (e) Van Lagao Rozi Kawas (1992)
  - (f) Silvi-Pasture (1992)
7. Wood Balance Study by the University of Himachal Pradesh
8. Impact Evaluation Study

#### III. Studies Contracted/Undertaken by UP SFW under WB Project Funds

1. Women's Role in Forestry (Institute of Social Sciences, Allahabad), 1990
2. Cost of Seedling Production by Species Group (by D.C. Pande), 1990
3. Impact of Social Forestry on Rural Population (by Association for Rural Development, Energy and Environment, Lucknow, July 1990)
4. Khadar/Usar Land Plantation - Consultant Group of Foresters - 1990

Additionally, with USAID support, the following studies were contracted/undertaken in UP:

1. Marketing of Social Forestry Products - Operations Research Group, Bandu, 1990
2. Cost Benefit Analysis of Agro-Forestry, 1990

By CSO/NWDB/GOI:

1. Survival of Agro-Forestry Seedlings - by Agricultural Finance Consultants, Bombay, 31 December 1990

**IV. Studies Contracted/Undertaken by Rajasthan Government****Studies by GOR:**

1. **Seedling Pricing Study (1990)**
2. **Household (Tree Tenure Study to determine procedures for allocating state lands to individuals for tree planting) 1990.**

**Studies by USAID:**

1. **Marketing of Social Forestry Products (1990)**
2. **Women's Role in Forestry (1990)**

**CSO Studies**

1. **Role of Voluntary Agencies in Social Forestry - Agricultural Finance Consultants, 1990**
2. **Study on Farm Forestry and Its Effect on Crop Production, AFC, 1990.**

## 7. Status of Covenants

Section	Summary Description	Type of Covenant 1/	Level of Compliance 2/	Revised Compliance Date	Original Compliance Date	Remarks
HP 10 AGR MN	GOHP should make adequate provision for vehicles and travel allowances to allow field staff to effectively carry out their extension responsibilities.	ORG	2	-	-	Lately, hiring of vehicles allowed in the reorganized SFW.
HP 10 AGR MN	GOHP should raise its charge for seedlings to 15 paise by 1987 and 20 paise by 1989.	ORG	1	04/30/92	-	Upward revised in 1982.
HP 3.01C DCA	Borrower shall make available out of proceeds of Credit an amount equivalent to SDR 24,500,000 to HP.	ORG	1	-	-	
HP 3 C4A.DCA	GOI shall furnish IDA proposed structure of Central Forestry Organization.	ORG	1	06/30/89	04/30/86	NAEP (formerly MWD8) is responsible. An Additional Secretary heads the organization.
HP 3.04B DCA	GOI shall sanction by 4.30.86 and fill by 10.31.86, the position of Head of the Central Social Forestry Organization.	MAN	1	-	04/30/86	
HP 3.04C DCA	GOI shall maintain thereafter position of Head of the Central Social Forestry Organization and those of Chief Project Economist and Deputy IGF/Monitoring.	MAN	2	-	10/31/86	DIGF (Monitoring) is not working for the project.
HP 4.01A2 DCA	GOHP shall cause its departments and other agencies responsible for Part A of the project to furnish IDA not later than nine months after each FY certified copies of their accounts and financial statements.	FIN	2	03/31/92	12/31/91	Overdue for 1991-92.
HP 4.01B2 DCA	GOHP shall cause its departments and other agencies to furnish IDA immediately upon finalization report on audited accounts and financial statements.	ADT	2	03/31/92	12/31/91	Overdue for 1991-92.
HP SH.2.01A.PA	GOHP shall furnish information on private wasteland planting schemes, tree tenure schemes, community managed woodlots and tree fodder plantations to cover procedures for selecting participants, participants' rights and responsibilities, etc.	ORG	2	-	12/31/85	
HP SH.2.02.PA	After third year of planting but not later than 3.31.88, GOHP undertakes to carry a joint review of its sub-project with borrower and IDA.	ORG	1	-	03/31/88	
HP SH.2.03.PA	Once a year, HP will furnish IDA results of the MSE of its sub-project.	ORG	2	-	-	A comprehensive report in 1989-90 has been published.
HP SH.2.04.PA	At least every two years, GOHP will revise/update its wood balance study.	STD	2	06/30/92	11/30/90	One study done and published.
HP SH.2.05.PA	By 12.31.85, GOHP shall make arrangements to ensure that their Department of Forests and Department of Agricultural Extension Services cooperate to provide extension service to farmers.	ORG	2	-	12/31/85	Orders have been issued, though coordination is wanting.
HP SH.2.06A.PA	GOHP shall ensure that a single line of administrative command for field staff is maintained from circle conservator down.	MAN	1	01/11/91	-	
HP SH.2.06B.PA	GOHP shall ensure that Steering Committee head by the State Forest Secretary meets quarterly to discuss and assign work priorities for field staff.	ORG	1	-	-	
HP SH.2.09.PA	GOHP shall maintain coordination committees for social forestry activities.	ORG	2	-	-	
HP SH.2.10.PA	By 3.31.88, GOHP shall carry out a study of the organizational issues in staff forest departments.	STD	1	06/30/89	03/31/88	See HP SH.2.08A.PA.
HP SH.2.11.PA	GOHP shall carry out a cost recovery study regarding social forestry seedlings' distribution and implement its findings.	STD	1	03/31/91	03/31/88	

1/ Codes for Type of Covenant:

ADT - Audit  
CRY - Cost Recovery  
FIN - Financial  
MAN - Management & Staffing

2/ Codes for Level of Compliance

1 - Fully Complied  
2 - Partially Complied - not affecting implementation

ORG - Organizational  
RPT - Reporting  
STD - Studies  
TCH - Technical

Section	Summary Description	Type of Component	Level of Compliance 2/	Revised Compliance Date	Original Compliance Date	Remarks
GUJ 10 AGR MIN	GOG to make adequate provision for vehicles and travel allowances to allow field staff to effectively carry out their extension responsibilities.	ORG	2	-	-	
GUJ 10 AGR MIN	GOG should reduce free distribution of seedlings from 2,500 per family to 1,000 by 1985, 800 by 1986, 600 by 1987, 400 by 1988, and 200 by 1989. The charge of seedlings should be increased to 10 paise by 1987 and 20 paise by 1989.	ORG	1	-	-	
GUJ 2.02	After third year of planting but not later than 3.31/88, each State undertakes to carry a joint review of its sub-project with borrower and IDA.	ORG	1	-	03/1/88	
GUJ 2.03	Once a year each State will furnish IDA results of the M&E of its sub-project.	ORG	2	-	-	
GUJ 2.04	At least every two years each State will revise/update its wood balance study.	ORG	2	-	-	
GUJ 3.01C	Borrower shall make available out of proceeds of Credit, an amount equivalent to SDR 62,500,000 to GOG.	ORG	1	-	-	
GUJ 3.04A	GOI shall furnish IDA proposed structure of Central Forestry Organization.	ORG	1	06/30/89	04/30/86	NAEB (formerly NWDB) is responsible for the Central Forestry Organization, which is headed by an Additional Secretary.
GUJ 3.04B(1)	GOI shall sanction by 4.30.86 and fill by 10.31.86 the position of Head of the Central Social Forestry Organization.	MAN	1	-	04/30/86	
GUJ 3.04B(2)	GOI shall maintain thereafter position of Head of the Central Social Forestry Organization and those of Chief Project Economist and Deputy IGF/Monitoring.	MAN	2	-	10/31/86	See above, but the DIGF (Monitoring) is not working for the project.
GUJ 4.01A2	Borrower shall cause its departments and other agencies responsible for Part A of the project to furnish IDA not later than nine months after each FY, certified copies of their accounts and financial statements.	FIN	1	-	-	
GUJ 4.01B	Borrower shall cause its departments and other agencies to furnish IDA immediately upon finalization, report on audited accounts and financial statements.	ADT	1	-	-	
GUJ 5H.2.01A	GOG to furnish information on private wasteland planting schemes, tree tenure schemes, community managed woodlots and tree fodder plantations which shall cover procedures for selecting participants, participants' rights and responsibilities, etc.	ORG	2	-	12/31/85	
GUJ 5H.2.09	GOG shall maintain coordination committees for social forestry activities.	ORG	2	-	-	
GUJ 5H.2.11	By 3.31.88, GOG to carry out a cost recovery study regarding social forestry seedlings' distribution and implement its findings.	STD	1	03/31/90	03/31/88	Done by USAID contract.
RAJ 10 AGR MIN	GOR should make adequate provision for vehicles and travel allowances to allow field staff to effectively carry out their extension responsibilities.	ORG	1	-	-	
RAJ 10 AGR MIN	GOR should limit free distribution of seedlings per family to 1,000 by 1987, and 500 by 1989 and should charge 5 paise per seedling by 1987, 10 paise by 1988, and 15 paise by 1989.	ORG	1	-	-	
RAJ 3.01C	Borrower shall make available out of proceeds of Credit, an amount equivalent to SDR 16,700,000 to Rajasthan.	ORG	1	-	-	
RAJ 3.04A	GOI shall furnish IDA proposed structure of Central Forestry Organization.	ORG	1	06/30/89	04/30/86	NAEP (formerly NWDB) is responsible. An Additional Secretary is the Head.
RAJ 3.04B	GOI shall sanction by 4.30.86 and fill by 10.31.86, the position of Head of the Central Social Forestry Organization.	MAN	1	06/30/89	04/30/86	
RAJ 3.04C	GOI shall maintain thereafter position of Head of the Central Social Forestry Organization and those of Chief Project Economist and Deputy IGF/Monitoring.	MAN	2	06/30/89	10/31/86	DIGF (Monitoring) is not working for the project.

Section	Summary Description	Type of Component	Level of Compliance	Revised Compliance Date	Original Compliance Date	Remarks
RAJ 4 01A2	GOR shall cause its departments and other agencies responsible for Part A of the project to furnish IDA not later than nine months after each FY, certified copies of their accounts and financial statements.	FIN	1	-	03/31/88	But inordinately delayed for 1990-91.
RAJ 4 01B2	GOR shall cause its departments and other agencies to furnish IDA immediately upon finalization, report on audited accounts and financial statements.	ADT	1	-	03/31/88	Same as above.
RAJ 5H.2.01A	GOR shall furnish information on private wasteland planting schemes, tree tenure schemes, community managed woodlots and tree fodder plantations to cover procedures for selecting participants, rights and responsibilities of participants, etc.	ORG	1	04/30/88	12/31/85	
RAJ 5H.2.02	After third year of planting but not later than 3.31.88, GOR undertakes to carry a joint review of its sub-project with borrower and IDA.	ORG	1	03/31/88	03/31/88	
RAJ 5H.2.03	Once a year, GOR will furnish IDA results of the M&E of its sub-project.	ORG	2	07/31/89	-	
RAJ 5H.2.04	At least every two years, GOR will revise/update its wood balance study.	STD	1	11/30/90	-	
RAJ 5H.2.06	By 12.31.85, GOR shall sanction the position of Conservator of Forests for Planning, M&E.	ORG	1	-	12/31/85	
RAJ 5H.2.08	GOR shall maintain coordination committees for social forestry activities.	ORG	2	-	-	
RAJ 5H.2.10	By 3.31.88, GOR shall carry out a study of the organizational issues in State Forest Departments.	STD	1	12/31/90	03/31/88	
RAJ 5H.2.11	By 3.31.88, GOR shall carry out a cost recovery study regarding social forestry seedlings' distribution and implement its findings.	STD	1	09/30/90	03/31/88	
UP 10 AGR MAN	GOUP should make adequate provision for vehicles and travel allowances to allow field staff to effectively carry out their extension responsibilities.	ORG	1	-	-	
UP 10 AGR M&N	GOUP should raise charge per seedling to 25 paise by 1987 and 30 paise by 1990.	ORG	1	-	-	
LP 3.01C	Borrower shall make available out of proceeds of Credit, an amount equivalent to SOR 61,500,000 to UP.	ORG	1	-	-	
LP 3.04A	GOI shall furnish IDA proposed structure of Central Forestry Organization.	ORG	1	06/30/89	04/30/86	NAEP (formerly NWOB) is responsible. An Additional Secretary is the Head.
LP 3.04B(i)	GOI shall sanction by 4.30.85 and fill by 10.31.85, the position of Head of the Central Social Forestry Organization.	MAN	1	-	04/30/86	
LP 3.04B(ii)	GOI shall maintain thereafter position of Head of the Central Social Forestry Organization and those of Chief Project Economist and Deputy IGF/Monitoring.	MAN	2	-	10/31/86	DIGF (monitoring) is not working for the project.
LP 4.01A2	GOUP shall cause its departments and other agencies responsible for Part A of the project to furnish IDA not later than nine months after each FY, certified copies of their accounts and financial statements.	FIN	1	-	03/31/88	
LP 4.01B2	GOUP shall cause its departments and other agencies to furnish IDA immediately upon finalization, report on audited accounts and financial statements.	ADT	1	-	03/31/88	
LP 5H.2.01A	GOUP shall furnish information on private wasteland planting schemes, tree tenure schemes, community managed woodlots and tree fodder plantations to cover procedures for selecting participants, rights and responsibilities of said participants, etc.	ORG	1	-	12/31/85	
LP 5H.2.02	After third year of planting but not later than 3.31.88, GOUP undertakes to carry a joint review of its sub-project with borrower and IDA.	ORG	1	-	03/31/88	
LP 5H.2.03	Once a year, GOUP will furnish IDA results of the M&E of its sub-project.	ORG	2	-	-	Some piecemeal plantation survey reports have been prepared.
LP 5H.2.04	At least every two years, GOUP will revise/update its wood balance study.	STD	2	12/31/90	-	Study carried out once has not been updated.

Section	Summary Description	Type of Complaint	Level of Compliance 2/	Revised Compliance Date	Original Compliance Date	Remarks
UP SH 2.07	By 12.31.85, UP shall sanction the position of Additional Conservator of Forests and a Conservator of Forests for planning.	MAN	1	.	12/31/85	
UP SH 2.09	GOJP shall maintain coordination committees for social forestry activities.	ORG	2	.	.	
UP SH 2.11	By 3.31.86, GOJP shall carry out a cost recovery study regarding social forestry seedlings' distribution and implement its findings.	STD	1	12/31/90	03/31/86	

## 8. Use of Bank Resources

### A. Staff Inputs (staff weeks)

Task	Pre-FY	FY84	FY85	FY86	FY87	FY88	FY89	FY90	FY91	FY92	FY93	FY94	Total
LENP	-	22.4	47.0	-	-	-	-	-	-	-	-	-	69.4
LENA	-	-	115.8	-	-	-	-	-	-	-	-	-	115.8
LENN	-	-	26.4	-	-	-	-	-	-	-	-	-	26.4
SPN	-	-	0.6	36.9	11.5	24.3	9.3	18.4	18.5	7.6	3.5	-	26.0
PCR	-	-	-	-	-	0.3	-	-	-	-	-	25.7	130.6
<b>Total</b>	-	22.4	189.8	36.9	11.5	24.6	9.3	18.4	18.5	7.6	3.5	25.7	368.2

LENP - Activities prior to Appraisal.  
 LENA - Activities related to Appraisal.  
 LE NN - Negotiation activities.  
 SPN - Supervision time.  
 PCR - PCR preparation time.

### B. Missions

Type of Mission	Date	Sent By	No. of Persons	Man-days in Field	Specialization <sup>a/</sup>	Performance Rating <sup>b/</sup>	Trend	Type of Problems <sup>c/</sup>
Preparation								
Appraisal	05/85	WB	10					
Supervision 1	10/85	WB + USAID	2	8	E + S	2		I
Supervision 2	7/86	WB + USAID	2	12	E + E	1		I
Supervision 3	3/88	WB + USAID						
Supervision 4	1/89	WB + USAID	3			2		
Supervision 5	8/89	WB	1	22	F	2		M + I
Supervision 6	11/89	WB	3	27	F	2		I + M
Supervision 7	6/90	WB + USAID	2	23	F	2		I + M
Supervision 8	11/90	WB	5	20	F + En + Inst.	2		T + I + M
Supervision 9	6/91	WB	3	23	F + Ag	2		I + T
Supervision 10	10/91	WB	4	17	F + Ag	2		I + M
Supervision 11	6/92	WB	2	20	F	2		I + M
Supervision 12	2/93	WB	2	25	F	2		T + M + I

<sup>a/</sup> AG = Agriculture; E = Economics; F = Forestry; S = Sociology; En = Environment; Inst. = Institutions.

<sup>b/</sup> 1 = Problem-free or minor problems. 2 = Moderate problems. 3 = Major problems.

<sup>c/</sup> F = Financial; M = Managerial; I = Institutional.

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Table 1. Exchange Rate and Inflation Factors

Fiscal Year	Exchange Rate <sup>1/</sup> (@ Rs to US\$1.00) (Period Average)	Wholesale Price Index (Base Year 1993-100)
1984/85	11.89	190.0
1985/86	12.24	182.0
1986/87	12.79	172.0
1987/88	12.97	159.0
1988/89	14.48	148.0
1989/90	16.66	138.0
1990/91	17.95	125.0
1991/92	24.52	109.9
1992/93	26.41	100.0

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<sup>1/</sup> IMF - International Financial Statistics.

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**Table 2. Sensitivity Analysis**

**PRESENT VALUES OF NET STREAMS AT A DISCOUNT RATE OF 12%**  
=====

	BTOT	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%	LAG 1 YEAR	LAG 2 YEARS	LAG 3 YEARS
CTOT	5,809.7	6,956.7	8,103.7	11,544.8	4,662.7	3,515.7	74.6	4,580.7	3,483.5	2,503.8
UP 10%	5,243.6	6,390.7	7,537.7	10,978.8	4,096.6	2,949.6	-491.6	4,014.7	2,917.4	1,937.7
UP 20%	4,677.6	5,824.6	6,971.6	10,412.7	3,530.6	2,383.5	-1,057.6	3,448.6	2,351.4	1,371.6
UP 50%	2,979.4	4,126.4	5,273.4	8,714.5	1,832.4	685.3	-2,755.8	1,750.4	653.2	-326.7
DOWN 10%	6,375.8	7,522.8	8,669.8	12,110.9	5,228.7	4,081.7	640.6	5,146.8	4,049.5	3,069.8
DOWN 20%	6,941.8	8,088.9	9,235.9	12,677.0	5,794.8	4,647.8	1,206.7	5,712.9	4,615.6	3,635.9
DOWN 50%	8,640.0	9,787.0	10,934.1	14,375.1	7,493.0	6,345.9	2,904.9	7,411.0	6,313.8	5,334.0
LAG 1 YEAR	-	-	-	-	-	-	-	5,187.2	4,090.0	3,110.2
LAG 2 YEARS	-	-	-	-	-	-	-	-	4,631.5	3,651.8
LAG 3 YEARS	-	-	-	-	-	-	-	-	-	4,135.2

**INTERNAL RATES OF RETURN OF NET STREAMS**  
=====

	BTOT	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%	LAG 1 YEAR	LAG 2 YEARS	LAG 3 YEARS
CTOT	21.843	23.350	24.767	28.588	20.230	18.492	12.164	19.187	17.157	15.546
UP 10%	20.382	21.843	23.217	26.923	18.818	17.133	10.984	17.955	16.089	14.600
UP 20%	19.087	20.507	21.843	25.446	17.567	15.928	9.931	16.858	15.133	13.751
UP 50%	15.928	17.249	18.492	21.843	14.511	12.901	7.319	14.156	12.763	11.634
DOWN 10%	23.512	25.071	26.538	30.488	21.843	20.044	13.505	20.586	18.366	16.613
DOWN 20%	25.446	27.066	28.588	32.686	23.712	21.843	15.055	22.197	19.752	17.831
DOWN 50%	33.925	35.799	37.557	42.275	31.915	29.744	21.843	29.156	25.666	22.985
LAG 1 YEAR	-	-	-	-	-	-	-	21.843	19.187	17.157
LAG 2 YEARS	-	-	-	-	-	-	-	-	21.843	19.187
LAG 3 YEARS	-	-	-	-	-	-	-	-	-	21.843

**Internal Rates of Return of Net Streams**  
=====

NBTOT                    21.85%

**SWITCHING VALUES AT 12%**  
=====

STREAM	APPRAISAL VALUE	SWITCHING VALUE	PERCENTAGE CHANGE
BTOT	11,470.20	5,660.59	-50.65%
CTOT	5,660.59	11,470.20	102.64%

Net Present Value at OCC 12% = 5,809.7  
Internal Rate of Return = 21.9%  
Coupon Equivalent Rate of Return = 24.7%

## ANNEX 1

### FINANCIAL AND ECONOMIC RE-EVALUATION

#### A. INTRODUCTION

1. This annex presents the financial and economic results of plantations undertaken under the National Social Forestry Project. Financial analysis was prepared, on a per hectare model, to assess the financial viability of investments undertaken by the farmers and the Forestry Department in each State - Rajasthan, Uttar Pradesh, Himachal Pradesh and Gujarat. Economic analysis was carried out to determine the economic profitability of the plantations to the states participating in the project. The financial and economic analysis have been undertaken in 1992/93 constant prices. In estimating production from farm forestry (the largest component of the project accounting for 76% of the total planted area), yields could only be based on notional area which is calculated by dividing the total number of seedlings issued to farmers by the average number of seedlings recommended for planting per hectare. Consequently, the results of the analysis would seem overly optimistic because wastage between time of issue and planting is ignored. This discrepancy is mitigated by carrying out a sensitivity analysis by reducing benefits up to 50% (see para 18).

2. Most of the farm forestry plantings have been found to be on field bunds and homesteads as many farmers could not plant their small land holdings and wait 5-15 years to receive a return. A certain percentage of larger farmers, (varying from an estimated 5% in Himachal Pradesh, 20% in Uttar Pradesh, 25% in Rajasthan to 60% in Gujarat) have, however, used their croplands for block planting of tree species such as eucalyptus and teak. Forest Department plantations have been on either community wasteland or degraded forest areas, which had, by and large, previously been subject to grazing. The opportunity cost of land in both cases have been incorporated into both analyses, although at appraisal, no land value had been imputed for community wastelands or degraded forest areas.

3. The annex is divided into two main sections; the first presenting the results and assumptions of the financial analysis, and the second, the assumptions and results of the economic analysis.

#### B. FINANCIAL ANALYSIS

##### General

4. At appraisal, the mix of plantation models was designed to emphasize the lower cost model (farm forestry), limit the high cost model (strip plantation) and promote more planting on wastelands to earn better returns. At Credit closing date, the farm forestry model has remained dominant in all states but has fallen short of appraisal expectations, except in Gujarat; wasteland plantings have exceeded the appraisal targets in all four states, and strip plantations have been well below the appraisal targets in Rajasthan and Gujarat but exceeded the original expectations in only Uttar Pradesh. The details are given in Part III/4A.

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5. The cash flows for typical plantation models also indicate the analyses of financial rates of return (FRRs) of the models. The detailed results are given in Tables 1A-D to 4A-D. As expected, farm forestry has achieved the highest FRRs.

6. Costs are calculated per hectare and 1992/93 prices are used for both costs and returns. Farmers' labour inputs and products accruing to rural households have been valued at imputed prices equal to market wage rate and output prices at stump. The market wage rate per person-day is taken at Rs40 (Rajasthan), Rs25 (Uttar Pradesh), Rs30 (Himachal Pradesh) and Rs32 (Gujarat), output prices are summarized in Table 5.

7. The results indicate acceptable to favourable FRRs for most models, ranging from 13.8% to 41.3%, except for strip plantations on government wastelands in Gujarat (1.7%), Rajasthan (6.6%) and Uttar Pradesh (10.2%); as well as community woodlot in Gujarat (9.2%), largely because of high investment costs.

#### Establishment Cost

8. Plantation establishment costs had obviously varied between plantation models within a state and between states, depending on different conditions, method of work and type of production units. However, on average, costs (per typical model) have been estimated based on data provided by the Forest Department of different states and updated to 1992/93 prices. The updated figures are provided in Tables 1A-D (Rajasthan), Tables 2A-D (Uttar Pradesh), Tables 3A-D (Himachal Pradesh) and Tables 4A-D (Gujarat). In summary, the total cost is estimated at:

	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
	..... Rs/ha .....			
<b>Establishment Cost</b>				
Farm forestry	6,267	4,631	2,898	7,185
Community woodlot	11,000	14,911	5,987	25,613 <sup>2/</sup>
Rehabilitation of degraded areas	6,500	13,808	6,025	11,077
Strip plantation	15,900	11,276	-	32,322
<sup>2/</sup> Average cost of rainfed plus irrigated.				

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### Plantation Maintenance Cost

9. Plantation maintenance is estimated at Rs90/ha/yr for plantations raised by the Forest Department. No maintenance, except for casualty replacement, has been assumed for farm forestry.

### Production Volume

10. Estimates of total production of major products are summarized below:

	Unit	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
Fuelwood	mt (million)	5.34	8.77	6.41	13.95
Poles	no. (million)	61.00	578.45	35.35	503.00
Timber	m <sup>3</sup> (million)	0.41	15.39	5.80	4.05
Grass	mt (million)	2.42	4.17	4.80	1.90
Leaf fodder	mt (million)	1.11	2.94	2.66	1.86

The above production has been based on annual planted areas shown in Table 1G (Rajasthan), 2G (Uttar Pradesh), 3F (Himachal Pradesh) and 4G (Gujarat).

### Output Prices

11. Prices used in calculating financial revenues are unit values which the producing unit expect to obtain at stump. Average 1992/93 prices prevailing in the respective project areas have been used, net of felling, handling and transportation costs. The resulting standing values are given in Table 5 and summarized below:

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	Unit	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
Fuelwood	mt	750	700	360 <sup>a/</sup> 520 <sup>b/</sup>	750
Fruit	mt	2,000	2,500	200	2,000
Poles	no.	30	35	30	30
Stemwood	m <sup>3</sup>	1,125	1,250	800	800
Grass	mt	200	300	400	450
Leaf fodder	mt	850	100	210	-

<sup>a/</sup> Conifer. <sup>b/</sup> Broadleaf.

The opportunity cost of land has been estimated at Rs1,000/ha/yr for agricultural fields used by farmers in block planting. Estimated area devoted to block planting varies from 5% (Himachal Pradesh), 20% (Uttar Pradesh), 25% (Rajasthan) to 60% (Gujarat). The opportunity cost of grass in government 'wastelands' is estimated at Rs100/ha/yr.

### Financial Rates of Return

12. Based on the foregoing, cost and revenue projections have been prepared with an assumed project life of 32 years. These are presented in Tables 1A-D to 4A-D and the results are summarized in Part III/6C.

## C. ECONOMIC RE-EVALUATION

### General

13. An economic re-evaluation has been carried out for the project as a whole and for each of the four state sub-projects. The main assumptions and estimates made in the SAR and PCR are set out below.

### Appraisal Estimates

14. At appraisal, the project's economic rate of return (ERR) was estimated to be 27% and for each of the four states at 17% (Rajasthan), 25% (Uttar Pradesh), 34% (Himachal Pradesh) and 26% (Gujarat), based on the following assumptions:

- (i) all costs taken are base costs, including physical contingencies;

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- (ii) investment costs are taken over project period (Years 1-6) including pre-project year (Year 0), and without replacements;
- (iii) 100% of staff costs for project period and 100% of extension staff costs for Years 7-15 have been taken; this provides for Forest Department's supervision and extension for individual schemes for at least ten years with eventual handing over to local beneficiaries or panchayats;
- (iv) 100% of other recurrent project costs for the project period and 100% of costs of extension components only in Years 7-15 for the reasons indicated in (iii) above; and
- (v) plantation recurrent costs are taken through Year 31.
- (vi) conversion factor for unskilled labour is 0.70 and standard conversion factor is 0.80.

#### PCR Estimates

15. The re-estimation of the ERRs follows SAR methodology. The main differences are:

- actual costs are used for project years FY1984-85 to 1992-93, with past expenditures restated in FY1992/93 constant prices using wholesale price index;
- all values are expressed in constant 1992/93 price terms, the project's completion year;
- opportunity cost of land valued at Rs1,000/ha/year for block planting by farmers and Rs100/ha/year for grazing lands on government wastelands;
- no benefits quantified for fuelwood plantations, silvi-pastoral plantation and tree tenure for the poor and landless and fuel saving devices because of the insufficient monitoring data and insignificant areas involved, less than 1% of total planted area;
- costs after project completion include 1% of the total expenditure for civil works as maintenance, 10% of staff salaries and 10% of vehicle

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and office operating costs of the year 1992/93 to continue, and Rs90/ha/yr as plantation maintenance for departmental plantations.

16. Phased investment costs in financial and economic values for the purpose of the analyses are shown in Table 1G (Rajasthan), Table 2G (Uttar Pradesh), Table 3G (Himachal Pradesh) and Table 4G (Gujarat).

17. Based on the above assumptions, the current estimate of ERRs for the project as a whole and each of the four states are 22% (whole project), 12% (Rajasthan), 28% (Uttar Pradesh), 13% (Himachal Pradesh) and 23% (Gujarat), (see Tables 1-4E) as compared with the appraisal estimates of 27%, 17%, 25%, 34% and 26% respectively. The special factors responsible for lower ERRs for Rajasthan and Himachal Pradesh are the higher cost increases of 111% and 113% compared to other states which had cost increases of 78% (Uttar Pradesh) and 29% (Gujarat). The principal factors which have contributed to the lower ERRs are the following:

- (i) lower yield expectations due to reduced survival rates - 30% (Rajasthan), 75% (Uttar Pradesh), 54% (Himachal Pradesh) and 18% (Gujarat), in contrast to the appraisal estimate of 80%;
- (ii) changes in species mix and effective densities; and
- (iii) overly optimistic MAI estimates at appraisal, in particular for Rajasthan and Gujarat.

However, increased planted area and high value product mix have not been high enough, except in Uttar Pradesh, to fully offset the above negative influences.

18. Sensitivity analysis was carried out for the project as a whole. The results show that a reduction in benefits by 20% or 50% will lower ERR to 18% or 12% respectively; while an increase in cost by 20% or 50% will lower ERR to 19% or 16% respectively. The project is not sensitive to variations in either costs or revenue. The results are presented in Table 7.

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Table 1A. Rajasthan: Farm Forestry - Financial Costs and Returns per Hectare (Rs)

	1	2	3	4	5	6-08	9	10-11	12	13-14	15	16	17
<b>Costs</b>													
Establish. & maint. costs 1/	5056.50	605.00	605.00	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land 2/	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
<b>Total costs</b>	<b>5306.50</b>	<b>855.00</b>	<b>855.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>
<b>Benefits</b>													
Fuelwood	-	-	-	-	202.50	202.50	915.00	202.50	7140.00	-	-	-	150.00
Poles	-	-	-	-	-	-	9000.00	-	-	-	-	-	-
Stemwood	-	-	-	-	-	-	-	-	-	-	1687.50	-	-
Pods	-	-	-	0.03	0.03	0.03	0.03	0.03	-	-	-	0.03	0.03
Leaf fodder	-	-	-	382.50	382.50	382.50	382.50	382.50	382.50	382.50	-	314.50	314.50
Grass	-	-	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	60.00	60.00	60.00
Fruit	-	-	-	-	-	300.00	300.00	300.00	300.00	300.00	300.00	300.00	300.00
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>100.00</b>	<b>482.53</b>	<b>685.03</b>	<b>985.03</b>	<b>10697.53</b>	<b>985.03</b>	<b>7922.50</b>	<b>782.50</b>	<b>2047.50</b>	<b>674.53</b>	<b>824.53</b>
<b>Net benefits</b>	<b>-5306.50</b>	<b>-855.00</b>	<b>-755.00</b>	<b>232.53</b>	<b>435.03</b>	<b>735.03</b>	<b>10447.53</b>	<b>735.03</b>	<b>7672.50</b>	<b>532.50</b>	<b>1797.50</b>	<b>424.53</b>	<b>574.53</b>
	18	19-23	24	25	26-29	30	31	32					
<b>Costs</b>													
Establish. & maint. costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	-	-	-	-
<b>Total costs</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>	<b>250.00</b>				
<b>Benefits</b>													
Fuelwood	720.00	150.00	4957.50	450.00	-	-	-	-	-	-	-	-	-
Poles	7200.00	-	-	5760.00	-	-	-	-	-	-	-	-	-
Stemwood	-	-	-	-	-	1350.00	-	-	-	-	-	-	-
Pods	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-
Leaf fodder	314.50	314.50	127.50	127.50	127.50	2550.00	2550.00	2720.00	-	-	-	-	-
Grass	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	60.00	-	-	-	-
Fruit	300.00	300.00	300.00	300.00	-	-	-	-	-	-	-	-	-
<b>Total benefits</b>	<b>8594.53</b>	<b>824.53</b>	<b>5445.00</b>	<b>6697.50</b>	<b>187.50</b>	<b>3960.00</b>	<b>2610.00</b>	<b>2780.00</b>					
<b>Net benefits</b>	<b>8344.53</b>	<b>574.53</b>	<b>5195.00</b>	<b>6447.50</b>	<b>-62.50</b>	<b>3710.00</b>	<b>2360.00</b>	<b>2530.00</b>					

FRR = 18.4%.

- 1/ In 1992/93 prices; bar grafting (Rs100), seedling transportation (Rs250), pit digging (Rs1,750), planting (Rs375), weeding and soil working (Rs500), watering (Rs125), fertilizer (Rs407) for Year 1, one weeding and watering (Rs605) each in Years 2 and 3.
- 2/ Estimated at Rs1,000/ha/year for block planting by farmers in about 25% of the planted

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Table 1B. Rajasthan: Community Woodlot - Financial Costs and Returns per Hectare (Rs)

	1	2	3	4	5-10	11	12	13-15	16-18	19-21	22	23	24	25-31	32
<b>Costs</b>															
Establish. & maint. costs <sup>1/</sup>	7000.00	3000.00	1000.00	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup>	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Total costs</b>	<b>7100.00</b>	<b>3100.00</b>	<b>1100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Benefits</b>															
Fuelwood	-	-	-	-	750.00	750.00	11850.00	-	600.00	600.00	9150.00	-	-	600.00	7650.00
Stemwood	-	-	-	-	-	-	4725.00	-	-	-	-	-	3712.50	-	-
Pods	-	-	-	-	0.07	0.07	-	-	0.04	0.04	0.04	0.04	-	-	-
Leaf fodder	-	-	-	255.00	255.00	255.00	-	-	195.50	195.50	127.50	127.50	127.50	680.00	680.00
Grass	-	-	140.00	140.00	140.00	400.00	400.00	400.00	400.00	300.00	300.00	300.00	300.00	300.00	300.00
Fruit	-	-	-	-	260.00	260.00	260.00	260.00	260.00	260.00	260.00	260.00	260.00	-	-
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>140.00</b>	<b>395.00</b>	<b>1405.07</b>	<b>1665.07</b>	<b>17235.00</b>	<b>660.00</b>	<b>1455.54</b>	<b>1355.54</b>	<b>9837.54</b>	<b>687.54</b>	<b>4400.00</b>	<b>1580.00</b>	<b>8630.00</b>
<b>Net benefits</b>	<b>-7100.00</b>	<b>-3100.00</b>	<b>-960.00</b>	<b>295.00</b>	<b>1305.07</b>	<b>1565.07</b>	<b>17135.00</b>	<b>560.00</b>	<b>1355.54</b>	<b>1255.54</b>	<b>9737.54</b>	<b>587.54</b>	<b>4300.00</b>	<b>1480.00</b>	<b>8530.00</b>

FRR = 13.99%.

<sup>1/</sup> See Table 1A.

<sup>2/</sup> Estimated at Rs100/ha/year on non-farm forestry land.

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Table 1C. Rajasthan: Rehabilitation of Degraded Forest - Financial Costs and Returns per Hectare (Rs)

	1	2	3	4	5	6-07	8	9-10	11	12	13-15	16	17-18
<b>Costs</b>													
Establish. & maint. costs	1/3000.00	2000.00	1000.00	250.00	250.00	-	-	-	-	-	-	-	-
Opportunity cost of land	2/100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Total costs</b>	<b>3100.00</b>	<b>2100.00</b>	<b>1100.00</b>	<b>350.00</b>	<b>350.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Benefits</b>													
Fuelwood	-	-	-	900.00	375.00	375.00	900.00	375.00	375.00	12375.00	-	825.00	300.00
Pods	-	-	-	0.01	0.01	0.01	0.01	0.01	-	-	-	0.01	0.01
Leaf fodder	-	-	-	170.00	170.00	170.00	170.00	170.00	-	-	-	170.00	170.00
Grass	-	-	80.00	80.00	80.00	80.00	80.00	80.00	200.00	200.00	200.00	200.00	200.00
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>80.00</b>	<b>1150.01</b>	<b>625.01</b>	<b>625.01</b>	<b>1150.01</b>	<b>625.01</b>	<b>575.00</b>	<b>12575.00</b>	<b>200.00</b>	<b>1195.01</b>	<b>670.01</b>
<b>Net benefits</b>	<b>-3100.00</b>	<b>-2100.00</b>	<b>-1020.00</b>	<b>800.01</b>	<b>275.01</b>	<b>525.01</b>	<b>1050.01</b>	<b>525.01</b>	<b>475.00</b>	<b>12475.00</b>	<b>100.00</b>	<b>1095.01</b>	<b>570.01</b>
	19	20	21	22	23	24	25-31	32					
<b>Costs</b>													
Establish. & maint. costs	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Total costs</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Benefits</b>													
Fuelwood	300.00	825.00	300.00	13500.00	300.00	525.00	-	13200.00	-	-	-	-	-
Pods	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-
Leaf fodder	170.00	170.00	170.00	170.00	170.00	170.00	-	-	-	-	-	-	-
Grass	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>Total benefits</b>	<b>570.01</b>	<b>1095.01</b>	<b>570.01</b>	<b>13770.01</b>	<b>570.01</b>	<b>795.01</b>	<b>100.00</b>	<b>13300.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>
<b>Net benefits</b>	<b>470.01</b>	<b>995.01</b>	<b>470.01</b>	<b>13670.01</b>	<b>470.01</b>	<b>695.01</b>	<b>-</b>	<b>13200.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

FRR = 15.67%.

1/ See Table 1A. 2/ See Table 1B.

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Table 10. Rajasthan: Strip Plantations - Financial Costs and Returns per Hectare (Rs)

	1	2	3	4	5-10	11	12	13-14	15	16-17	18	19-21
<b>Costs</b>												
Establish. & maint. costs	115900.000	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup>	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
<b>Total costs</b>	<b>16000.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>
<b>Benefits</b>												
Fuelwood	-	-	-	-	750.000	750.000	7140.000	-	-	900.000	900.000	900.000
Stemwood	-	-	-	-	-	-	-	-	7087.500	-	-	-
Pods	-	-	-	-	0.135	0.135	-	-	-	0.108	0.108	0.108
Leaf fodder	-	-	-	127.500	127.500	127.500	127.500	127.500	-	-	85.000	85.000
Grass	-	-	40.000	40.000	40.000	80.000	80.000	80.000	80.000	80.000	80.000	100.000
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>40.000</b>	<b>167.500</b>	<b>917.635</b>	<b>957.635</b>	<b>7347.500</b>	<b>207.500</b>	<b>7167.500</b>	<b>980.108</b>	<b>1065.108</b>	<b>1085.108</b>
<b>Net benefits</b>	<b>-16000.000</b>	<b>-100.000</b>	<b>-60.000</b>	<b>67.500</b>	<b>817.635</b>	<b>857.635</b>	<b>7247.500</b>	<b>107.500</b>	<b>7067.500</b>	<b>880.108</b>	<b>965.108</b>	<b>985.108</b>
	22	23	24-25	26-29	30	31	32					
<b>Costs</b>												
Establish. & maint. costs	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
<b>Total costs</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>	<b>100.000</b>
<b>Benefits</b>												
Fuelwood	5707.500	-	-	-	-	-	5707.500	-	-	-	-	-
Stemwood	-	-	-	-	9450.000	-	-	-	-	-	-	-
Pods	0.108	0.108	-	-	-	-	-	-	-	-	-	-
Leaf fodder	85.000	85.000	85.000	-	-	-	-	-	-	-	-	-
Grass	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000	100.000
<b>Total benefits</b>	<b>5892.608</b>	<b>185.108</b>	<b>185.000</b>	<b>100.000</b>	<b>9550.000</b>	<b>100.000</b>	<b>5807.500</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>
<b>Net benefits</b>	<b>5792.608</b>	<b>85.108</b>	<b>85.000</b>	<b>-</b>	<b>9450.000</b>	<b>-</b>	<b>5707.500</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>-</b>

FRR = 6.6%.

<sup>1/</sup> See Table 1A. <sup>2/</sup> See Table 1B.

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Table 1E. Rajasthan: Economic Analysis - Total Project (Rs million)

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>Costs</b>																
Farm forestry establish.	1/	-	70.30	54.60	49.80	44.20	54.90	57.00	40.20	5.20	2.10	-	-	-	-	-
Opportunity cost of land	2/	-	4.80	8.40	12.00	14.90	19.10	23.50	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10
Investment costs	3	41.79	66.70	88.71	75.26	102.22	150.64	139.37	136.30	3.63	3.63	3.63	3.63	3.63	3.63	3.63
Total costs		41.79	141.80	151.71	137.06	161.32	224.64	219.87	202.60	34.93	31.83	29.73	29.73	29.73	29.73	29.73
<b>Benefits</b>																
Farm forestry		-	-	-	1.39	7.69	15.15	25.31	33.91	42.77	186.42	155.99	145.31	236.07	227.84	218.29
Rehab. of Degraded Forest		-	-	-	0.25	3.85	5.51	10.44	10.92	18.44	20.97	25.55	21.00	60.71	52.89	88.18
Community Woodlot		-	-	-	0.11	0.43	1.83	3.51	7.39	10.46	17.21	20.47	22.10	34.79	34.70	64.55
Strip Plantations		-	-	0.01	0.07	0.35	0.91	1.16	1.34	1.51	1.76	1.80	3.41	6.08	3.02	3.96
Improved Grafted Orchards		-	-	-	0.00	0.06	0.13	0.18	0.24	0.28	0.36	0.43	0.43	0.43	0.43	0.43
Total benefits		-	-	0.01	1.82	12.38	23.53	40.60	53.80	73.47	226.71	204.25	192.25	338.08	318.87	375.40
Net benefits		-41.79	-141.80	-151.70	-135.24	-148.94	-201.11	-179.27	-148.80	38.54	194.88	174.52	162.52	308.35	289.14	345.67

ERR = 12.1%.

- 1/ Planting costs as in Table 1A, except seedling price, to avoid double counting.  
2/ Based on 25% block planting by farmers at Rs1,000/ha/yr plus Rs100/ha/yr on other lands.  
3/ See Table 1F.

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Table 1E. Rajasthan: Economic Analysis - Total Project (Rs million)

(Page 2)

	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
<b>Costs</b>																
Farm forestry establish.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10
Investment costs	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63
<b>Total costs</b>	<b>29.73</b>															
<b>Benefits</b>																
Farm forestry	137.18	136.55	217.88	142.60	131.02	120.98	130.66	134.27	171.48	182.52	143.49	124.42	124.85	134.69	166.72	127.58
Rehab. of Degraded Forest	93.41	78.77	81.81	14.17	20.52	21.64	67.25	55.85	97.99	56.47	104.32	83.87	84.24	9.42	6.92	3.15
Community Woodlot	110.27	60.58	37.15	14.61	19.11	21.12	28.92	27.81	46.50	31.98	77.88	46.23	49.95	31.46	28.60	24.62
Strip Plantations	5.48	3.16	2.94	3.98	2.36	3.47	5.23	2.69	2.03	1.62	2.19	0.57	0.43	2.52	6.71	4.31
Improved Grafted Orchards	0.45	0.48	0.51	0.53	0.56	0.59	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62
<b>Total benefits</b>	<b>346.79</b>	<b>279.54</b>	<b>340.28</b>	<b>175.91</b>	<b>173.56</b>	<b>167.80</b>	<b>232.68</b>	<b>221.25</b>	<b>318.62</b>	<b>273.21</b>	<b>328.50</b>	<b>255.71</b>	<b>260.09</b>	<b>178.72</b>	<b>209.57</b>	<b>160.28</b>
<b>Net benefits</b>	<b>317.06</b>	<b>249.81</b>	<b>310.55</b>	<b>146.18</b>	<b>143.83</b>	<b>138.07</b>	<b>202.95</b>	<b>191.52</b>	<b>288.89</b>	<b>243.48</b>	<b>298.77</b>	<b>225.98</b>	<b>230.36</b>	<b>148.99</b>	<b>179.84</b>	<b>130.55</b>
<b>Costs</b>																
Farm forestry establish.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10	26.10
Investment costs	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63	3.63
<b>Total costs</b>	<b>29.73</b>															
<b>Benefits</b>																
Farm forestry	104.33	84.87	85.54	88.64	80.76	45.96	18.74	-	-	-	-	-	-	-	-	-
Rehab. of Degraded forest	44.87	38.18	77.96	38.57	86.68	71.78	72.09	-	-	-	-	-	-	-	-	-
Community Woodlot	30.27	29.00	41.48	26.12	56.44	27.02	12.19	-	-	-	-	-	-	-	-	-
Strip Plantations	6.03	3.26	4.26	1.42	2.17	0.28	0.19	-	-	-	-	-	-	-	-	-
Improved Grafted Orchards	0.62	0.54	0.44	0.36	0.28	0.21	0.10	-	-	-	-	-	-	-	-	-
<b>Total benefits</b>	<b>186.11</b>	<b>155.86</b>	<b>209.68</b>	<b>155.11</b>	<b>226.33</b>	<b>145.25</b>	<b>103.30</b>	<b>-</b>								
<b>Net benefits</b>	<b>156.38</b>	<b>126.13</b>	<b>179.95</b>	<b>125.38</b>	<b>196.60</b>	<b>115.52</b>	<b>73.57</b>	<b>-29.73</b>	<b>-</b>							

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Table 1F. Rajasthan - Investment Costs in Financial and Economic Terms (Rs million)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Plantation Activities	19.35	35.00	55.13	46.74	70.81	123.10	124.74	134.45
CF = 0.70	13.54	24.50	38.59	32.72	49.57	85.47	87.32	94.11
Civil Works	2.03	2.00	1.27	0.04	0.20	4.04	6.66	3.63
CF = 0.66	1.34	1.32	0.84	0.03	0.14	2.67	4.39	2.39
Vehicles, Furniture & Equip.	4.05	3.12	0.23	0.09	1.67	4.13	2.73	3.50
CF = 0.66	2.67	2.06	0.15	0.06	1.10	2.72	1.80	2.31
Training Overseas, Research, Special Study & Evaluation	-	0.11	0.31	0.10	1.35	2.05	1.13	0.76
CF = 0.97	-	0.10	0.30	0.10	1.31	1.99	1.10	0.74
Staff Salary & Travelling Allowance CF = 1.00	4.32	9.19	13.85	16.01	19.58	23.85	27.82	32.65
Building Rent & Maintenance	-	0.10	0.10	0.18	0.18	0.36	0.31	0.42
CF = 0.84	-	0.08	0.08	0.15	0.15	0.30	0.26	0.35
Vehicle Operating Expenses	0.13	0.34	0.57	0.62	0.80	1.00	1.19	1.28
CF = 0.80	0.10	0.27	0.46	0.50	0.64	0.80	0.95	1.02
Office and Other Expenses	1.10	0.90	0.97	0.77	1.03	1.97	1.74	1.58
CF = 0.84	0.92	0.76	0.81	0.65	0.86	1.65	1.46	1.33
Farmers Meeting & Study Tours	0.05	0.38	0.55	0.41	0.61	0.88	1.60	1.42
CF = 0.97	0.05	0.37	0.53	0.40	0.59	0.85	1.55	1.38
Crenatoria	0.03	0.17	0.23	0.29	0.17	0.27	0.07	0.08
CF = 0.79	0.02	0.13	0.18	0.23	0.13	0.21	0.05	0.06
<b>Total Financial Cost</b>	<b>31.06</b>	<b>51.41</b>	<b>73.21</b>	<b>65.25</b>	<b>96.40</b>	<b>160.65</b>	<b>167.99</b>	<b>179.77</b>
<b>Total Economic Cost</b>	<b>22.96</b>	<b>38.78</b>	<b>55.79</b>	<b>50.85</b>	<b>74.07</b>	<b>120.51</b>	<b>126.70</b>	<b>136.34</b>
<b>MP1</b>	<b>1.82</b>	<b>1.72</b>	<b>1.59</b>	<b>1.48</b>	<b>1.38</b>	<b>1.25</b>	<b>1.10</b>	<b>1.00</b>
<b>Total Economic Cost in 1992-93 Constant Prices</b>	<b>41.79</b>	<b>66.70</b>	<b>88.71</b>	<b>75.26</b>	<b>102.22</b>	<b>150.64</b>	<b>139.37</b>	<b>136.34</b>

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Table 1G. Rajasthan- Physical Phasing of Plantations (ha)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	Total
Farm Forestry (Sub-total)	-	17,347	12,452	10,508	9,537	12,336	12,755	8,425	83,360
Improved Ber Grafting	-	450	590	440	470	400	620	600	3,570
Household Farm Forestry	-	191	255	224	50	50	26	50	846
Community Woodlots	-	1,002	1,002	3,438	1,485	7,195	3,590	1,765	19,477
Rehabilitation of Degraded Forests	-	3,950	3,347	7,139	3,463	8,045	6,695	6,775	39,414
Strip Plantations	303	860	360	255	200	400	60	40	2,478
Sub-total	303	6,453	5,554	11,496	5,668	16,090	10,991	9,230	65,785
Total Area Planted	303	23,800	18,006	22,004	15,205	28,426	23,746	17,655	149,145

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Table 2A. Uttar Pradesh: Farm Forestry - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4-07	8	9-11	12	13-14	15	16	17-18	19-23	24	25-29	30-31	32
<b>Costs</b>																
Planting costs <sup>1/</sup>	3.871	0.380	0.380	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup>	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200	0.200
<b>Total costs</b>	<b>4.071</b>	<b>0.580</b>	<b>0.580</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>	<b>0.200</b>
<b>Benefits</b>																
Fuelwood	-	-	-	0.105	4.445	0.105	0.406	0.105	1.358	3.738	-	0.490	3.535	0.049	1.064	0.049
Poles	-	-	-	-	32.795	-	-	-	-	25.200	-	-	22.680	-	-	-
Stemwood	-	-	-	-	5.037	-	12.125	-	3.375	8.050	-	-	13.800	-	-	14.525
Leaf fodder	-	-	-	0.060	0.060	0.060	0.060	0.060	-	-	0.030	0.030	0.010	0.010	0.010	0.010
Grass	-	-	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.060	0.060	0.060	0.060	0.060	0.060	0.060
Fruit	-	-	-	-	1.250	1.250	1.250	1.250	1.250	1.250	0.750	0.750	0.250	0.250	0.250	0.250
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>0.090</b>	<b>0.255</b>	<b>43.677</b>	<b>1.505</b>	<b>13.931</b>	<b>1.505</b>	<b>6.073</b>	<b>38.298</b>	<b>0.840</b>	<b>1.330</b>	<b>40.335</b>	<b>0.369</b>	<b>1.384</b>	<b>14.894</b>
<b>Net benefits</b>	<b>-4.071</b>	<b>-0.580</b>	<b>-0.490</b>	<b>0.055</b>	<b>43.477</b>	<b>1.305</b>	<b>13.731</b>	<b>1.305</b>	<b>5.873</b>	<b>38.098</b>	<b>0.640</b>	<b>1.130</b>	<b>40.135</b>	<b>0.169</b>	<b>1.184</b>	<b>14.694</b>

FRR = 41.3%.

<sup>1/</sup> In 1992/93 prices; includes Rs1,533.25 (seedlings average price for mix of seedlings of 2,500), Rs292.89 (transportation), Rs965.25 (pit digging), Rs450 (planting), Rs280 (weeding and soil working), Rs70 (watering) and Rs180 (fertilizer application) for Year 1, Rs380 (weeding and watering) for Year 2 and 3 each.

<sup>2/</sup> Block planting by farmers assumed at 20% of the area, with opportunity cost of Rs1,600/ha/year.

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Table 2B. Uttar Pradesh: Community Woodlot - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5-09	10	11	12	13-14	15	16-17	18-19	20	21-23	24	25-29	30	31	32
<b>Costs</b>																			
Establish. & maint. costs <sup>1/</sup> 8.867	2.328	2.908	0.808	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup> 0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>Total costs</b>	<b>8.967</b>	<b>2.428</b>	<b>3.008</b>	<b>0.908</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>
<b>Benefits</b>																			
Fuelwood	-	-	-	0.350	1.652	0.350	7.000	-	1.309	0.245	0.245	1.316	0.245	4.200	-	1.897	-	-	-
Poles	-	-	-	-	5.600	-	-	-	-	-	-	-	4.480	-	-	-	-	4.025	-
Stemwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leaf fodder	-	-	-	0.100	0.100	0.100	0.050	0.050	0.050	0.050	0.050	0.100	0.100	0.050	0.050	0.050	0.050	0.050	0.050
Grass	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.450	0.450	0.450	0.450	0.450	0.300	0.300	0.300	0.300	0.300	0.300	0.300
Fruit	-	-	-	-	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	-	-	-	-	-	-
<b>Total benefits</b>	<b>0.300</b>	<b>0.300</b>	<b>0.300</b>	<b>0.750</b>	<b>8.152</b>	<b>1.250</b>	<b>7.850</b>	<b>1.000</b>	<b>30.909</b>	<b>1.245</b>	<b>1.295</b>	<b>6.696</b>	<b>0.645</b>	<b>4.550</b>	<b>0.350</b>	<b>2.247</b>	<b>4.375</b>	<b>0.350</b>	<b>0.350</b>
<b>Net benefits</b>	<b>-8.967</b>	<b>-2.128</b>	<b>-2.708</b>	<b>-0.608</b>	<b>8.052</b>	<b>1.150</b>	<b>7.750</b>	<b>0.900</b>	<b>30.809</b>	<b>1.145</b>	<b>1.195</b>	<b>6.596</b>	<b>0.545</b>	<b>4.450</b>	<b>0.250</b>	<b>2.147</b>	<b>4.275</b>	<b>0.250</b>	<b>0.250</b>

FRR = 13.8%.

<sup>1/</sup> Costs based on figures provided by Forestry Department for a typical hectare and updated to 1992/93 prices.

<sup>2/</sup> Estimated at Rs100/ha/year.

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Table 2C. Uttar Pradesh: Rehabilitation of Degraded Forest - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5	6-09	10	11	12-14	15	16-18	19	20	21-29	30	31	32
<b>Costs</b>																	
Establish. & maint. costs <sup>1/</sup>	5.123	5.084	1.632	1.969	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup>	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>Total costs</b>	<b>5.223</b>	<b>5.184</b>	<b>1.732</b>	<b>2.069</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>
<b>Benefits</b>																	
Fuelwood	-	-	-	-	0.161	0.994	0.994	0.994	0.861	0.861	0.861	0.861	5.628	0.070	0.070	0.070	6.083
Poles	-	-	-	-	-	-	3.150	-	-	-	-	-	2.800	-	2.800	-	-
Stemwood	-	-	-	-	-	-	-	-	-	15.787	-	26.250	-	-	12.625	-	35.337
Grass	-	-	0.150	0.150	0.150	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300	0.300
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>0.150</b>	<b>0.150</b>	<b>0.311</b>	<b>1.294</b>	<b>4.444</b>	<b>1.294</b>	<b>1.161</b>	<b>16.948</b>	<b>1.161</b>	<b>27.411</b>	<b>8.728</b>	<b>0.370</b>	<b>15.795</b>	<b>0.370</b>	<b>41.720</b>
<b>Net benefits</b>	<b>-5.223</b>	<b>-5.184</b>	<b>-1.582</b>	<b>-1.919</b>	<b>0.211</b>	<b>1.194</b>	<b>4.344</b>	<b>1.194</b>	<b>1.061</b>	<b>16.848</b>	<b>1.061</b>	<b>27.311</b>	<b>8.628</b>	<b>0.270</b>	<b>15.695</b>	<b>0.270</b>	<b>41.620</b>

FRR = 13.9%.

<sup>1/</sup> In 1992/93 prices.

<sup>2/</sup> See Table 2B.

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Table 20. Uttar Pradesh: Strip Plantations - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4-09	10	11-12	13-14	15	16	17-19	20	21-24	25-29	30	31	32
<b>Costs</b>																
Establish. & maint. costs	1/6.123	5.153	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	2/0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>Total costs</b>	<b>6.223</b>	<b>5.253</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>
<b>Benefits</b>																
Fuelwood	-	-	-	0.070	0.070	0.070	0.070	2.450	0.350	0.350	0.350	0.350	0.350	0.490	-	13.300
Poles	-	-	-	-	7.000	-	-	-	-	-	4.200	-	-	4.200	-	-
Steewood	-	-	-	-	-	-	-	11.637	-	-	-	-	-	8.125	-	20.000
Leaf fodder	-	-	-	0.025	0.025	0.025	0.025	0.025	0.013	0.013	0.013	0.013	0.013	0.013	0.013	0.013
Grass	-	-	0.150	0.150	0.150	0.150	0.120	0.120	0.120	0.060	0.060	0.060	0.030	0.030	0.030	0.030
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>0.150</b>	<b>0.245</b>	<b>7.245</b>	<b>0.245</b>	<b>0.215</b>	<b>14.232</b>	<b>0.483</b>	<b>0.423</b>	<b>4.623</b>	<b>0.423</b>	<b>0.393</b>	<b>12.858</b>	<b>0.043</b>	<b>33.343</b>
<b>Net benefits</b>	<b>-6.223</b>	<b>-5.253</b>	<b>0.050</b>	<b>0.145</b>	<b>7.145</b>	<b>0.145</b>	<b>0.115</b>	<b>14.132</b>	<b>0.383</b>	<b>0.323</b>	<b>4.523</b>	<b>0.323</b>	<b>0.293</b>	<b>12.758</b>	<b>-0.057</b>	<b>33.243</b>

FRR = 10.2%.

1/ and 2/ See Table 20.

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Table 2E. Uttar Pradesh: Economic Analysis - Total Project (Rs million)

(Page 1)

	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Costs</b>													
Farm Forestry establish. 1/	-	75.200	52.200	60.100	76.200	80.100	92.800	58.600	54.100	12.200	6.100	-	-
Opportunity cost of land 2/	-	7.600	12.000	16.300	22.800	29.800	37.300	41.600	45.700	45.700	45.700	45.700	45.700
Investment costs 3/	78.400	205.100	196.900	255.500	332.000	387.700	433.700	332.800	298.600	12.200	12.200	12.200	12.200
<b>Total costs</b>	<b>78.400</b>	<b>287.900</b>	<b>261.100</b>	<b>331.900</b>	<b>431.000</b>	<b>497.600</b>	<b>563.800</b>	<b>433.000</b>	<b>398.400</b>	<b>70.100</b>	<b>64.000</b>	<b>57.900</b>	<b>57.900</b>
<b>Benefits</b>													
Farm Forestry	-	-	3.024	10.152	14.688	20.200	27.340	1493.836	847.797	897.051	1350.784	1803.297	1813.171
Rehab. of Degraded forest	-	-	0.575	1.216	2.125	7.206	12.577	15.979	21.887	41.072	48.774	47.386	58.195
Community Woodlot	-	0.576	1.034	1.761	3.607	5.677	7.566	10.006	12.739	28.144	27.663	48.692	53.159
Strip Plantations	-	-	0.514	1.279	1.813	2.264	2.916	3.559	4.155	28.601	25.320	16.724	18.167
<b>Total benefits</b>	-	<b>0.576</b>	<b>5.147</b>	<b>14.408</b>	<b>22.233</b>	<b>35.348</b>	<b>50.399</b>	<b>1523.380</b>	<b>886.578</b>	<b>994.868</b>	<b>1452.541</b>	<b>1916.100</b>	<b>1942.692</b>
<b>Net benefits</b>	<b>-78.400</b>	<b>-287.324</b>	<b>-255.953</b>	<b>-317.492</b>	<b>-408.767</b>	<b>-462.252</b>	<b>-513.401</b>	<b>1090.380</b>	<b>488.178</b>	<b>924.768</b>	<b>1388.541</b>	<b>1858.200</b>	<b>1884.792</b>

ERR = 27.7%.

1/ Financial costs of Rs2,239/ha (excluding seedling costs) for Year 1, Rs380 for Year 2 and Rs390 for Year 3, adjusted by SCF (0.8) for planted area in Table 2G.

2/ Based on 25% block planting by farmers on agricultural land with an opportunity cost of Rs1,000/ha/yr plus Rs100/ha/yr opportunity cost on other 'wasteland'.

3/ See Table 2F.

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Table 2E. Uttar Pradesh: Economic Analysis - Total Project (Rs million)

(Page 2)

	14	15	16	17	18	19	20	21	22	23	24	25	26	
<b>Costs</b>														
Farm forestry establish.	-	-	-	-	-	-	-	-	-	-	-	-	-	
Opportunity cost of land	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	
Investment costs	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	
Total costs	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	
<b>Benefits</b>														
Farm Forestry	1165.667	1461.666	1949.556	1390.666	1245.027	1612.417	1421.728	1486.143	890.414	820.253	1546.724	898.201	909.947	
Renab. of Degraded forest	62.647	121.811	129.437	87.262	108.017	231.586	268.546	214.282	228.903	214.194	215.939	220.646	180.999	
Community Woodlot	70.177	120.522	122.741	129.889	143.910	177.128	115.565	129.631	103.924	41.875	54.605	39.134	43.436	
Strip Plantations	26.457	68.706	64.086	40.993	33.105	50.220	53.870	55.034	37.660	16.448	21.379	17.859	18.608	
Total benefits	1324.948	1772.706	2265.820	1648.810	1530.059	2071.350	1859.708	1885.090	1260.901	1092.771	1838.647	1175.840	1152.989	
Net benefits	1267.048	1714.806	2207.920	1590.910	1472.159	2013.450	1801.808	1827.190	1203.001	1034.871	1780.747	1117.940	1095.089	
	27	28	29	30	31	32	33	34	35	36	37	38	39	40
<b>Costs</b>														
Farm forestry establish.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700	45.700
Investment costs	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200	12.200
Total costs	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900
<b>Benefits</b>														
Farm forestry	1277.359	1250.451	1379.563	759.397	761.777	594.183	359.941	371.212	511.890	489.392	520.933	260.679	238.483	-
Renab. of Degraded forest	49.907	13.179	13.179	72.262	79.160	201.566	253.205	178.223	266.485	333.229	298.638	246.175	183.337	-
Community Woodlot	38.441	29.380	20.433	25.456	27.501	18.390	22.929	28.356	29.190	21.276	19.960	10.745	0.769	-
Strip Plantations	14.736	7.962	7.868	50.479	43.092	140.730	126.408	99.633	95.678	137.123	97.679	83.720	53.322	-
Total benefits	1380.443	1300.972	1421.043	907.594	911.531	954.869	762.483	677.424	903.242	981.021	937.210	601.319	475.911	-
Net benefits	1322.543	1243.072	1363.143	849.694	853.631	896.969	704.583	619.524	845.342	923.121	879.310	543.419	418.011	-57.900

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Table 2F. Uttar Pradesh - Investment Costs in Financial and Economic Terms (Rs million)

	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Field Activities (including nurseries) CF = 0.70	37.80	82.40	81.30	101.80	166.60	219.50	317.30	259.90	221.10
Incremental Salaries (CF = 1)	12.10	33.80	8.20	19.50	28.30	40.10	43.40	57.80	75.80
Travelling Allowance (CF = 1)	-	3.60	4.30	5.20	6.70	9.40	9.50	9.80	12.80
Civil Works, incl. maint. CF = 0.66	-	9.30	43.90	60.00	69.30	24.60	53.50	31.60	31.60
Vehicles, Furniture & Equip. CF = 0.66	-	4.70	8.30	14.90	11.00	12.30	3.00	1.70	1.90
Operating Costs CF = 0.80	3.40	9.00	12.30	17.00	21.60	60.70	36.80	33.20	32.20
Consultants, Training & Studies, Research CF = 0.97	-	1.20	0.80	1.80	2.50	5.00	5.40	4.60	6.90
	-	1.16	0.78	1.75	2.42	4.85	5.24	4.46	6.69
<b>Total Financial Cost</b>	<b>53.30</b>	<b>144.00</b>	<b>159.10</b>	<b>220.20</b>	<b>306.00</b>	<b>371.60</b>	<b>468.90</b>	<b>398.60</b>	<b>383.30</b>
<b>Total Economic Cost</b>	<b>41.28</b>	<b>112.68</b>	<b>114.48</b>	<b>160.74</b>	<b>224.32</b>	<b>280.92</b>	<b>346.98</b>	<b>302.53</b>	<b>298.63</b>
<b>WPI</b>	<b>1.90</b>	<b>1.82</b>	<b>1.72</b>	<b>1.59</b>	<b>1.48</b>	<b>1.38</b>	<b>1.25</b>	<b>1.10</b>	<b>1.00</b>
<b>Economic Cost in 1992-93 Prices</b>	<b>78.43</b>	<b>205.08</b>	<b>196.90</b>	<b>255.58</b>	<b>331.99</b>	<b>387.67</b>	<b>433.72</b>	<b>332.78</b>	<b>298.63</b>

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Table 2G. Uttar Pradesh - Physical Phasing of Plantations (ha)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	Total
Farm forestry	42,000	22,000	22,667	35,000	35,000	40,000	20,018	20,015	236,700
<b>Public Lands</b>									
Tree tenure on Government lands	-	-	-	162	397	146	231	-	935
Community Woodlots - Rainfed	2,399	1,911	3,027	4,093	5,760	3,331	4,025	2,748	27,294
Rehabilitation of Degraded Forests	4,788	5,347	2,431	5,232	7,101	6,803	7,327	5,493	44,522
Strip Plantations	4,280	3,667	2,132	2,408	3,904	2,887	3,136	1,999	24,414
<b>Total Plantations on Public Land</b>	<b>11,467</b>	<b>10,925</b>	<b>7,590</b>	<b>11,895</b>	<b>17,162</b>	<b>13,167</b>	<b>14,719</b>	<b>10,240</b>	<b>97,165</b>
<b>Total Plantations</b>	<b>53,467</b>	<b>32,925</b>	<b>30,257</b>	<b>46,895</b>	<b>52,162</b>	<b>53,167</b>	<b>34,737</b>	<b>30,255</b>	<b>333,865</b>

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Table 3A. Himachal Pradesh: Farm Forestry - Financial Rate of Return per Hectare (Rs)

	1	2	3-07	8	9	10-14	15	16	17-19	20	21-23	24	25-31	32
Fuelwood conifer	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
Fuelwood, broadleaves	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00
Leaf fodder	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00
Fruit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Poles	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Stemwood	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Fuelwood conifer (mt)	-	-	-	-	-	0.20	0.20	0.30	0.30	0.30	0.30	0.30	0.10	0.10
Fuelw. broadleaves (mt)	-	-	-	10.61	0.25	0.25	2.74	10.49	0.22	0.22	0.22	6.75	-	5.00
Poles (No.)	-	-	-	80.00	-	-	-	80.00	-	-	-	64.00	-	-
Leaf fodder (mt)	-	-	0.70	1.40	1.40	1.40	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70
Stemwood (m3)	-	-	-	-	-	-	-	16.66	-	3.83	-	4.84	-	5.89
Fruit (ct)	-	-	-	0.30	0.30	0.30	0.30	0.30	0.10	0.10	-	-	-	-
Fuelwood conif. benefits	-	-	-	-	-	72.00	72.00	108.00	108.00	108.00	108.00	108.00	36.00	36.00
Fuelw. broadlea. benefits	-	-	-	5517.20	130.00	130.00	1424.80	5454.80	114.40	114.40	114.40	3510.00	-	2600.00
Poles benefits	-	-	-	2400.00	-	-	-	2400.00	-	-	-	1920.00	-	-
Leaf fodder benefits	-	-	147.00	294.00	294.00	294.00	147.00	147.00	147.00	147.00	147.00	147.00	147.00	147.00
Stemwood benefits	-	-	-	-	-	-	-	13328.00	-	3064.00	-	3872.00	-	4712.00
Total benefits	-	-	147.00	8211.20	424.00	496.00	1643.80	21437.80	369.40	3433.40	369.40	9557.00	183.00	7495.00
Seedl. & maintenance cost <sup>1/</sup>	2898.00	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
Net benefits	-2948.00	-50.00	97.00	8161.20	374.00	446.00	1593.80	21387.80	319.40	3383.40	319.40	9507.00	133.00	7445.00

FRR = 25.7%.

<sup>1/</sup> Comprising seedling price at Rs30/seedling for 1,800 plants, transportation at Rs0.07/seedling for Rs126, pit digging for 1,800 plants at Rs0.53/plant for Rs954, planting at Rs0.26/plant for Rs468 and fertilizer application at Rs0.45/plant for Rs810. No casualty replacement.

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Table 38. Himachal Pradesh: Community Woodlot - Financial Rate of Return per Hectare (Rs)

(Page 1)

	1	2	3	4	5	6-07	8	9	10	11-15	16	17	18
Fuelwood conifer	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
Fuelwood, broadleaves	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00
Leaf fodder	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00
Grass	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Poles	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Stemwood	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Fuelwood conifer (mt)	-	-	-	-	-	-	-	-	0.10	0.10	0.25	0.25	0.25
Fuelw. broadleaves (mt)	-	-	-	0.42	0.42	0.42	14.54	-	-	0.44	15.54	-	0.46
Large poles (No.)	-	-	-	-	-	-	100.00	-	-	-	100.00	-	-
Grass (mt)	-	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	2.00	2.00	2.00	2.00
Leaf fodder (mt)	-	-	0.95	0.95	0.95	0.95	-	-	-	0.80	-	-	-
Stemwood conifer (m3)	-	-	-	-	-	-	-	-	-	-	-	-	-
Stemwood broadl. (m3)	-	-	-	-	-	-	-	-	-	-	-	-	-
Fuelwood conif. benefits	-	-	-	-	-	-	-	-	36.00	36.00	90.00	90.00	90.00
Fuelw. broadl. benefits	-	-	-	218.40	218.40	218.40	7560.80	-	-	228.80	8080.80	-	239.20
Large poles benefits	-	-	-	-	-	-	3000.00	-	-	-	3000.00	-	-
Leaf fodder benefits	-	-	199.50	199.50	199.50	199.50	-	-	-	168.00	-	-	-
Grass benefits	-	-	40.00	40.00	40.00	40.00	40.00	40.00	40.00	800.00	800.00	800.00	800.00
Stemwood conif. benefits	-	-	-	-	-	-	-	-	-	-	-	-	-
Stemwood broadl. benefits	-	-	-	-	-	-	-	-	-	-	-	-	-
Total benefits	-	-	239.50	457.90	457.90	457.90	10600.80	40.00	76.00	1232.80	11970.80	890.00	1129.20
Costs	4373.00	570.00	400.00	338.00	306.00	-	-	-	-	-	-	-	-
Opportunity cost of land	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Net benefits	-4473.00	-670.00	-260.50	19.90	51.90	357.90	10500.80	-60.00	-24.00	1132.80	11870.80	790.00	1029.20

FRR = 20.8%.

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Table 3B. Himachal Pradesh: Community Woodlot - Financial Rate of Return per Hectare (Rs)

(Page 2)

	19	20	21-23	24	25	26-29	30	31	32
Fuelwood conifer	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
Fuelwood, broadleaves	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00
Leaf fodder	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00	210.00
Grass	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Poles	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Stemwood	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Fuelwood conifer (mt)	0.25	0.25	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Fuelw. broadleaves (mt)	0.46	0.46	0.46	13.14	0.10	0.10	0.10	0.10	0.10
Large poles (No.)	-	-	-	100.00	-	-	-	-	-
Grass (mt)	2.00	2.00	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Leaf fodder (mt)	0.80	0.80	0.80	-	-	0.20	0.20	0.20	0.20
Stemwood conifer (m3)	-	10.56	-	-	-	-	5.28	-	5.28
Stemwood broadl. (m3)	-	10.00	-	-	-	-	-	-	-
Fuelwood conif. benefits	90.00	90.00	36.00	36.00	36.00	36.00	36.00	36.00	36.00
Fuelw. broadl. benefits	239.20	239.20	239.20	6832.80	52.00	52.00	52.00	52.00	52.00
Large poles benefits	-	-	-	3000.00	-	-	-	-	-
Leaf fodder benefits	168.00	168.00	168.00	-	-	42.00	42.00	42.00	42.00
Grass benefits	800.00	800.00	600.00	600.00	600.00	600.00	600.00	600.00	600.00
Stemwood conif. benefits	-	8448.00	-	-	-	-	4224.00	-	4224.00
Stemwood broadl. benefits	-	8000.00	-	-	-	-	-	-	-
Total benefits	1297.20	17745.20	1043.20	10468.80	688.00	730.00	4954.00	730.00	4954.00
Costs	-	-	-	-	-	-	-	-	-
Opportunity cost of land	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Net benefits	1197.20	17645.20	943.20	10368.80	588.00	630.00	4854.00	630.00	4854.00

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Table 3C. Himachal Pradesh: Rehabilitation of Degraded Forestry - Financial Rate of Return per Hectare (Rs)

	1	2	3	4	5	6-07	8	9-14	15	16	17-19	20	21-23
Fuelwood conifer	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00	360.00
Grass	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00	400.00
Fuelwood, broadleaves	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00	520.00
Poles	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00	30.00
Stemwood	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00
Fuelwood conifer (mt)	-	-	-	-	-	-	-	-	2.57	-	-	3.80	-
Fuelw. broadleaves (mt)	-	-	-	-	-	-	1.00	-	-	1.68	-	-	-
Grass (mt)	-	-	2.00	2.00	2.00	2.00	2.00	2.00	1.50	1.50	1.50	1.50	1.50
Stemwood (m3)	-	-	-	-	-	-	-	-	-	-	-	6.00	-
Fuelwood conif. benefits	-	-	-	-	-	-	-	-	925.20	-	-	1368.00	-
Fuelw. broadlea. benefits	-	-	-	-	-	-	520.00	-	-	873.60	-	-	-
Grass benefits	-	-	800.00	800.00	800.00	800.00	800.00	800.00	600.00	600.00	600.00	600.00	600.00
Stemwood benefits	-	-	-	-	-	-	-	-	-	-	-	4800.00	-
Total benefits	-	-	800.00	800.00	800.00	800.00	1320.00	800.00	1525.20	1473.60	600.00	6768.00	600.00
Establish. & maint. costs	4373.00	570.00	400.00	363.00	319.00	-	-	-	-	-	-	-	-
Opportunity cost of land	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Net benefits	-4473.00	-670.00	300.00	337.00	381.00	700.00	1220.00	700.00	1425.20	1373.60	500.00	6668.00	500.00

	24	25	26-29	30	31	32
Fuelwood conifer	360.00	360.00	360.00	360.00	360.00	360.00
Grass	400.00	400.00	400.00	400.00	400.00	400.00
Fuelwood, broadleaves	520.00	520.00	520.00	520.00	520.00	520.00
Poles	30.00	30.00	30.00	30.00	30.00	30.00
Stemwood	800.00	800.00	800.00	800.00	800.00	800.00
Fuelwood conifer (mt)	-	4.58	-	4.58	-	-
Fuelw. broadleaves (mt)	1.10	-	-	-	-	-
Grass (mt)	1.50	1.00	1.00	1.00	1.00	1.00
Stemwood (m3)	-	-	-	-	-	93.00
Fuelwood conif. benefits	-	1648.80	-	1648.80	-	-
Fuelw. broadlea. benefits	572.00	-	-	-	-	-
Grass benefits	600.00	400.00	400.00	400.00	400.00	400.00
Stemwood benefits	-	-	-	-	-	74400.00
Total benefits	1172.00	2048.80	400.00	2048.80	400.00	74800.00
Establish. & maint. costs	-	-	-	-	-	-
Opportunity cost of land	100.00	100.00	100.00	100.00	100.00	100.00
Net benefits	1072.00	1948.80	300.00	1948.80	300.00	74700.00

FRR = 14.9%.

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Table 3D. Himachal Pradesh: Economic Analysis - Total Project (Rs million)

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>Costs</b>														
Farm forestry, establish.	7.510	10.430	14.570	14.130	16.000	10.830	5.590	4.090	-	-	-	-	-	-
Investment costs 1/	69.120	134.900	139.460	163.050	179.650	168.770	178.630	195.280	1.880	1.880	1.880	1.880	1.880	1.880
Opportunity cost of land 2/	1.150	2.560	4.920	6.600	8.700	10.620	12.560	13.910	13.910	13.910	13.910	13.910	13.910	13.910
<b>Total costs</b>	<b>77.780</b>	<b>147.890</b>	<b>158.950</b>	<b>183.780</b>	<b>204.350</b>	<b>190.220</b>	<b>196.780</b>	<b>213.280</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>
<b>Benefits</b>														
Farm forestry	-	-	0.535	1.279	2.317	3.324	4.465	34.591	47.442	65.558	66.176	75.892	58.335	39.827
Community Woodlot	-	-	1.305	4.003	7.135	10.377	13.975	73.095	83.701	96.665	97.614	121.866	120.249	147.945
Rehab. of Degrad. Forest	-	-	0.950	1.672	2.782	3.602	4.447	6.183	8.121	9.496	9.307	9.324	9.501	10.131
Private Wasteland	-	0.427	1.345	2.818	4.193	5.633	6.617	6.941	7.230	9.982	13.163	16.873	15.319	15.406
<b>Total benefits</b>	<b>-</b>	<b>0.427</b>	<b>4.135</b>	<b>9.772</b>	<b>16.427</b>	<b>22.936</b>	<b>29.505</b>	<b>120.809</b>	<b>146.495</b>	<b>181.701</b>	<b>186.260</b>	<b>223.954</b>	<b>203.404</b>	<b>213.308</b>
<b>Net benefits</b>	<b>-77.780</b>	<b>-147.463</b>	<b>-154.815</b>	<b>-174.008</b>	<b>-187.923</b>	<b>-167.284</b>	<b>-167.275</b>	<b>-92.471</b>	<b>130.705</b>	<b>165.911</b>	<b>170.470</b>	<b>208.164</b>	<b>187.614</b>	<b>197.518</b>
	15	16	17	18	19	20	21	22	23	24	25	26	27	28
<b>Costs</b>														
Farm forestry, establish.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Investment costs	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880
Opportunity cost of land	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910
<b>Total costs</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>	<b>15.790</b>
<b>Benefits</b>														
Farm Forestry	39.301	101.891	133.594	174.679	170.402	196.794	144.784	96.137	77.722	72.109	76.795	86.467	80.994	81.960
Community Woodlot	160.418	112.524	132.183	155.167	149.869	260.653	266.048	306.133	302.892	266.193	263.588	308.177	308.949	141.067
Rehab. of Degrad. Forest	10.365	10.229	10.151	10.035	9.536	16.922	16.061	18.719	14.128	13.778	17.437	24.531	17.415	7.974
Private Wasteland	12.102	9.447	9.143	8.336	13.686	19.575	25.990	22.650	22.289	15.695	10.410	9.474	7.696	7.908
<b>Total benefits</b>	<b>222.187</b>	<b>234.091</b>	<b>285.071</b>	<b>348.216</b>	<b>343.492</b>	<b>493.945</b>	<b>452.884</b>	<b>443.638</b>	<b>417.032</b>	<b>367.776</b>	<b>368.231</b>	<b>428.648</b>	<b>415.054</b>	<b>238.910</b>
<b>Net benefits</b>	<b>206.397</b>	<b>218.301</b>	<b>269.281</b>	<b>332.426</b>	<b>327.702</b>	<b>478.155</b>	<b>437.094</b>	<b>427.848</b>	<b>401.242</b>	<b>351.986</b>	<b>352.441</b>	<b>412.858</b>	<b>399.264</b>	<b>223.120</b>

ERR = 12.8%.

1/ Costs after Year 8 are estimated at Rs90/ha/yr for maintenance of plantations on public lands, 1% of total expenditure for civil works and 10% of staff salaries and vehicle and office expenses.

2/ Rs1,000/ha/yr on farm forestry area plus Rs100/ha/yr on public lands.

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Table 30. Himachal Pradesh: Economic Analysis - Total Project (Rs million)

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	29	30	31	32	33	34	35	36	37	38	39	40
<b>Costs</b>												
Farm Forestry, establish.	-	-	-	-	-	-	-	-	-	-	-	-
Investment costs	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880	1.880
Opportunity cost of land	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910	13.910
Total costs	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790
<b>Benefits</b>												
Farm Forestry	57.501	33.141	25.992	33.994	43.705	57.433	54.596	59.970	40.235	20.666	14.682	-
Community Woodlot	131.766	173.189	179.062	98.650	96.523	104.220	93.909	106.760	100.623	57.975	53.456	-
Rehab. of Degrad. Forest	8.011	10.943	11.258	97.317	72.741	108.561	81.546	85.512	108.459	195.640	104.959	-
Private Wasteland	8.029	8.073	8.102	8.102	7.559	6.394	4.525	2.969	1.415	0.532	0.207	-
Total benefits	205.307	225.347	224.414	238.063	220.528	276.608	234.575	255.211	250.731	274.813	173.504	-
Net benefits	189.517	209.557	208.624	222.273	204.738	260.818	218.785	239.421	234.941	259.023	157.714	-15.790

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Table 3E. Himachal Pradesh - Investment Costs in Financial and Economic Terms (Rs million)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Plantation	45.41	74.32	81.91	96.59	97.11	122.14	134.45	158.43
CF = 0.70	31.79	52.02	57.34	67.61	67.97	87.60	94.12	110.90
Staff Salaries	4.77	16.54	17.97	24.93	45.74	33.48	41.29	50.60
Staff Travelling Allowances	0.67	1.39	1.66	2.49	4.24	2.00	3.11	3.93
Civil Works	0.03	4.87	10.32	9.58	6.07	5.27	17.98	18.35
CF = 0.66	0.02	3.21	6.81	6.32	4.00	3.48	11.87	12.11
Building Rent & Maintenance	0.003	0.15	-	1.28	1.20	1.01	2.95	4.55
CF = 0.84	0.002	0.13	-	1.07	1.01	0.85	2.48	3.82
Vehicles	0.13	1.71	2.18	0.88	0.13	0.005	0.006	2.67
CF = 0.66	0.09	1.13	1.44	0.58	0.89	0.003	0.004	1.76
Furniture & Equipment	0.010	0.66	-	0.74	0.34	0.14	0.08	0.26
CF = 0.66	0.008	0.44	-	0.49	0.22	0.09	0.05	0.17
Research & Training Expenses	-	1.23	0.43	1.28	1.42	1.76	0.49	2.49
CF = 0.97	-	1.19	0.42	1.24	1.38	1.71	0.48	2.42
Vehicle Operating & Maint.	0.31	0.83	0.69	3.14	0.91	1.64	2.45	3.30
CF = 0.80	0.24	0.66	0.55	2.51	0.73	1.31	1.96	2.64
Office & Other Expenses	0.46	1.30	1.30	3.19	3.55	3.61	4.55	4.09
CF = 0.84	0.39	1.08	1.09	2.68	2.98	3.03	3.82	3.44
Fuel Saving Devices	-	0.81	0.54	0.31	1.29	1.86	4.07	4.42
CF = 0.79	-	0.64	0.43	0.25	1.02	1.47	3.21	3.49
<b>Total Financial Cost</b>	<b>51.79</b>	<b>103.81</b>	<b>117.00</b>	<b>144.41</b>	<b>162.00</b>	<b>175.91</b>	<b>211.42</b>	<b>253.09</b>
<b>Total Economic Cost</b>	<b>37.98</b>	<b>78.43</b>	<b>87.71</b>	<b>110.17</b>	<b>130.18</b>	<b>135.02</b>	<b>162.39</b>	<b>195.28</b>
<b>MPI</b>	<b>1.82</b>	<b>1.72</b>	<b>1.59</b>	<b>1.48</b>	<b>1.38</b>	<b>1.25</b>	<b>1.10</b>	<b>1.00</b>
<b>Economic Cost in 1992-93 Prices</b>	<b>69.12</b>	<b>134.90</b>	<b>139.46</b>	<b>163.05</b>	<b>179.65</b>	<b>168.77</b>	<b>178.63</b>	<b>195.28</b>

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Table 3f. Himachal Pradesh - Physical Phasing of Plantations (ha)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	Total
Farm Forestry	4,550	6,324	8,829	8,565	9,698	6,567	3,386	2,482	50,401
Private Wasteland	890	1,913	3,068	2,553	2,551	1,449	534	339	13,297
Tree Tenure	39	67	219	133	118	140	-	-	716
Community Lands	6,810	7,873	9,167	8,561	10,972	10,149	12,965	13,749	80,246
Government Wasteland (RDF)	1,484	1,128	1,735	1,281	1,321	1,747	3,260	1,754	13,710
Silvi-pastoral (RDF)	-	-	-	-	1,124	2,441	995	1,348	5,908
<b>Total Area Planted</b>	<b>13,773</b>	<b>17,305</b>	<b>28,018</b>	<b>21,093</b>	<b>25,784</b>	<b>22,493</b>	<b>21,140</b>	<b>19,672</b>	<b>164,278</b>

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Table 4A. Gujarat: Farm Forestry - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5	6-07	8	9-10	11-14	15	16	17-19	20-23	24	25-31	32
<b>Costs</b>																
Establish. & maint. costs <sup>1/</sup>	5.415	1.020	0.750	-	-	-	-	-	-	-	-	-	-	-	-	-
Land opportunity cost <sup>2/</sup>	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600
<b>Total costs</b>	<b>6.015</b>	<b>1.620</b>	<b>1.350</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>	<b>0.600</b>
<b>Benefits</b>																
Fuelwood	-	-	-	0.165	0.165	0.165	3.705	-	-	2.700	3.457	-	-	2.070	-	-
Poles	-	-	-	-	-	-	30.450	-	-	-	24.300	-	-	19.440	-	-
Stemwood	-	-	-	-	-	-	-	-	-	2.400	2.808	-	-	3.560	-	6.040
Bamboo	-	-	-	-	-	0.336	0.888	0.336	0.336	0.336	6.048	0.336	0.336	6.048	0.336	6.048
Leaf fodder	-	-	-	-	0.025	0.025	0.025	0.025	0.025	0.025	-	-	-	-	-	-
Grass	-	-	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090	0.090
Fruit	-	-	-	-	-	2.400	2.400	2.400	1.500	1.500	1.500	1.500	1.500	1.500	1.500	1.500
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>0.090</b>	<b>0.255</b>	<b>0.280</b>	<b>3.016</b>	<b>37.558</b>	<b>2.851</b>	<b>1.951</b>	<b>7.051</b>	<b>38.203</b>	<b>1.926</b>	<b>0.426</b>	<b>31.208</b>	<b>0.426</b>	<b>12.178</b>
<b>Net benefits</b>	<b>-6.015</b>	<b>-1.620</b>	<b>-1.260</b>	<b>-0.345</b>	<b>-0.320</b>	<b>2.416</b>	<b>36.958</b>	<b>2.251</b>	<b>1.351</b>	<b>6.451</b>	<b>37.603</b>	<b>1.326</b>	<b>-0.174</b>	<b>30.608</b>	<b>-0.174</b>	<b>11.578</b>

Switching Values at 12.0%			
Stream	Appraisal Value	Switching Value	Percentage Change
BTOT	33.233	11.049	-66.754%
CFTOT	11.049	33.233	200.788%

FRR = 31.1%.

<sup>1/</sup> Costs in 1992/93 constant price for a typical hectare estimated at Rs1,125 (seedlings 2,500 @ Rs0.45 to Rs0.50 per seedling); Rs400 (transport); Rs1,375 (pit digging); Rs625 (pit planting); Rs600 (weeding and soil working); Rs540 (watering); Rs750 (fertilizer application) for Year 1; Rs1,020 for one weeding and watering in Year 2 and Rs750 for one watering and weeding in Year 3.

<sup>2/</sup> 60% of the area in block planting @ Rs1,000/ha.

Net Present Value at OCC 12.0% = 22.2  
Internal Rate of Return = 31.1%  
Coupon Equivalent Rate of Return = 37.5%

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Table 4B. Gujarat: Community Woodlot (Rainfed and Irrigated) - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
<b>Costs</b>																	
Establish. & maint. costs	1/ 4.827	10.647	4.559	3.157	2.080	0.343	-	-	-	-	-	-	-	-	-	-	
Opportunity cost of land	2/ 0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	
<b>Total costs</b>	<b>4.927</b>	<b>10.747</b>	<b>4.659</b>	<b>3.257</b>	<b>2.180</b>	<b>0.443</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	
<b>Benefits</b>																	
Fuelwood	-	-	-	-	-	0.675	0.675	1.147	0.675	12.900	-	-	-	-	-	1.875	0.997
Poles	-	-	-	-	-	-	-	1.200	-	-	-	-	-	-	-	-	0.960
Stemwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.400	-
Bamboo	-	-	-	-	-	4.176	-	-	-	-	-	4.176	-	-	-	-	-
Leaf fodder	-	-	-	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.060
Grass	-	0.090	0.090	0.090	0.090	-	-	-	0.090	0.090	0.090	0.090	0.090	-	-	-	0.090
Fruit	-	-	-	0.120	0.120	0.120	0.120	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.920	0.800
<b>Total benefits</b>	<b>-</b>	<b>0.090</b>	<b>0.090</b>	<b>0.270</b>	<b>0.270</b>	<b>5.031</b>	<b>0.855</b>	<b>3.327</b>	<b>1.745</b>	<b>13.970</b>	<b>1.070</b>	<b>5.246</b>	<b>1.070</b>	<b>0.980</b>	<b>5.255</b>	<b>2.907</b>	
<b>Net benefits</b>	<b>-4.927</b>	<b>-10.657</b>	<b>-4.569</b>	<b>-2.987</b>	<b>-1.910</b>	<b>4.588</b>	<b>0.755</b>	<b>3.227</b>	<b>1.645</b>	<b>13.870</b>	<b>0.970</b>	<b>5.146</b>	<b>0.970</b>	<b>0.880</b>	<b>5.155</b>	<b>2.807</b>	
	17	18	19	20	21-23	24	25	26	27-29	30	31-32						
<b>Costs</b>																	
Establish. & maint. costs	-	-	-	-	-	-	-	-	-	-	-						
Opportunity cost of land	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100						
<b>Total costs</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>						
<b>Benefits</b>																	
Fuelwood	0.472	0.472	0.472	10.320	-	0.405	-	-	-	1.125	-						
Poles	-	-	-	-	-	0.750	-	-	-	-	-						
Stemwood	-	-	-	-	-	-	-	1.680	-	-	-						
Bamboo	-	4.176	-	-	-	4.176	-	-	-	-	-						
Leaf fodder	0.060	0.060	0.020	0.020	0.020	0.020	0.020	-	-	-	-						
Grass	0.090	0.090	-	-	0.090	-	-	-	-	-	-						
Fruit	0.800	0.800	0.800	0.800	-	-	-	-	-	-	-						
<b>Total benefits</b>	<b>1.422</b>	<b>5.598</b>	<b>1.292</b>	<b>11.140</b>	<b>0.110</b>	<b>5.351</b>	<b>0.020</b>	<b>1.680</b>	<b>-</b>	<b>1.125</b>	<b>-</b>						
<b>Net benefits</b>	<b>1.322</b>	<b>5.498</b>	<b>1.192</b>	<b>11.040</b>	<b>0.010</b>	<b>5.251</b>	<b>-0.080</b>	<b>1.580</b>	<b>-0.100</b>	<b>1.025</b>	<b>-0.100</b>						

FRR = 9.2%.

- 1/ Irrigated planted area is about 22% of rainfed planted area and cost is weighted average per hectare; costs provided by Forestry Department for a typical hectare, updated to 1992/93 prices using WPI.
- 2/ Estimated at Rs100/ha/year on non-farm forestry land.

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Table 4C. Gujarat: Rehabilitation of Degraded forestry - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
<b>Costs</b>																
Establish. & maint. costs	1/3.213	5.187	1.621	0.772	0.142	0.142	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	2/0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>Total costs</b>	<b>3.313</b>	<b>5.287</b>	<b>1.721</b>	<b>0.872</b>	<b>0.242</b>	<b>0.242</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>
<b>Benefits</b>																
Fuelwood	-	-	-	-	-	0.607	0.607	1.027	0.607	11.557	-	-	-	-	1.650	0.892
Poles	-	-	-	-	-	-	-	0.600	-	-	-	-	-	-	-	0.600
Stemwood	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.160	-
Bamboo	-	-	-	-	-	2.880	-	-	-	-	-	2.880	-	-	-	-
Leaf fodder	-	-	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
Grass	-	0.135	0.135	0.135	0.135	-	-	-	0.180	0.180	0.180	0.180	0.180	-	-	0.090
<b>Total benefits</b>	<b>-</b>	<b>0.135</b>	<b>0.185</b>	<b>0.185</b>	<b>0.185</b>	<b>3.537</b>	<b>0.657</b>	<b>1.677</b>	<b>0.837</b>	<b>11.787</b>	<b>0.230</b>	<b>3.110</b>	<b>0.230</b>	<b>0.050</b>	<b>3.860</b>	<b>1.632</b>
<b>Net benefits</b>	<b>-3.313</b>	<b>-5.152</b>	<b>-1.536</b>	<b>-0.687</b>	<b>-0.057</b>	<b>3.295</b>	<b>0.557</b>	<b>1.577</b>	<b>0.737</b>	<b>11.687</b>	<b>0.130</b>	<b>3.010</b>	<b>0.130</b>	<b>-0.050</b>	<b>3.760</b>	<b>1.532</b>
	17	18	19	20	21	22-23	24	25	26	27-29	30	31-32				
<b>Costs</b>																
Establish. & maint. costs	-	-	-	-	-	-	-	-	-	-	-	-				
Opportunity cost of land	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100				
<b>Total costs</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>				
<b>Benefits</b>																
Fuelwood	0.427	0.427	0.427	9.285	-	-	0.367	-	-	-	1.012	-				
Poles	-	-	-	-	-	-	0.480	-	-	-	-	-				
Stemwood	-	-	-	-	-	-	-	-	1.440	-	-	-				
Bamboo	-	2.880	-	-	-	-	2.880	-	-	-	-	-				
Leaf fodder	0.050	0.050	0.010	0.010	0.010	0.010	0.010	-	-	-	-	-				
Grass	0.090	0.090	0.090	-	-	0.090	0.090	0.090	0.090	0.090	0.090	0.090				
<b>Total benefits</b>	<b>0.567</b>	<b>3.447</b>	<b>0.527</b>	<b>9.295</b>	<b>0.010</b>	<b>0.100</b>	<b>3.827</b>	<b>0.090</b>	<b>1.530</b>	<b>0.090</b>	<b>1.102</b>	<b>0.090</b>				
<b>Net benefits</b>	<b>0.467</b>	<b>3.347</b>	<b>0.427</b>	<b>9.195</b>	<b>-0.090</b>	<b>-0.000</b>	<b>3.727</b>	<b>-0.010</b>	<b>1.430</b>	<b>-0.010</b>	<b>1.002</b>	<b>-0.010</b>				

FRR = 13.98%.

- 1/ Costs, as provided by the Forestry Department for a typical hectare, updated to 1992/93 prices terms.  
2/ See Table 4B.

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Table 4D. Gujarat: Strip Plantations - Financial Costs and Returns per Hectare (Rs '000)

	1	2	3	4	5	6	7	8	9	10	11-13	14	15	16	17-19	20
<b>Costs</b>																
Establish. & maint. costs <sup>1/</sup>	8.231	16.634	4.511	1.754	0.596	0.596	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land <sup>2/</sup>	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100	0.100
<b>Total costs</b>	<b>8.331</b>	<b>16.734</b>	<b>4.611</b>	<b>1.854</b>	<b>0.696</b>	<b>0.696</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>
<b>Benefits</b>																
Fuelwood	-	-	-	-	-	0.720	0.720	1.140	0.720	13.867	-	-	-1.980	1.065	0.510	11.137
Poles	-	-	-	-	-	-	-	0.600	-	-	-	-	-	-	-	-
Stemwood	-	-	-	-	-	-	-	-	-	-	-	-	2.560	-	-	-
Leaf fodder	-	-	-	0.060	0.060	0.060	0.060	0.060	0.060	0.060	0.040	0.040	0.040	0.040	0.040	-
Grass	-	-	0.162	0.162	0.162	-	-	-	0.216	0.216	0.216	-	-	0.108	0.108	-
<b>Total benefits</b>	<b>-</b>	<b>-</b>	<b>0.162</b>	<b>0.222</b>	<b>0.222</b>	<b>0.780</b>	<b>0.780</b>	<b>1.800</b>	<b>0.996</b>	<b>14.143</b>	<b>0.256</b>	<b>0.040</b>	<b>4.580</b>	<b>1.213</b>	<b>0.658</b>	<b>11.137</b>
<b>Net benefits</b>	<b>-8.331</b>	<b>-16.734</b>	<b>-4.449</b>	<b>-1.632</b>	<b>-0.474</b>	<b>0.084</b>	<b>0.680</b>	<b>1.700</b>	<b>0.896</b>	<b>14.043</b>	<b>0.156</b>	<b>-0.060</b>	<b>4.480</b>	<b>1.113</b>	<b>-0.558</b>	<b>11.037</b>
<hr/>																
	21-25	26	27-29	30	31-32											
<b>Costs</b>																
Establish. & maint. costs	-	-	-	-	-											
Opportunity cost of land	0.100	0.100	0.100	0.100	0.100											
<b>Total costs</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>	<b>0.100</b>											
<b>Benefits</b>																
Fuelwood	-	-	-	1.215	-											
Poles	-	-	-	-	-											
Stemwood	-	1.728	-	-	-											
Leaf fodder	0.010	0.010	0.010	0.010	0.010											
Grass	0.117	0.117	0.117	0.117	0.117											
<b>Total benefits</b>	<b>0.127</b>	<b>1.855</b>	<b>0.127</b>	<b>1.342</b>	<b>0.127</b>											
<b>Net benefits</b>	<b>0.027</b>	<b>1.755</b>	<b>0.027</b>	<b>1.242</b>	<b>0.027</b>											

FRR = 1.7%.

<sup>1/</sup> Costs, based on figures provided by forest Department for a typical hectare, updated to 1992/93 prices.

<sup>2/</sup> See table 4B.

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Table 4E. Gujarat: Economic Analysis - Total Project (Rs million)

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	1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Costs</b>													
Establish. cost Farm For.	1/ 64.600	78.200	72.900	124.300	126.800	135.200	140.200	116.400	35.700	13.200	-	-	-
Opportunity cost of land	2/ 10.400	20.300	28.000	44.100	58.500	73.700	90.100	103.500	103.500	103.500	103.500	103.500	103.500
Other investment costs	3/ 137.630	130.460	170.480	174.300	195.780	222.150	265.040	256.310	13.110	13.110	13.110	13.110	13.110
<b>Total costs</b>	<b>212.630</b>	<b>228.960</b>	<b>271.380</b>	<b>342.700</b>	<b>381.080</b>	<b>431.050</b>	<b>495.340</b>	<b>476.210</b>	<b>152.310</b>	<b>129.810</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>
<b>Benefits</b>													
Farm forestry	-	-	1.355	5.159	8.933	54.422	100.740	656.644	712.409	644.904	1141.303	1126.394	1165.316
Rehab. of Degraded Forest	-	0.627	1.357	2.171	3.157	19.523	19.672	31.141	38.340	88.266	89.315	124.549	141.494
Private Wasteland	-	-	-	0.831	1.739	2.991	5.270	33.545	38.631	39.222	74.234	42.835	71.297
Community Woodlot	-	0.348	0.606	1.549	2.394	21.576	20.148	31.868	39.859	90.799	87.432	109.481	122.309
<b>Total benefits</b>	<b>-</b>	<b>0.974</b>	<b>3.318</b>	<b>9.710</b>	<b>16.223</b>	<b>98.512</b>	<b>145.831</b>	<b>753.197</b>	<b>829.239</b>	<b>863.190</b>	<b>1392.283</b>	<b>1403.259</b>	<b>1500.417</b>
<b>Net benefits</b>	<b>-212.630</b>	<b>-227.986</b>	<b>-268.062</b>	<b>-332.990</b>	<b>-364.857</b>	<b>-332.538</b>	<b>-349.509</b>	<b>276.987</b>	<b>676.929</b>	<b>733.380</b>	<b>1275.673</b>	<b>1286.649</b>	<b>1383.807</b>
	14	15	16	17	18	19	20	21	22	23	24	25	26
<b>Costs</b>													
Establish. cost Farm For.	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500
Other investment costs	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110
<b>Total costs</b>	<b>116.610</b>												
<b>Benefits</b>													
Farm forestry	1189.629	1039.427	949.858	894.966	806.946	1267.283	1178.919	1167.836	1172.827	833.023	622.205	577.193	424.810
Rehab. of Degraded Forest	92.984	148.184	167.958	186.366	83.721	79.962	100.957	110.084	124.841	103.493	100.208	125.792	128.071
Private Wasteland	72.384	95.202	52.912	53.677	68.997	77.496	65.727	87.785	92.689	64.179	29.494	31.100	33.769
Community Woodlot	99.697	131.893	134.136	133.494	92.423	89.054	108.959	104.549	101.911	90.827	99.337	97.368	85.387
<b>Total benefits</b>	<b>1454.693</b>	<b>1414.707</b>	<b>1304.864</b>	<b>1268.503</b>	<b>1052.087</b>	<b>1513.794</b>	<b>1454.562</b>	<b>1470.254</b>	<b>1492.268</b>	<b>1091.522</b>	<b>851.233</b>	<b>831.453</b>	<b>672.037</b>
<b>Net benefits</b>	<b>1338.083</b>	<b>1298.097</b>	<b>1188.254</b>	<b>1151.893</b>	<b>935.477</b>	<b>1397.184</b>	<b>1337.952</b>	<b>1353.644</b>	<b>1375.658</b>	<b>974.912</b>	<b>734.623</b>	<b>714.843</b>	<b>555.427</b>

ERR = 23.1%.

1/ Based on cost Rs4,290 (Year 1), Rs1,020 (Year 2) and Rs750 (Year 3), adjusted by SCF of 0.8 on farm forestry area at 18% of annual national area (see Table 4G). Cost of seedling excluded to avoid double counting.

2/ Rs1,000/ha/yr on 60% of farm forestry represented by block planting adjusted by SCF of 0.8. See Table 4f. Maintenance cost from Year 1993/94 at Rs90/ha/yr on non-farm forestry plantations, 1% of total civil works and 10% of staff salaries, vehicle operating expenses and office expenses of 1992/93 to continue.

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Table 4E. Gujarat: Economic Analysis - Total Project (Rs million)

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	27	28	29	30	31	32	33	34	35	36	37	38	39	40
<b>Costs</b>														
Establish. cost farm For.	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Opportunity cost of land	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500	103.500
Other investment costs	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110	13.110
<b>Total costs</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>	<b>116.610</b>
<b>Benefits</b>														
Farm Forestry	797.259	741.408	744.954	788.984	607.838	240.710	229.785	178.850	326.536	295.063	287.040	294.423	215.229	-
Rehab. of Degraded Forest	134.912	24.990	39.182	53.484	61.061	24.161	26.239	7.759	10.568	13.366	14.120	1.953	1.025	-
Private Wasteland	54.673	31.718	54.457	56.616	66.191	21.602	30.364	12.164	18.500	17.646	19.120	1.767	0.946	-
Community Woodlot	82.386	23.945	29.305	37.583	37.471	11.693	12.637	3.716	4.629	5.686	5.724	-	-	-
<b>Total benefits</b>	<b>1069.228</b>	<b>822.061</b>	<b>867.898</b>	<b>936.667</b>	<b>772.561</b>	<b>298.166</b>	<b>299.025</b>	<b>202.490</b>	<b>360.233</b>	<b>331.762</b>	<b>326.003</b>	<b>298.143</b>	<b>217.200</b>	<b>-</b>
<b>Net benefits</b>	<b>952.618</b>	<b>705.451</b>	<b>751.288</b>	<b>820.057</b>	<b>655.951</b>	<b>181.556</b>	<b>182.415</b>	<b>85.880</b>	<b>243.623</b>	<b>215.152</b>	<b>209.393</b>	<b>181.533</b>	<b>100.590</b>	<b>-116.610</b>

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Table 4F. Gujarat - Investment Costs in Financial and Economic Terms (Rs million)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93
Field Activities	95.44	97.41	114.08	149.92	172.24	222.34	313.67	337.23
CF = 0.70	66.81	68.19	79.86	104.94	120.57	159.14	219.57	236.06
Staff Salaries	1.21	1.42	1.38	1.77	2.17	2.26	2.94	4.92
Staff Travelling Allowances	2.66	0.20	1.40	4.01	5.95	2.83	0.12	0.15
Civil Works, Bldg. & Maint.	0.58	1.12	5.73	3.21	8.87	7.66	14.54	4.79
CF = 0.66	0.38	0.74	3.78	2.12	5.85	5.05	9.60	3.16
Vehicles, Furniture & Equip.	0.37	0.55	0.09	0.18	1.41	2.09	0.52	0.37
CF = 0.66	0.24	0.36	0.06	0.12	0.93	1.38	0.34	0.24
Vehicle Operating & Maint.	4.82	5.05	4.85	4.57	5.42	5.75	6.53	7.40
CF = 0.80	3.86	4.04	3.88	3.66	4.34	4.60	5.22	5.92
Consultancy Services, Studies, Training & Research	0.48	0.93	1.46	1.19	2.12	2.54	3.26	4.36
CF = 0.97	0.46	0.90	1.42	1.15	2.06	2.46	3.16	4.23
Office and Other Expenses	-	-	18.38	-	-	-	-	-
CF = 0.84	-	-	15.44	-	-	-	-	-
<b>Total Financial Cost</b>	<b>105.56</b>	<b>106.38</b>	<b>147.27</b>	<b>164.85</b>	<b>198.18</b>	<b>250.47</b>	<b>341.58</b>	<b>359.22</b>
<b>Total Economic Cost</b>	<b>75.62</b>	<b>75.85</b>	<b>107.22</b>	<b>117.77</b>	<b>141.87</b>	<b>177.72</b>	<b>240.95</b>	<b>254.68</b>
<b>WPI</b>	<b>1.82</b>	<b>1.72</b>	<b>1.59</b>	<b>1.48</b>	<b>1.38</b>	<b>1.25</b>	<b>1.10</b>	<b>1.00</b>
<b>Economic Cost in 1992-93 Prices</b>	<b>137.63</b>	<b>130.46</b>	<b>170.48</b>	<b>174.30</b>	<b>195.78</b>	<b>222.15</b>	<b>265.04</b>	<b>254.68</b>

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Table 4G. Gujarat - Physical Phasing of Plantations (ha)

	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	Total
Farm Forestry	104,533	101,866	75,466	165,466	152,866	153,666	163,600	122,733	1,040,196
Private Wasteland	3,405	3,721	3,525	7,585	3,523	6,992	7,129	8,208	44,088
Community Woodlots - Rainfed	3,839	2,932	2,504	3,665	3,262	4,380	5,337	5,549	31,468
Community Woodlots - Irrigated	989	659	940	879	867	763	981	811	6,888
Tree Fodder	-	-	-	130	80	474	285	309	1,278
Government Wasteland Plantation									
- RDF	5,804	4,615	5,825	6,973	4,820	8,805	12,880	14,239	63,961
- Others: roadside, canal, etc.	3,243	1,978	2,530	2,769	2,453	2,523	3,186	3,163	21,845
<b>Total Area Planted</b>	<b>121,812</b>	<b>115,771</b>	<b>90,790</b>	<b>187,467</b>	<b>167,871</b>	<b>177,603</b>	<b>193,398</b>	<b>155,012</b>	<b>1,209,724</b>

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Table 5. Financial Prices (Rs) <sup>1/</sup>

	Unit	Rajasthan	Uttar Pradesh	Himachal Pradesh	Gujarat
Fuelwood:		750	700	-	750
- Conifer	mt	-	-	360	-
- Broadleaf	mt	-	-	520	-
Stemwood	m <sup>3</sup>	1,125	1,250	800	800
Poles	no.	30	35	30	30
Grass	mt	200	300	400	450
Leaf fodder	mt	850	100	210	-
Bamboo pole	no.	-	-	-	12
Fruit	mt	2,000	2,500	200	2,000
Wage rate	person/day	40	25	30	32

<sup>1/</sup> Prices represent unit values which growers would receive at stump; economic price is derived by taking 80% of financial price, using SCF of 0.8.

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Table 6. Economic Analysis - Total Project (Rs million)

(Page 1)

	1	2	3	4	5	6	7	8	9	10
<b>Costs</b>										
Himchal Pradesh	77.780	147.890	158.950	183.780	204.350	190.220	196.780	213.280	15.790	15.790
Gujarat	212.630	229.960	271.380	342.700	381.080	431.050	495.360	476.210	152.310	129.810
Uttar Pradesh	79.400	287.900	261.100	331.900	431.000	497.600	563.800	433.000	398.400	70.100
Rajasthan	41.790	141.800	151.700	137.060	161.320	224.640	219.870	202.600	34.930	31.830
<b>Total Costs</b>	<b>410.600</b>	<b>806.550</b>	<b>843.130</b>	<b>995.439</b>	<b>1177.740</b>	<b>1343.500</b>	<b>1475.780</b>	<b>1325.080</b>	<b>601.430</b>	<b>247.530</b>
<b>Benefits</b>										
Himchal Pradesh	-	0.427	4.135	9.772	16.427	22.936	29.505	120.809	146.495	181.701
Gujarat	-	0.974	3.318	9.710	16.223	28.512	145.831	753.197	829.239	863.190
Uttar Pradesh	-	0.576	5.147	14.408	22.233	35.348	50.399	1523.380	886.578	994.868
Rajasthan	-	-	0.010	1.820	12.380	23.530	40.600	53.800	73.470	226.710
<b>Total Benefits</b>	<b>-</b>	<b>1.977</b>	<b>12.610</b>	<b>35.710</b>	<b>67.263</b>	<b>180.326</b>	<b>266.335</b>	<b>2451.180</b>	<b>1935.780</b>	<b>2266.460</b>
<b>Net Benefits</b>	<b>-410.600</b>	<b>-804.573</b>	<b>-830.520</b>	<b>-959.729</b>	<b>-1110.480</b>	<b>-1163.180</b>	<b>-1209.450</b>	<b>1126.090</b>	<b>1334.350</b>	<b>2018.930</b>
	11	12	13	14	15	16	17	18	19	20
	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790
	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610
	64.000	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900
	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730
	226.130	220.030	220.030	220.030	220.030	220.030	220.030	220.030	220.030	220.030
	186.260	223.254	203.404	213.308	222.187	234.091	285.071	348.216	343.492	493.945
	1392.280	1405.290	1500.410	1454.690	1414.700	1304.860	1268.500	1052.080	1513.790	1454.560
	1452.540	1916.090	1942.690	1324.940	1772.700	2265.810	1648.800	1530.050	2071.340	1859.700
	204.250	192.250	338.080	318.870	375.400	288.900	346.790	279.540	340.280	175.910
	3235.330	3735.560	3984.590	3311.810	3784.990	4093.670	3549.170	3209.900	4268.910	3984.120
	3609.200	3515.530	3764.560	3091.780	3564.960	3873.640	3329.140	2989.870	4048.880	3764.090

EPR = 21.9%.

INDIA: National Social Forestry Project (Cr.1611-IN)  
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Table 6. Economic Analysis - Total Project (Rs million)

(Page 2)

	21	22	23	24	25	26	27	28	29	30	31	32
<b>Costs</b>												
Himchal Pradesh	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790	15.790
Gujarat	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610	116.610
Uttar Pradesh	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900	57.900
Rajasthan	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730	29.730
<b>Total Costs</b>	<b>220.030</b>											
<b>Benefits</b>												
Himchal Pradesh	452.884	443.638	417.032	367.776	368.231	428.648	415.054	238.910	205.307	225.347	224.414	238.063
Gujarat	1470.250	1492.260	1091.520	851.233	831.453	672.037	1069.220	822.061	867.898	936.667	772.561	298.166
Uttar Pradesh	1885.080	1260.900	1092.770	1838.640	1175.830	1152.980	1380.440	1300.970	1421.040	907.594	911.531	954.869
Rajasthan	173.560	167.800	232.680	221.250	318.620	273.210	328.500	255.710	260.090	178.720	209.570	160.280
<b>Total Benefits</b>	<b>3981.780</b>	<b>3364.600</b>	<b>2834.000</b>	<b>3278.900</b>	<b>2694.140</b>	<b>2526.880</b>	<b>3193.220</b>	<b>2617.650</b>	<b>2754.330</b>	<b>2248.320</b>	<b>2118.070</b>	<b>1651.370</b>
<b>Net Benefits</b>	<b>3761.750</b>	<b>3144.570</b>	<b>2613.970</b>	<b>3058.870</b>	<b>2474.110</b>	<b>2306.850</b>	<b>2973.190</b>	<b>2397.620</b>	<b>2534.300</b>	<b>2028.290</b>	<b>1898.040</b>	<b>1431.340</b>
	33	34	35	36	37	38	39	40				
	15.790	15.790	15.790	15.790	15.790	15.790	15.790	-				
	116.610	116.610	116.610	116.610	116.610	116.610	116.610	-				
	57.900	57.900	57.900	57.900	57.900	57.900	57.900	-				
	29.730	29.730	29.730	29.730	29.730	29.730	29.730	-				
	220.030	220.030	220.030	220.030	220.030	220.030	220.030	-				
	220.528	276.608	234.575	255.211	250.731	274.813	173.504	-				
	299.025	202.490	360.233	331.762	326.003	298.143	217.200	-				
	762.483	677.424	903.242	981.021	937.210	601.319	475.911	-				
	185.110	155.860	209.680	155.110	226.330	145.250	103.300	-				
	1468.140	1312.380	1707.730	1723.100	1740.270	1319.520	969.915	-				
	1248.110	1092.350	1487.690	1503.070	1520.260	1099.490	749.885	-				

INDIA: National Social Forestry Project (Cr.1611-IN)  
Annex 1: Financial and Economic Re-evaluation  
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Table 7. Sensitivity Analysis

PRESENT VALUES OF NET STREAMS AT A DISCOUNT RATE OF 12%

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	BTOT	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%	LAG 1 YEAR	LAG 2 YEARS	LAG 3 YEARS
CTOT	5,809.7	6,956.7	8,103.7	11,544.8	4,662.7	3,515.7	74.6	4,580.7	3,483.5	2,503.8
UP 10%	5,243.6	6,390.7	7,537.7	10,978.8	4,096.6	2,949.6	-491.6	4,014.7	2,917.4	1,937.7
UP 20%	4,677.6	5,824.6	6,971.6	10,412.7	3,530.6	2,383.5	-1,057.6	3,448.6	2,351.4	1,371.6
UP 50%	2,979.4	4,126.4	5,273.4	8,714.5	1,832.4	685.3	-2,755.8	1,750.4	653.2	-326.7
DOWN 10%	6,375.8	7,522.8	8,669.8	12,110.9	5,228.7	4,081.7	640.6	5,146.8	4,049.5	3,069.8
DOWN 20%	6,941.8	8,088.9	9,235.9	12,677.0	5,794.8	4,647.8	1,206.7	5,712.9	4,615.6	3,635.9
DOWN 50%	8,640.0	9,787.0	10,934.1	14,375.1	7,493.0	6,345.9	2,904.9	7,411.0	6,313.8	5,334.0
LAG 1 YEAR	-	-	-	-	-	-	-	5,187.2	4,090.0	3,110.2
LAG 2 YEARS	-	-	-	-	-	-	-	-	4,631.5	3,651.8
LAG 3 YEARS	-	-	-	-	-	-	-	-	-	4,135.2

INTERNAL RATES OF RETURN OF NET STREAMS

=====

	BTOT	UP 10%	UP 20%	UP 50%	DOWN 10%	DOWN 20%	DOWN 50%	LAG 1 YEAR	LAG 2 YEARS	LAG 3 YEARS
CTOT	21.843	23.350	24.767	28.588	20.230	18.492	12.164	19.187	17.157	15.546
UP 10%	20.382	21.843	23.217	26.923	18.818	17.133	10.984	17.955	16.089	14.600
UP 20%	19.087	20.507	21.843	25.446	17.567	15.928	9.931	16.858	15.133	13.751
UP 50%	15.928	17.249	18.492	21.843	14.511	12.981	7.319	14.156	12.763	11.634
DOWN 10%	23.512	25.071	26.538	30.488	21.843	20.044	13.505	20.586	18.366	16.813
DOWN 20%	25.446	27.066	28.588	32.686	23.712	21.843	15.055	22.197	19.752	17.831
DOWN 50%	33.925	35.799	37.557	42.275	31.915	29.744	21.843	29.156	25.666	22.985
LAG 1 YEAR	-	-	-	-	-	-	-	21.843	19.187	17.157
LAG 2 YEARS	-	-	-	-	-	-	-	-	21.843	19.187
LAG 3 YEARS	-	-	-	-	-	-	-	-	-	21.843

Internal Rates of Return of Net Streams

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NBTOT	21.85%
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SWITCHING VALUES AT 12%

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STREAM	APPRAISAL VALUE	SWITCHING VALUE	PERCENTAGE CHANGE
BTOT	11,470.20	5,660.59	-50.65%
CTOT	5,660.59	11,470.20	102.64%

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Net Present Value at OCC 12% = 5,809.7  
Internal Rate of Return = 21.9%  
Coupon Equivalent Rate of Return = 24.2%

Table 8. Per Hectare Yield Estimates of Major Species Planted Under the Project

	Rajasthan		Uttar Pradesh		Himachal Pradesh		Gujarat	
	MAI (mt)	Rotation (years)	MAI (mt)	Rotation (years)	MAI (mt)	Rotation (years)	MAI (mt)	Rotation (years)
<b>I. Species</b>								
Ailanthus sps.	4.5	15	-	-	-	-	-	-
Casuarina sps.	-	-	-	-	-	-	5.5	10-15
Conifers:	-	-	-	-	1.3	80-120	-	-
P. roxburghii								
P. wallichiana								
C. deodara								
Dalbergia sissoo	2.5	15	5	15	1.9	15	3.2	12-15
Eucalyptus sps.	4.5	8-10	6	8	3.5	10	6.3	8
Fuelwood and fodder <sup>1</sup>	2	10-15	5	10-12	3.2	10-15	3.5	10-12
Poplar sps.	-	-	6	8	3.5	10	-	-
Teak (Tectona grandis)	-	-	6.6	40-80	-	-	6.0	40-80
<b>I. Other Products</b>								
Bamboo, 2 culms per clump per year from Year 6.								
Branchwood - ½ to 3 kg/tree/yr								
(Ber - fruit) - 2 to 6 kg/tree/yr								
Fruit (general) - 2 to 5 kg/tree/yr								
Grass - 1 to 3 mt/ha/yr								
Leaf fodder - ½ to 2 kg/tree/yr								
Seed pods - ½ to 3 kg/tree/yr								

<sup>1</sup> These include: Acacias, Albizzia, Bauhinia, Melia, Prosopis, etc.

Note: In general, SAR plantation model felling and harvest schedules have been adhered to.  
Pole = 0.044 m<sup>3</sup>/pole. 1 m<sup>3</sup> = 0.63 mt.