India

Rajasthan Forestry Development Project

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Field Survey: October 2004

1. Project Profile and Japan's ODA Loan

Region Map of Project Site

Trees planted by this Project

1.1 Background

The forests in Rajasthan were devastated by indiscriminate deforestation to satisfy the demand for lumber in urban areas and also by overuse of forest resources as a result of population increases and overgrazing in agricultural areas.

In the agricultural areas of this state, people depend on firewood for household fuel needs, and nearly all of that firewood is supplied by the state's forests. So, it was necessary to increase production of wood for usage as fuel to ensure that the supply of fuel would keep pace with the increasing population in the agricultural areas. Moreover, it was necessary to reduce overgrazing as that inhibits the natural renewal of forests, and because most of the fodder (grass, etc.) for animals raised in state was produced in state, it was desirable to increase the fodder supply by planting grass as well.

Meanwhile, accompanying widespread topsoil erosion due to frequent droughts and forest devastation, the water supply balance was upset, and the level of the water table in Rajasthan was dropping. For this reason, it was necessary to construct small dams[1] on the lower reaches of waterways in the afforested regions and to raise the level of the water table around wells, together with implementing afforestation around the villages, accelerating permeation of flowing surface water, and boosting the soil's water retention capacity.

In the agricultural areas, firewood was consumed in large quantities because, in addition usage of firewood for household needs, funeral cremation using firewood was also customary.

[1] Small-scale dams are simple dams built in waterways to store water and maximize water usage in low rainfall areas. They are effective for providing watering holes for livestock and water for household use such as laundry as well as for increasing greenery by improving the water retention capacity of soil in the area.

Consequently, to avoid exhaustion of forest resources, measures were required such as construction small-scale crematoriums with improved fuel efficiency (improved wood and coal crematorium facilities) [2].

The government of Rajasthan was aware of the fact that the cooperation of local residents is indispensable for the preservation and restoration of forest resources, and it had implemented afforestation based on a forest policy centered around resident-participatory forest management. The farm village residents were also deepening their appreciation of the importance of forest resources and were requesting early implementation in each village of afforestation activities by the Forest Department.

1.2 Objectives

The objective was to improve productivity by increasing grass and fodder, etc., and to promote environmental preservation and job creation through the planting of trees and grass by the Joint Forest Management (JFM) conducted cooperatively by the Forest Department and local residents in the 15 regions in Rajasthan (shaded area of map below), and thereby to contribute to the alleviation of poverty in those regions.

Figure 1: 15 Regions Involved in Project

[2] Improved wood and coal crematorium facilities are built with improved specifications and materials and also take into consideration the traditional religious views of Hinduism. They are effective for improving thermal efficiency and for reducing both the fuel cost and the time required for cremation.

1.3 Borrower/Executing Agency

Borrower: President of India

Executing Agency: Forest Department, Government of Rajasthan

1.4 Outline of Loan Agreement

Loan Amount/Disbursed Amount	4,219 million yen/4,219 million yen
Exchange of Notes/Loan Agreement	December 1994/February 1995
Terms and Conditions -Interest Rate -Repayment Period (Grace Period) -Procurement	 2.6% 30 years (10 years) General Untied
Final Disbursement Date	April 2002
Main Agreement	Managed Directly
Feasibility Study, etc.	1992 Government of Rajasthan

2. Results and Evaluation

Figure 2: Wasteland prior to Project

2.1 Relevance

2.1.1 Relevance of the Plan at the Time of Appraisal

In India's 8th 5-year plan (1992-1997), the policy of poverty alleviation was asserted as a major policy issue.

In Rajasthan in particular, the living environment of the poor class in farm villages had deteriorated due to devastation of the forests, and important issues included increasing production of wood for fuel and animal fodder, environmental preservation, and provision of employment opportunities to the poor class.

This was a project to conduct afforestation activities through Joint Forest Management (JFM) conducted cooperatively by the Forest Department and local residents for the benefit of the local residents in 15 regions of Rajasthan. As a response to the above issues, this was a project of high priority and pressing urgency

2.1.2 Relevance of the Plan at the Time of Evaluation

In the 10th 5-year plan (2002-2007), poverty alleviation is positioned as one of India's major issues.

The rate of forest cover in Rajasthan is only about 5%, versus the national average of 21%. Improvement of the social and economic environment is of continued importance, and this includes environmental preservation, increased production of forest products and grass for fuel and fodder, and creation of employment opportunities in Rajasthan.

This is a project to conduct afforestation and grass planting activities through JFM, which is proclaimed in a Rajasthan Government ordinance (revised in 2000). As a response to the above issues, this is a project of high priority and pressing urgency

From the above standpoints, the project's relevance is considered high at the current stage in time.

2.2 Efficiency

2.2.1 Output

This project is composed of (1) an afforestation component[3] which includes afforestation of bare land, restoration of devastated forest land, timber planting for fuel use, grass planting, and farm forestry and (2) a non-afforestation component which includes development of water sources (small dams) and construction of small-scale crematoriums. The output of this project was accomplished basically as planned, as shown below (Table 1).

Table 1: Original Plan, Actual Results, and Achievement Ratio of the Project

	Component	Planned	Actual	Achievement Ratio (%)
(1)	Afforestation Component (ha)	55,000	55,578	101
1	Bare land afforestation (ha)	12,000	11,525	96
2	Devastated forest restoration (ha)	29,000	29,947	103
3	Timber planting for fuel use (ha)	8,000	8,053	101
4	Grass planting (ha)	6,000	6,053	101
5	Farm forestry (10,000 trees)	8,000	8,700	109
(2)	Other Component of Project			
1	Development of water sources (small dams) (number of dams)	530	600	113
2	Construction of small-scale crematoriums (number of facilities)	250	252	101
(3)	Executing Agency's Project Management			
1	Preparation of project implementation plan (micro plan)	1400	864	62
2	Progress management and evaluation of project (%)	10	15	150
3	Research	-	-	-
4	Domestic training (persons)	22,200	67,950	306
5	Foreign training (persons)	15	3	20
6	Purchase of vehicles (number of vehicles)	113	63	56
7	Construction of offices, etc. (number of locations)	99	148	149
(4)	VFPMC's Project Management			
1	Villages participating in project	1,400	1,890	131
2	Number of VFPMCs	1,400	1,952	139

The number of villages participating in this project was 139% of the number originally planned. The number increased because, although the initial plan was to form Village Forest Protection & Management Committees (VFPMC) in each village, VFPMCs were actually formed in each hamlet, which is a different from administrative unit of village. The afforestation

[3] The land area afforested by this project is 55,578 ha, which is approximately equivalent to 550 Km², the square area of Kobe, Japan.

component was implemented basically according to plan. The number of young trees distributed was 109% of the planned level, and this was due to increased demand for afforestation from residents.

The initial plan was to organize one VFPMC in each village and to prepare one micro plan[4]. However, VFPMCs were organized in more villages than planned. Due to the way in which the forest was used, the project was implemented with one micro plan prepared for multiple villages and VFPMCs, but no problems have arisen due to this joint operation. The preparation of these micro plans appears to have contributed to the understanding of the villages' social and economic conditions as well as to the smooth implementation of project activities. With regard to research, the initial plan was to consign research concerning cultivation methods for agro-forestry and raising of tree seedlings to universities and outside research institutions, in addition to research by the Forest Department itself concerning preservation of seeds, etc. However, following the start of the project, the Forest Department itself conducted research on young trees and soil, as this was anticipated to have a more immediate effect on the survival rate, etc., of planted trees.

With regard to training, due to high interest, the number of participants was more than three times the number initially planned (an increase of 45,750 persons).

As the result of adjustments based on the state government's budget-tightening policy, there was a decline in the number of persons trained overseas and the number of vehicles purchased. Meanwhile, in response to demand from the field following the start of the project, there was an increase in the number of facilities such as offices constructed.

2.2.2 Project Period

In the original plan, afforestation activities were scheduled to be completed by March 2000, but in fact the entire process was completed in March 2002 due to the time required for farm forestry.

2.2.3 Project Cost

The project cost of 5,012 million yen was almost the same as the planned amount of 4,964 million yen (approximately 101%). The actual total cost of the project in local currency was 1,492 million rupees, which was 162% of the original plan (921 million rupees) due to inflation.

As described above, although delays were evident in the project period, the output achieved a level that generally exceeded the planned level, and project cost was almost as originally

[4] The micro plan is generally divided into three stages, (1) collection of basic data, (2) summarization and prioritization of the local residents' needs, and (3) preparation of a detailed plan. In this project, all programs targeted at villages were implemented in accordance with micro plans.

planned. So, it can be said that, by and large, there was no problem with the efficiency in the implementation of this project overall.

2.3 Effectiveness

2.3.1 Improvement of Productivity

Shown in Table 2 are the changes in production quantity and the production value of the grass and non-timber products (fodder, fruit, resin, fats and oils, essential oils, and herbal medicines) from this project. As can be seen in the table, it appears that this project was effective in creating a supply of grass and fodder.

Table 2: Production Quantity and Production Value of Grass and Non-Timber Products

Year	Production Quantity (thousand tons)	Production Value (million rupees)
1996	2.443	1.65
1997	7.395	3.60
1998	7.692	3.76
1999	16.103	16.39
2000	11.423	14.60
2001	9.870	9.90
Total	54.926	49.90

Source: Rajasthan Forest Department

2.3.2 Environmental Preservation

2.3.2.1 Survival Rate of Planted Trees

Table 3 indicates the average survival rate by type of afforestation one year after the planting in the 15 regions (March 2001). The average of the survival rates by type of afforestation for this project is 72%.

Table 3: Average Survival Rate by Type of Afforestation

(%)

Bare land afforestation	73
Devastated forest restoration	70
Timber planting for fuel use	76.5
Grass planting	69
Average	72

Source: Rajasthan Forest Department

The following four main points are identified as factors contributing to the high survival rate of the young trees that were planted, despite the severe weather and soil conditions in the regions concerned: (1) mainly local varieties that grow naturally in the project regions were planted (Table 4); (2) construction was implemented to develop water sources, such as small dams; (3) measures (stone walls) were implemented to prevent livestock from intruding in planted areas; and (4) the village residents cooperated in the organization of VFPMCs as well as in spreading them and in their educational activities and training.

Table 4: Example of Planted Varieties

Name	Usage
Acacia catechu	Uncaria peg, dye, chewing, medicine, farm tools, tool design, vehicles, rail ties, high quality firewood and charcoal
Acacia nilotica	Dye
Acacia senegal (Sengegal Gum Acacia)	Textiles, glue for stamps
Albizzia lebbak (Woman's Tongue or Siris Tree)	Vehicles, interior decoration, furniture
Azadirachta indica (Neem Tree)	Furniture, construction, vehicles, interior decorating, bark and seeds used for medicinal purposes, used to line streets
Dendrocalamus strictus	Civil engineering construction material, agricultural building material, furniture, mats, knitting
Holoptelia integrifolia	Farm tools, carving, vehicles, construction, oil from seeds. Leaves used for fodder.
Madhuka latifolia	Lumber, fuel, raw material for alcohol, medicine, fodder
Zizyphys jujuba (Indian Jujube)	Fruit eaten raw and processed. Fruit, seeds, and bark used for medicinal purposes and as raw material for tannin.

Source: Rajasthan Forest Department

Looking at other afforestation projects in India by the Japan Bank for International Cooperation (JBIC), the average survival rate of trees planted in the Afforestation and Pasture Development Project along Indira Gandhi Canal Area (loan agreement, 1991) was from 50.6% (for trees planted in FY 1995) to 70.8% (for trees planted in FY1996). The average survival rate

for the Afforestation Project in Aravalli Hills was 77.9%. Compared to these two projects, the survival rate of trees planted in this project may be considered high overall.

2.3.2.2 Rate of Forest Cover

Table 5 indicates the rate of forest cover[5] (as of March 2001) for each of the 15 regions involved.

The Food and Agriculture Organization of the United Nations (FAO) has set a goal of 10% or more for the rate of forest cover in developing countries. The rate of forest cover in this project exceeds 10% in 6 regions and is less than 10% in 9 regions.

The rate varies according to region in this project due to regional differences in climate, soil quality, and topographical features, etc.

Table 5: Rate of forest cover by Region (%)

Region	Coverage Ratio
Ajmer	4.19
Baran	16.30
Bharatpur	4.92
Bhilwara	2.09
Bundi	8.20
Dausa	4.53
Dholpur	13.68
Dungarpur	6.37
Jaipur	4.53
Khalawar	6.96
Karauli	12.22
Kota	11.32
Rajsamand	12.69
Sawai Madhopur	12.22
Tonk	2.81
Average	4.78

Source: Rajasthan Forest Department

2.3.2.3 Improvement of the Water Supply Balance

Table 6 displays the results of an impact evaluation study which is related to improvement of the water supply balance and which was conducted by an external agency commissioned by the Rajasthan Forest Department in 2000. According to this study, in the 12 regions evaluated, the water levels in wells one year after the planting has risen an average of 1.78 meters, and the number of soil water retention days improved to an annual average of 131 days due to the development of water sources.

Table 6: Results of Improvement in Water Supply Balance

Project Areas	Increase in Well Water Level	Annual Average Soil Water Retention Days (days)
Eastern Area	From 0.55m to 1.80m	102
Mid-Area	From 0.60m to 2.45m	129
Western Area	From 0.75m to 3.00m	148
Average	1.78m	131

Source: Rajasthan Forest Department

Note: The eastern area includes Jaipur, Dausa, Dholpur, and Karauli; the mid-area includes Kota, Tonk, Bundi, and Jhalawar; the western area includes Dungarpur, Udaipur, Rajsamand, and Bhilwara.

[5] Rate of Forest Cover is equal to the forest area divided by the total land area of the region concerned.

2.3.3 Job Creation

Table 7 displays the number of jobs created by this project according to gender and fiscal year. According to this table, jobs for a total of 21.8 million person/days were created by this project (99% of the planned amount), and of this, women were employed in jobs created by this project for 12.92 million person/days.

Table 7: Jobs by Gender and Fiscal Year (person/days) (million persons)

	Planned	Actual		
Year	Total	Total	Men	Women
1995	2.62	2.37	0.98	1.39
1996	4.68	4.15	1.62	2.53
1997	5.48	5.56	2.17	3.39
1998	5.83	4.32	1.82	2.5
1999	3.4	3.37	1.42	1.95
2000	-	1.25	0.51	0.74
2001	-	0.78	0.36	0.42
Total	22.01	21.8	8.88	12.92

Source: Rajasthan Forest Department

2.3.4 Internal Rate of Return

Financial internal rate of return (FIRR) was not calculated because this project was not originally intended to be a financially profitable project.

To summarize the above, the project's objectives of "improvement of productivity by increasing grass and fodder, etc., and promotion of environmental preservation and job creation" were achieved beyond the level planned, to the extent that one looks at the resultant improved productivity, environmental preservation, and job creation.

2.4 Impact

2.4.1 Improvement of Social and Economic Environment

2.4.1.1 Improvement of Conditions Affecting Gender and Development（GAD）

Women are playing an important role in afforestation activities. With the goal of encouraging women's participation in VFPMC activities, an ordinance of the Rajasthan Forest Department issued in October 2000 established a regulation that at least one-third of VFPMC members must be women, at least 3 of the 11 members of the VFPMC executive council must be women, and of the offices of chairperson, deputy chairperson, and accountant, at least one must be filled by a woman. Moreover, in consideration of the fact that heretofore women have had few opportunities to participate in public and have their voices heard, VFMPCs are obligated to set up a Women's Advisory Sub-Committee (WAS) within the VFMPC to more accurately reflect the needs of women. Through efforts to promote women's participation in projects such as this, effects are being realized that lead to the empowerment of women, including an increased voice

for women in the villages and greater participation in village activities. Below are the results of a beneficiary survey (of 75 men and 30 women) in 3 regions[6] that benefited from the project[7].

-Results of Beneficiary Survey-

-Impact on Women-

When men and women who benefited from the project were questioned concerning whether the project had positive effects for women, 93% replied that there "were positive effects." Specifically mentioned are "increased animal fodder and fuel," 38.6%; "increased employment," 13.9%; "women became able to state their opinions freely," 9.9%; and "improvement in women's status," 7.9%. Furthermore, concerning the reply of "increased animal fodder and fuel," securing firewood and animal fodder is considered housework for women and girls, and it appears that the reduction in the time required for these jobs is considered a positive effect for women.

2.4.1.2 Improvements in the Lives of Local Residents

Below are the results of the beneficiary survey concerning improvements in the lives of the local residents due to the project.

-Results of Beneficiary Survey-

-Improvements in the Lives of Local Residents-

When beneficiaries were questioned concerning the positive effects of this project, they replied "reduction in time required to secure animal fodder," (reduced 86 minutes on average) 74%; and "reduction in required to secure firewood," (reduced 74 minutes on average) 48%. In addition, other positive effects were pointed out, including greater sufficiency of basic necessities such as fuel and animal fodder, savings on fuel expense due to the crematoriums, a more convenient water supply due to the higher level of well water, and reduction in the heavy labor of securing firewood.

Also, 57% replied that "changes have occurred in the structure of livestock ownership." It seems that, due to the stable supply of grass and fodder thanks to this project, the number of goats kept has decreased, and the number of milk cows and water buffalo, which have a higher added value, has increased.

2.4.2 Contribution to Alleviation of Poverty

Below are the results of the beneficiary survey concerning the project's contribution to the alleviation of poverty.

[6] The 3 regions of Rajsamand、Dausa、Bhilwara were selected as subjects of the beneficiary survey from among the 15 regions that benefited from this project due to their topography, location, and industrial structure, etc.

[7] Furthermore the estimated number of beneficiaries in the 15 regions that benefited from the project is approximately 252,000 persons. (cf. population of Fukui City, Fukui Prefecture, Japan: 252,104)

-Results of Beneficiary Survey-

-Contribution to Increased Income-

When the beneficiaries were questioned concerning changes in income due to this project, 66% responded that "household income increased." Specifically, the respondents' monthly average income rose 29%, from 2,878.26 rupees prior to the project to 3,736.23 rupees subsequent to the project. The reasons for the increased income were given as "harvest of twig and leaf fodder and grass," 42.6%; "livestock ownership," 29.4%; "employment in this project," 13.2%; and "other," 14.7%.

2.4.3 Effects of Resident Relocation and Land Acquisition

The land afforested by this project is owned jointly with the National Forest. From the standpoint of land acquisition, resident-participatory forest management is being implemented, and there has been no information of deleterious effects on the lives of the beneficiary residents.

2.5 Sustainability

2.5.1 Village Forest Protection and Management Committee (VFPMC)

2.5.1.1 Operation and Maintenance System

Figure 3: VFPMC Meeting

Based on Joint Forest Management (JFM), the VFPMC is conducting the operation and management of the afforested regions.

JFM is a program where government agencies (the Forest Department in the case of India) cooperate with local residents to carry out nurturing and management of the forest. Rajasthan State enforced a law for this in 1999, and the law was revised in October 2000.

The number of VFPMCs organized by this project stands at 1,952 at the time of this evaluation, with more than 150,000 people participating in JFM. The executing agency's "The Forest Developmnet Project Overview" reports that the understanding of the Forest Department staff concering JFM is improving and that participation by residents in forest preservation and management is being promoted. Given the fact that VFPMCs were engaged in on-going forest preservation activities when observed for the purpose of this evaluation and the fact that 96% of the respondents in the beneficiary survey indicated interest in on-going participation in a VFPMC, the sustainability of the VFPMCs appears strong.

2.5.1.2 Technical Capacity

No technical problems are visible in the basic operation, maintenance, and management because the state Forest Department is implementing training concerning JFM, etc., for farmers.

2.5.1.3 Financial Status

There are no problems in the financial status since VFPMC has established and is maintaining a reserve fund.

2.5.2 Rajasthan Forest Department

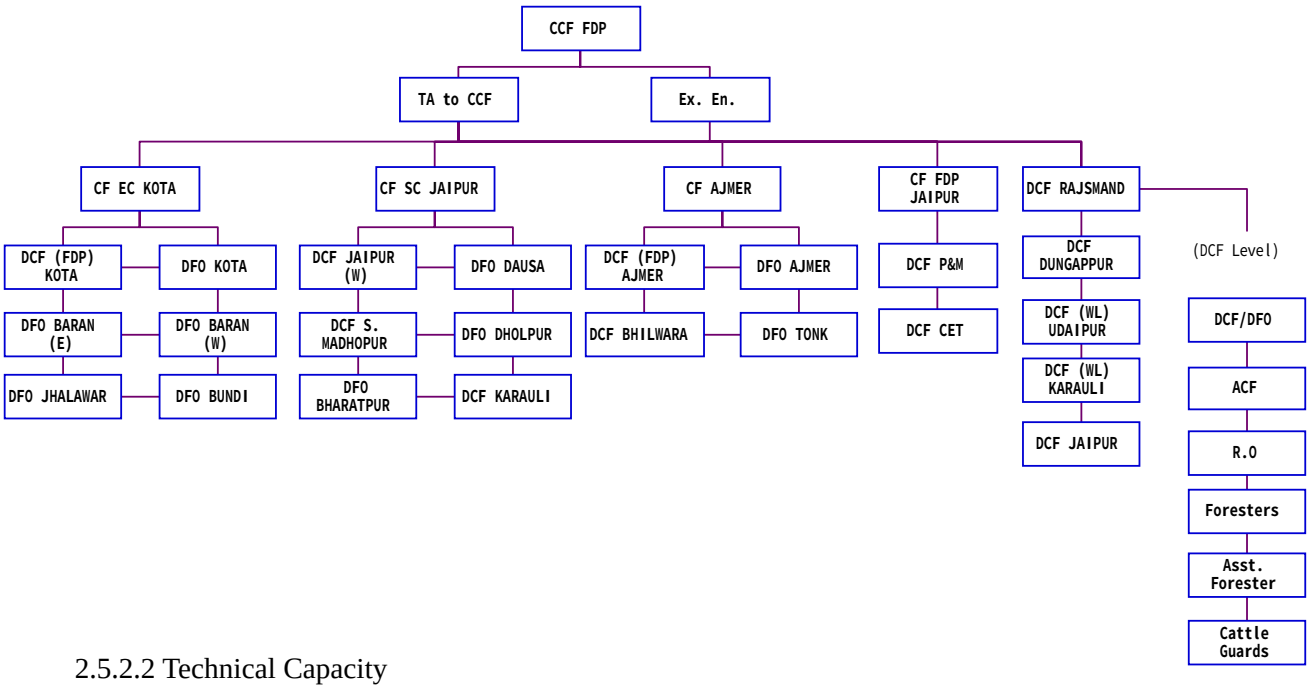
2.5.2.1 Operation and Maintenance System

The executing agency of this project is the Rajasthan Forest Department. Operation and management duties that are not conducted by the VFPMC are handled by the Forest Department.

In the Forest Department, the Chief Conservator of Forest (CCF) oversees the Conservator of Forest (CF) and the Deputy Conservators of Forest (DCF/DFO). Onsite afforestation operations are conducted under the supervision of the DCFs by the Assistant Conservators of Forest, Range Forest Officers, Foresters, and Forest Guards (Figure 4).

The operation and maintenance activities in the afforested regions consist of grass mowing, watering, and branch trimming. The VFPMCs are responsible for this operation and maintenance, under the supervision of the Forest Department. In addition, the Forest Department personnel are in charge of monitoring, evaluating, and doing research on the trees that are planted.

Figure 4: Organization of the State Forest Department



2.5.2.2 Technical Capacity

A training system for staff is established, and opportunities are also arranged for transfer of technology to staff of other forest departments and for sharing experience with them. In addition,

training has been implemented continually since the implementation of the project.

2.5.2.3 Financial Status

A budget was allocated by the state government for this project. Furthermore, the actual operation and maintenance budget for FY2003 was 151 million rupees. The executing agency anticipates that the operation and maintenance budget will be secured in the future.

3. Feedback

3.1 Lessons Learned

None

3.2 Recommendations

None

Comparison of Original and Actual Scope

Item	Planned	Actual Performance
Output		
1) Afforestation Component	Total 55,000 ha	Total 55,578 ha
1. Bare land afforestation	12,000 ha	11,525 ha
2. Devastated forest restoration	29,000 ha	29,947 ha
3. Timber planting for fuel use	8,000 ha	8,053 ha
4. Grass planting	6,000 ha	6,053 ha
5. Farm forestry (trees distributed)	80 million trees	87 million trees
2) Other Component		
1. Water source development (small dams)	530 dams	600 dams
2. Small-scale crematoriums	250 facilities	252 facilities
3) Executing agency's project management		
1. Preparation of micro plans	1,400	864
2. Progress management and evaluation of project	Implementation of external and internal evaluations in 10% of each beneficiary region.	Implementation of external and internal evaluations in 15% of each beneficiary region.
3. Research	Preservation of seeds, etc.	Research on young trees and soil.
4. Training	22,000 persons domestically and 15 persons overseas.	67,950 persons domestically and 3 persons overseas.
5. Vehicle purchase, office construction, etc.	113 vehicles/99 locations	63 vehicles/148 locations
4) VFPMC's project management		
1. Number of villages participating in project	1,400 villages	1,840 villages
2. Number of VFPMCs	1,400	1,952
2. Project Period		
Afforestation Component		
(except farm forestry)	1995 - 1999	1995 - 1999
(Farm forestry)	1995 - 1999	1995 – 2002
Other Component	1995 - 1999	1995 - 1999
3. Project Cost		
Foreign Currency	302 million yen	2 million yen
Local Currency	4,662 million yen (864.9 million rupees)	5,010 million yen (1,491 million rupees)
Total	4,964 million yen	5,012 million yen
ODA Loan Portion	4,219 million yen	4,215 million yen
Exchange Rate	1 rupee ＝5.39 yen	1 rupee ＝3.36 yen