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IMPLEMENTATION COMPLETION REPORT
(IDA-26230; TF-28737)

ON A

CREDIT

IN THE AMOUNT OF SDR 141.7 MILLION (US\$ 200 MILLION EQUIVALENT)

TO

THE PEOPLE'S REPUBLIC OF CHINA

FOR A

FOREST RESOURCE DEVELOPMENT AND PROTECTION PROJECT

June 27, 2002

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CURRENCY EQUIVALENTS

(Exchange Rate Effective January 2002)

Currency Unit = Yuan (Y)
Yuan 1 = US\$ 0.1205
US\$ 1 = Y 8.30

Year Average

1994 \$1 = Y8.50
1995 \$1 = Y8.30
1996 \$1 = Y8.30
1997 \$1 = Y8.30
1998 \$1 = Y8.30
1999 \$1 = Y8.30
2000 \$1 = Y8.30
2001 \$1 = Y8.30

FISCAL YEAR

January 1 - December 31

Weights and Measures Metric System

ABBREVIATIONS AND ACRONYMS

CAF	Chinese Academy of Forestry
CAS	Country Assistance Strategy
CTBEP	Commercial Timber Base Establishment Program
ERR	Economic Rate of Return
FRDPP	Forest Resource Development and Protection Project
FRR	Financial Rate of Return
GEF	Global Environment Facility
ICR	Implementation Completion Report
IMPC	Intensively Managed Plantation Component
MPFC	Multiple-Use Protection Forest Component
NAP	National Afforestation Project
NFPP	Natural Forest Protection Program
NPV	Net Present Value
PMC	Project Management Center (in SFA)
PMO	Project Management Office
R&E	Research and Extension
RESP	Planning and Extension Support Panels
SAR	Staff Appraisal Report
SDR	Special Drawing Right
SFA	State Forestry Administration

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**CHINA
FOREST RESOURCE DEV**

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<i>Project ID:</i> P003557	<i>Project Name:</i> FOREST RESOURCE DEV
<i>Team Leader:</i> Jin Liu	<i>TL Unit:</i> EASRD
<i>ICR Type:</i> Core ICR	<i>Report Date:</i> June 27, 2002

1. Project Data

Name: FOREST RESOURCE DEV *L/C/TF Number:* IDA-26230; TF-28737
Country/Department: CHINA *Region:* East Asia and Pacific Region
Sector/subsector: AT - Forestry; VM - Natural Resources Management

KEY DATES

	<i>Original</i>	<i>Revised/Actual</i>
<i>PCD:</i> 1992-06-29	<i>Effective:</i> 1994-11-03	
<i>Appraisal:</i> 1993-11-05	<i>MTR:</i> 1997-05-01	
<i>Approval:</i> 1994-06-07	<i>Closing:</i> 2001-12-31	

Borrower/Implementing Agency: People's Republic of China/State Forestry Administration
Other Partners:

STAFF	Current	At Appraisal
<i>Vice President:</i>	Jemal-ud-din Kassum	Gautam S. Kaji
<i>Country Manager:</i>	Yukon Huang	Nicholas C. Hope
<i>Sector Manager:</i>	Mark D. Wilson	Joseph Goldberg
<i>Team Leader at ICR:</i>	Liu Jin	Richard Scobey
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2. Principal Performance Ratings

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HL=Highly Likely, L=Likely, UN=Unlikely, HUN=Highly Unlikely, HU=Highly Unsatisfactory, H=High, SU=Substantial, M=Modest, N=Negligible)

Outcome: S
Sustainability: L
Institutional Development Impact: SU
Bank Performance: S
Borrower Performance: S

Quality at Entry: QAG (if available) ICR
S
Project at Risk at Any Time: No

3. Assessment of Development Objective and Design, and of Quality at Entry

3.1 Original Objective:

The Forest Resource Development and Protection Project (FRDPP) was designed to enhance the

productivity of forestry resources, the efficiency of resource use, and the institutional capacity for sustainable management in the three major types of forest land in China: plantations, watershed protection forests and nature reserves. The project would: (a) expand the supply of commercial timber and pulpwood through establishment of intensively managed plantations; (b) develop improved models for watershed management through establishment of protection forests; (c) enhance biodiversity conservation through the protection of nature reserves; (d) strengthen the operating efficiency of technical support services in the forestry sector, particularly planting materials, research, and extension programs; and (e) strengthen the capacity of forest sector institutions in planning and management.

The project objectives were clear and well understood by the participating agencies. The bulk of China's very limited timber supply was being drawn through unsustainable exploitation of natural forests in the past decades. The Government's Natural Forest Protection Program (NFPP), which launched the logging ban for nature forests in 1998 further widened the timber supply gap. The project objectives supported the government's afforestation drive to improve timber supply, release the pressure on natural forests and improve the ecosystem. These objectives reflected Government development priorities and are consistent with the Bank's Country Assistance Strategy (CAS). The project design was relatively simple, and included introduction of improved silvicultural techniques, watershed land use models, environmental management guidelines, research priorities and extension of best practice for the forestry sectors and related government agencies.

The market and price risks were manageable, since China has large gap of timber supply in its domestic market and the project can produce timber of different dimensions according to market conditions. The risks of pests or fire destroying the plantations were minimized by incorporating suitable environmental measures into the project design and adopting pest and fire monitoring systems. However, the project may not achieve expected benefits without continuing management inputs from the forestry entities and the Governments policy support for plantation logging. This could be promoted through appropriate post-project management arrangements and active government commitment.

3.2 Revised Objective:

The project's objectives remained unchanged.

3.3 Original Components:

The project has the following six components:

- (a) Intensively Managed Plantation Component would establish 620,000 hectares of plantations for timber supply in sixteen provinces as the second phase for the plantation program initiated under the National Afforestation Project (NAP);
- (b) Multiple-Use Protection Forest Component would establish 280,000 hectares of watershed protection forests in the middle and upper reaches of the Yangtze River Basin in Sichuan and Hubei Provinces based on new silvicultural models and improved land-use planning;
- (c) Nature Reserves Management Component would enhance biodiversity conservation through support for new management of natural forest habitats for Giant Pandas and other endangered species, and development of new training, research, and information management programs;

(d) Planting Stock Development and Nursery Management Component would raise the quality of planting materials through introduction of improved genetic materials and nursery management technologies, and support the production of 2.1 billion seedlings for afforestation under the project.

(e) Research and Technology Transfer Component would strengthen the operational focus of relevant research and extension in China through provision of technical assistance and operating support for eleven priority research programs, experimental plantations, and a field extension network; and

(f) Institutional Capacity Building Component would strengthen the capacity of public and private sector institutions in forestry through support for training and technical assistance, development of an information management system, development of a new private sector investment promotion agency, improved natural forest management, and carry out policy studies.

The components were reasonably related to the project objectives. In response to the lessons learned from previous Bank supported projects, the project emphasized the introduction of new afforestation technologies, particularly improved planting materials and planting models for a wider range of species, integration of protection forests and nature reserves management into project activities and capacity building of forestry agencies.

The formulation of Research and Extension (R&E) objectives and their translation to operational terms provided a sound basis for achieving the overall project objectives. The design recognized the need to depart from traditional research, and focus on more precise targets with immediate operational application for the implementation of the plantation and forest protection program. It also set up a unique arrangement, aimed at rapidly disseminating research results to field afforestation entities. However, the design was over-ambitious in regard to the rapid application of several of technologies, including clonal forestry and containerized seedlings. The design also heavily relied on reaping immediate benefits from short-term research programs, but underemphasized the ongoing long-term research that is necessary for sustained improvement of forest practices.

3.4 Revised Components:

Component	Cost	Rating
Intensively Managed Plantation	\$239,800,000	S
Multiple-Use Protection Forest	\$ 44,700,000	S
Nature Reserves Management	\$ 21,400,000	S
Planting Stock Development and Nursery Management	\$ 41,000,000	S
Research and Technology Transfer	\$ 4,400,000	S
Institutional Capacity Building	\$ 3,500,000	S

3.5 Quality at Entry:

The project was assessed for quality at entry and the rating was satisfactory. The project design is consistent with the Bank's CAS and government priorities, and was carefully structured to include meaningful innovations. The Bank's applicable safeguard policies on environmental assessment, natural habitats, pest management, and forestry were adhered to adequately. Project designers were aware of the environment-economy-social linkages, and benefits were achieved in these three aspects.

4. Achievement of Objective and Outputs

4.1 Outcome/achievement of objective:

The project was carried out by State Forestry Administration (former Ministry of Forestry), 17 provinces, autonomous regions and municipalities, and 313 counties. The outcome of the project as a whole, both in relation to its development objectives and its physical implementation, is satisfactory. In principal, the project has achieved its objectives and yielded sound development impacts. The project has fully reached its objectives of extending the forest resources, which will expand commercial timber supply, developing improved models for watershed management, strengthening the technical support services on planting material, research and extension programs. It is expected to generate most of the economic and environmental benefits projected in the project Staff Appraisal Report (SAR) and the financial risk is considered to be acceptable. The project basically reached the objective of strengthening the institutional capacity. Under this aspect, the domestic training and extension program was extremely successful, which has effectively disseminated improved silvicultural technologies and project management experience to the project agencies and entities. As a result, institutional capacity building in forestry management was greatly improved. However, number of people involved in the overseas training and international technical assistance was less than the designed targets, which has limited the introduction of the experience from abroad.

The project objectives and achievements were completely in line with the current Government development strategy and the Bank goals of environment improvement, technology transfer and institutional capacity building. As about one-third of the project counties are poverty counties, the project has had an impact on poverty reduction by generating employment opportunity and income raising for poor households in the remote areas.

4.2 Outputs by components:

(1) *Intensively Managed Plantation Component (IMPC)* A total of 749,135 ha intensively managed plantations have been established, 121% of the SAR target for timber plantation establishment. Of these, about 59% are conifers, 28% are broadleaf trees and 13% are bamboo. This result has exceeded project design targets that required at least 23% of broadleaf trees and 7% of bamboo to be planted. Native Chinese species comprise 79% of total planting compared with the target of 75%. The plantations were in general well planted and tended, with average survival rate of 95%, and the plantation models and environment protection measures have been adopted in most planting sites.

However, in some cases fertilizer applications were not enough or were applied too late. This occurred for two reasons: (a) organic matter was substituted for chemical fertilizer and there are no equivalent application rate standards; and (b) the project's centralized procurement system for fertilizer resulted in very long delays for the fertilizer delivery. In some plantation sites, the Environmental Protection Guidelines were not correctly followed. Deficiencies included planting lines not properly following the contour, incorrect terrace building allowing water to collect and flow down hill, insufficient water cut-offs on roads and paths and vegetation was not appropriately retained on slope bottoms.

(2) *Multiple-Use Protection Forest Component (MPFC)* A total of 282,218 ha of multiple-use protection forests were planted, 101% of target. This component was designed to develop improved models for watershed management and improve land use plan in key degraded watersheds. Three categories of plantations were established: new planting in deforested sites 156,126 ha, hill closure to allow natural regeneration 86,992 ha, and enrichment planting on hill closure sites 39,100 ha, which are close to the design targets of 57.1%, 28.6% and 14.3% respectively.

The successfully implemented protection forest component has utilized a multiple use approach to ensure protection requirements and also allow economic activities such as fruit, nuts, medicinal plants production as well as controlled timber production. This approach will improve project entities and farmers' economic situation while local communities are able to enjoy environmental benefits such as higher levels of well water and less erosion in these rehabilitated catchments where they live. Many varieties of trees, shrubs and grasses have been planted or retained, which has improved the biodiversity. Soil erosion has been reduced and water runoff is better controlled in the project areas. For example, a monitoring plot in Chongqing Municipality showed a reduction of 30% in silt load following development of the protection forest. Plantation quality is generally good and the result is a vigorous vegetation cover in terms of both ground cover and vertical stratification, except on extreme sites such as slips at the very high altitudes where growth is much slower. Models for forest management in watersheds have been developed and some domestic programs have now adopted the protection models.

Land use planning and catchment selection for the multiple-use protection forest component were based on master plans of integrated watershed management formulated by agencies of the forestry, agriculture and water resources sectors. Though integrated management has been successfully carried out for the forest zones, the progress of related activities carried out by agriculture and water resource departments in other zones outside the project areas has lagged behind and it will have the negative impacts on the overall functions of minimizing soil erosion and water runoff for some catchments.

(3) *Nature Reserves Management Component* This component is designed to strengthen biodiversity conservation in nature reserves through testing of innovative approaches for organization, planning, skills development, information management, and the integration of local communities into reserve management. The implementation of the component focused on the following five aspects: (a) strengthening management of nature reserves; (b) restructuring the management of natural forests adjacent to nature reserves; (c) developing institutional capacity; (d) developing new nature reserve management information systems; and (f) supporting nature reserve research. This component is financed by the Global Environment Facility (GEF) and was carried out separately as an independent project named the Nature Reserves Management Project. As informed by SFA, the implementation of this component (project) has reached its expected targets and has had a broad positive impact on nature reserve management. The Nature Reserves Management Project was launched in July 1995 and will close on June 30, 2002. A separate project Implementation Completion Report (ICR) will be undertaken soon, hence that project's related evaluation including cost and financing has not been included in this report.

(4) *Planting Stock Development and Nursery Management Component* Total tree stock production was 2.533 billion, 120% of SAR target, of which 94% were the first class planting stocks. The stocks were generally available on time and in the quantities and species planned. The real success of this component is the rapid dissemination of improved genetic materials from research programs into field planting. About 249 superior clones, 630 superior families and 35 superior provenances were developed for the major afforestation species. Clones were 7.8% of the planting stock production and container stocks were 13.6% of production, which have reached the SAR target of 5% and 14% respectively. Seedling production has made improvements in bed width reduction, mycorrhiza use, reduced sowing densities, use of root cuttings, increased use of colonel material and the use of plastic bag containerized stock.

However, as the project supervision mission indicated, most of the plantations continued to exhibit a wider variation in tree height and diameter than that expected after the adoption of improved nursery technology and use of improved genetic material. The implication is that tree stocks were not correctly culled and graded, or properly transported and handled. It is an evident from field visits that the guidelines used for acceptance of planting material need to be more strict. Therefore, it seems that nursery management

remains a constraint on planting quality improvement and should be further improved in future forestry projects.

(5) Research and Technology Transfer Component The ten research programs established under the NAP were to be carried out in the project. One new program was initiated on protection forests. The research programs have been closely linked with project plantation establishment and have contributed to a sustained flow of innovations. Integrated Research and Extension Support Panels (RESPs) at national, provincial and county levels have successfully planned and supervised research work, although the effectiveness of RESPs and Central Research Groups varied from one group to another. The organizational structure was generally rated as efficient by project staff interviewed.

The majority of the individual research programs, carried out by Chinese Academy of Forestry (CAF) and provincial research institutions, have been rated satisfactory or very satisfactory, reflecting the quantity and quality of outputs. The most striking results are noticed in seed genetics quality and tree breeding improvement and the establishment of demonstration stands and pilot forests. For all important tree species within the project, provenance areas were identified, seed stands, seedling seed orchards and clonal seed orchards were established or improved, and clonal selection and propagation were started for a number of species. Except for loblolly pine, for which improved seed has still to be imported, national programs are now in a position to regularly supply site matching, high quality reproductive materials. This is one of the most significant achievements of the project, since it will contribute to upgrading of the quality of future plantations.

The extension program, aimed at disseminating a specific set of technologies appears to have had a significant impact. The main technologies disseminated include: planting material selection and development, seedling production and nursery management, fast growing species cultivation, fertilization, thinning, protection forest planting and management, and pest control. Interviews of field technicians confirmed that they received significant amounts of technical training and information and adopted a series of new techniques for their plantation establishment. According to available data, 49 research results have been identified and disseminated and 317,000 copies of 161 technical guidelines were distributed at provincial level, while 36 publications received a ministerial level distribution.

An area of 278 ha mid-term pilot plantations established during NAP has been followed-up under the project and 350 ha of new experimental plantations have been established, against the target of 140 ha. In addition, 402 ha of demonstration plantations have been established, against the project national research target of 120 ha, and about 13,674 ha of demonstration plantations also were planted by local project entities, combining various technological advancements. A larger than planned area of demonstration plantations was established because the field demonstrations were found extremely useful in guiding farmers to adopt new technologies.

(6) Institutional Capacity Building Component

Human Resource Development The implementation of training and consultant services is mixed. Project design recognized the need for a massive training program to popularize the new approach to forest establishment and management. The comprehensive training plan outlined in SAR has been implemented with considerable adaptation, giving priority to internal and local training, which was up to 150,366 person-times to project staff, 361% of the target of 41,600 person-times, and 282,561 workers and farmers have also been trained with total of 14,461 classes offered, which reflects the fact that the project has made an exceptional effort to ensure that the new technical prescriptions reach end users in the fields. The successful domestic training has played a fundamental role for realizing the goal of technical transfer and

institutional capacity building. In project areas, it is found that a significant amount of funds were provided by provincial and local authorities from outside of the project budget, instead of using project funds, to support the local training and extension.

The number of overseas study tours reached 156 person-times, 149% of the SAR target; overseas training reached 39 person-months, 65% of the target and international consultant services reached 60 person-days, against an SAR target of 225 and a revised Mid-term Review objective of 140. Project officials explained that the decrease in overseas training was due to reluctance of local managers to release staff for long-term overseas training and it was considered more worthwhile to arrange overseas tours for project staff to experience advanced forestry practices of other countries. The limited use of international consultancy has deprived the project of needed international expertise that could point out a number of deficiencies in project design or implementation. As a result, the technical assistance allocation of the Credit was reduced from Special Drawing Right (SDR) 1,370,000 to SDR 564,000, about 41% of the original figure.

Natural Forest Management Pilot The pilot program to strengthen management of three secondary natural forests has followed a sound technical approach on forest management, through the establishment of thinning and tending programs and the scientific and technical description of priority tree species. As expected, preliminary results demonstrated the benefits of proactive technical intervention in the tree composition and structure. However, the pilot program did not address key socio-economic issues relating to the sustainable use of natural forests by neighboring communities and individuals, which is crucial for the success of natural forest management. Therefore, it is considered that the technical measures taken are only the first step towards a comprehensive approach to sustainable forest management. While this small scale program could help identify some key issues, higher level attention is needed to obtain a sustainable impact on natural forest management.

Information System To improve the collection and management of forestry data, the project supported the expansion of the information system based on experience adopted from NAP. The system has been established at central, provincial, prefecture and county levels, but was largely simplified. The data include project progress, investment and material inputs, planting cost, growth of young plantations, and timber market price, which enabled effective monitoring of project progress, implementation quality, expenditure structure, market changes, and providing feedback to improve project management.

During the project Mid-term review, Fujian Private Investment Promotion Center was canceled and it has proved unnecessary because private forestry investment has increased more than ten times in Fujian Province in the past 7 years, and the policy study program was dropped due to the proposed studies had been carried out during the government's on-going policy reform.

4.3 Net Present Value/Economic rate of return:

Economic analysis was carried out for each of the 31 species models. In comparison to the SAR projections, the analysis showed an overall improved and acceptable economic rate of return (ERR) for species models under the MPFC (ranging from 12 percent to 22 percent) and for species models under IMPC (ranging from 15 percent to 33 percent). For MPFC, the total number of models with negative NPV decreased from five at appraisal to only one at ICR where the ERR was improved for 6 out of a total of 11 models. For the IMPC, an impressively improved ERR was achieved for 6 out of total 18 models. Though the analysis showed a mixed result of economic performance for various species models, the project as a whole yielded an ERR of 18.5 percent and a net present value (NPV) of Y 2,900 million (\$350 million equivalent) at a discount rate of 12 percent, over a 25-year period. This result is quite robust to wide

changes in key variables. In addition, the project generated a total of about 420,000 full time jobs as alternative employment opportunities during the project implementation period.

4.4 Financial rate of return:

Financial analysis using a cost and benefit analysis approach has been carried out for each species model, for the MPFC and IMPC, and the project as a whole. For consistency and compatibility purposes, the analysis followed the principles observed at project appraisal: (a) one rotation for all species, (b) complete production and harvesting costs, (c) complete actual investment costs, (d) on one-hectare model basis, (e) inclusion of residual values assumed in the final year for the protection forests, and (f) before tax and debt service. Benefits are derived from timbers, fruits, and by-products such as fuel wood and resin but neither investment for nor revenue from inter-cropping is considered. The analysis used a 25-year time period though a shorter growth period is required for some species models. Financial prices are in 2001 current prices. Actual import prices or the market prices actually paid were used for inputs. Weighted average roadside prices and average market prices collected from all project provinces for timber products and economic tree products were used respectively. Yearly average daily rate for labor, provided by project areas, was used for each project implementation year. All these prices have been converted to 1994 constant prices deflated based on the official inflation indices during the period. Both MPFC and IMPC and the project as a whole show very marginally higher financial rates of returns (FRR) than those at project appraisal. The project overall FRR is projected at 17.7 percent. This was attributable mainly to (a) the increase in planted area, (b) favorable market prices for some products, (c) the decrease in establishment cost, and (d) adjusted residual value for protection tree species. The estimated FRRs are generally sensitive to market prices, assumptions about the stand's age at final harvest and their productivity. Overall FRR, however, would have been dropped to 15.2 percent if forest taxes and forest fees are included in the financial analysis.

4.5 Institutional development impact:

The Project's impact on institutional development has been substantial. The project established an efficient administrative system within the provincial and county forestry bureaus, and the staff from thousands of counties, township extension stations and planting entities received training in new technologies, environmental protection and project management. This strengthened the capacity of project agencies and planting entities in planning and management. Strong linkages between research institutes with domestic experts and research programs with planting activities have enabled project agencies to quickly bring research results to field operation. The requirements for checking and evaluating quality criteria for many project operations have resulted in an appreciation of quality aspects. Environmental awareness and understanding of management requirements on forest rehabilitation and protection has been developed by the project, and important lessons are being extended within the forestry sector. However, the implementation of the overseas training and international technical assistance activities have not reached project targets, and this has limited the introduction of international technologies and experience from abroad.

5. Major Factors Affecting Implementation and Outcome

5.1 Factors outside the control of government or implementing agency:

The domestic prices of timber increased slightly in real terms during the project period due to increasing timber demand and the ban on logging of natural forests. Wages increased slightly in real terms also, but this cost increase was offset by reduced requirement of labor and other inputs for site preparation, planting

and fertilizing.

5.2 Factors generally subject to government control:

(a) Political support was mobilized from the provincial and county governments through establishment of Leading Groups involving local high level officials and representatives of local finance and planning departments. It serves as a mechanism to ensure the cooperation of local officials in budgeting counterpart funds and cross sector support, etc.

(b) Beginning from the second half of 1998, NFPP initiatives were launched in those areas with concentrated natural forests and strategic ecological locations. NFPP completely bans logging of the natural forests along upper reaches of the Yangtze River and upper and middle reaches of the Yellow River. Logging of the plantations has also been banned temporarily within the NFPP areas of Sichuan, Chongqing, Guizhou and Yunnan while forest classification is carrying out to consider alternative management systems.

(c) The State Forestry Administration (SFA) carried out an internal restructuring in early 2001 and PMC has been assigned responsibility for national Commercial Timber Bases Establishment Program (CTBEP). Trying to keep the same structure, most of the project provincial forestry departments have merged provincial Project Management Offices (PMOs) with the offices that are currently responsible for the commercial plantation establishment. These arrangements will contribute to stability of the project management institutions for the post management of the plantations established under the project, and dissemination of project experience to government's programs across the China.

5.3 Factors generally subject to implementing agency control:

The existence, prior to the project, of a well staffed and trained forestry agency and well-defined management structures provided a sound framework for project management. Weak coordination between financial departments and implementing agencies at successive levels led to delay in credit disbursement during the early period of the project implementation, but this problem was solved by improving coordination and linkages between financial management and technical quality control for the related agencies.

The centralized procurement of fertilizers and pesticides carried out by PMC, the central project agency, was not appropriate for the project where project sites are scattered in 313 counties of 17 provinces, autonomous regions and municipalities. Import quota restrictions and complex logistics led to fertilizer shortfalls and prolonged delays in delivery to farmers to meet the planting season.

5.4 Costs and financing:

To reallocate more funds for plantation and allow participating project provinces to select most adaptable plantation models, three Bank-approved implementation adjustments were made during project implementation period. By year 2001, implementation of both MPFC and IMPC had been completed. Based on information provided by PMC, the total project cost was at \$339.0 million, about 2 percent over the SAR estimate of \$333.3 million (excluding cost for Nature Reserves Management component financed by GEF). This total project cost was likely underreported according to findings of the ICR mission field visits where applied organic manure was very often not valued. In addition, as reported by PMC, about US\$4.9 million were provided by the provincial and local authorities from the budget outside of the project to support local training and new technology transfer. As those funds have not been audited as part of the

project cost, it was not included in the project cost mentioned in the report. While financing sources remain unchanged from the appraisal plan, both absolute and relative contributions by each source indeed changed. In general, contributions from all sources are reduced except beneficiary's contribution. The following table provides a summary of these changes. Of the total cost of \$339.0 million, about 57 percent (\$193.6 million) was funded by the World Bank, three percentage points lower than the project appraisal plan. The aggregated financial contributions of the government at all levels as a whole were reduced to 21 percent (\$71.0 million) from the project appraisal plan, four percentage points lower. On the contrary, the beneficiary's contribution increased by 49 percent mostly in the form of labor, organic manure and some limited amount of cash. A total of SDR 140.3 million was disbursed and there was an undisbursed balance of SDR 1.45 million in the project account, which was cancelled from the credit.

Change of Contribution at ICR from Appraisal by Financing Source

Item	Financing Sources (\$million)			
	IDA	Government	Beneficiaries	Total
Contribution at Appraisal by Value	200.0	83.3	50.0	333.3
Contribution at Appraisal by %	60.0%	25.0%	15.0%	100.0%
Contribution at ICR by Value	193.6	71.0	74.4	339.0
Contribution at ICR by %	57.1%	20.9%	21.9%	100.0%
Change by Value	-6.4	-12.4	24.4	5.6
Change by Percentage Point	-3.2%	-14.8%	48.7%	1.7%
Change by Relative Contribution	-2.9%	-4.1%	6.9%	0.0%

6. Sustainability

6.1 Rationale for sustainability rating:

Project sustainability is likely. Most of the physical project activities have been completed and the plantations are virtually certain to survive and generate economic and financial returns and environmental benefits as forecast. Project offices at the county, provincial and national levels remain in place and they or their successors are monitoring the tending, thinning, pest and fire prevention of the plantations, and the loan repayment activities of the afforestation entities. The silvicultural and management techniques and management experience developed during the project have been used in the Bank supported Forestry Development in Poor Areas Project and the Sustainable Forestry Development Project, and are now being adopted in many other plantation programs and individual plantations across the country.

Continued liberalization and economic growth in China will be favorable to timber markets and project production. The Government's NFPP and CTBEP launched in 1998 and 2001 respectively focus on the protection of natural forest and increase of the forest resource by establishing plantations to release the pressure on natural forests and meet timber needs. Therefore, the Government will continue to support the plantation management and at the same time domestic prices of timber are likely to increase. However, 107,151 hectares of intensively managed plantations and 120,564 hectares of multiple-use protection forests established under the project, about 14.3% and 42.7% of the total separately, are located in the areas where logging has been banned. Unless the timber plantation logging related issue is resolved, the future management of those plantations, economic benefits and repayment by the project entities are threatened. SFA informed that a pilot on logging and replanting plantations in a sustainable way has been successfully carried out in Sichuan Province, and central and provincial governments have confirmed that the pilot will likely be extended to other regions. The relevant policies and specific steps to address

problems associated with the logging ban are currently under review and more sustainable solutions will likely be implemented in the near future. However, close monitoring of the solutions on logging ban related issues will be necessary during the project post-management period. The final judgement on the impacts of logging ban could only be made after above subsequence are put in place.

6.2 Transition arrangement to regular operations:

Plantations have a long gestation period before delivering their final economic benefits. Suitable arrangements for post-management of the plantations are essential if the expected project benefits are to be achieved. The various levels of government and project agencies have made the appropriate arrangements for this purpose:

- (a) Project management offices at the county, provincial and national levels will remain and they or their successors will continually provide the technical and management support for post-project management.
- (b) Fire and pest prevention arrangements, and technical services for plantation post-management have been integrated into the regular operation of the local forestry system. Significant loss due to fires or pests is unlikely because measures are in place to monitor and control these risks, and the project sites are in widely dispersed locations.
- (c) PMC, provincial and county PMOs will strengthen information services on the dynamic status of the timber markets to the project entities to improve the linkages between plantation management and market needs. Project entities will develop a thinning timing and technical regime for the main species based on the updated thinning guidelines formulated by the Sustainable Forestry Development Project. The final harvest will be required to follow relevant regulations and timely replanting will be carried out for sustainable management purposes. Provincial and county PMOs will develop a training plan for post plantation management and carry out the training, mainly on thinning and pruning techniques.
- (d) The need for continued support of basic research programs through public funding is strongly emphasized. The research agenda of CAF and provincial research institutions is increasingly driven by short-term contractual considerations. Therefore, PMC and CAF will jointly work on linking the follow-up project research programs to the government research priorities and disseminating project research results, so as to provide a continuous flow of new research results for further improvement of plantation quality.
- (e) The funds for post management of project plantations will be raised largely by the planting entities from harvesting of existing plantations and using other short-term income. SFA and provincial forestry departments have also committed to include plantations established under the project within the government commercial forestry development program and financial support will be provided, as a priority, to the thinning of the plantations established under project.
- (f) Central and provincial governments have committed to resolve the logging ban related issues that affect timber plantations in NFPP areas and the successful experience from the pilot will most likely extend to those plantation sites and enable improved logging measures to be adopted. For some protection forests that are located in steep areas or at high altitude, logging will not be allowed and the local governments will offer compensation to those planting entities and provide forest management fee for maintenance operations, as well as likely undertake repayment. It is suggested that the Bank should support Government to carry out a policy study that will appropriately address key issues caused by

the logging ban and ensure sustainable forest management. Logging ban and related subsequent policies will be monitored by the Bank and project agencies in the future. The growth rate and timely thinning of the project plantations are also two key aspects to be monitored during the post project management period.

7. Bank and Borrower Performance

Bank

7.1 Lending:

The Bank's performance in the identification, preparation and appraisal of the project is rated satisfactory. The project objectives were consistent with the Government's development strategy for increasing timber production, in a sustainable way, to address the issues of inadequate forest products supply and improve the ecological environment. The Project also reflects CAS priorities of environmental improvement, technology transfer and institutional capacity building. The Bank team appropriately appraised the capacity of implementing agencies, government commitment, technical and economic analysis for the project preparation. Adapting experience from the previous projects, the project widened the project scope by including multiple-use protection forestry and nature reserves management components to take the opportunity to broaden the introduction of new technology and management experience in those aspects.

7.2 Supervision:

Bank supervision was timely, and included a skill mix and continuity of staff and consultants. Supervision teams recognized project constraints and issues and dealt with them effectively. During implementation, the project management system ensured that plantation establishment, research and extension, procurement, financial management and reporting supporting systems operated smoothly. This permitted Bank supervision to focus consistently on technology transfer, appropriate staff training, development of models for multiple-use protection forest. Supervision missions also paid particular attention to environmental protection measures that were taken to enhance soil and water conservation, maintain biodiversity and implement pest and disease prevention and control.

7.3 Overall Bank performance:

Overall, the Bank's performance is rated satisfactory due to the quality in preparation, and the flexible and effective supervision provided.

Borrower

7.4 Preparation:

Borrower's performance for the project preparatory work is rated satisfactory. At the preparation and appraisal stage, the Ministry of Finance and SFA effectively secured financial and political commitment from the project provincial governments. PMC and the provincial PMOs delivered satisfactory technical preparation documents that appropriately incorporated the recommendations of the Bank missions. Details were discussed in a straightforward and professional manner and senior managers paid full attention to the preparation related difficulties and issues and resolved them clearly and promptly.

7.5 Government implementation performance:

Government commitment and support for the project were consistent throughout project implementation. The government was able to continue to adhere to sound programs of macroeconomic management and forest resource development and protection, and provided necessary counterpart funds. The cooperation

between the Government and the Bank remained firm throughout the implementation period and resulted in a positive impact on project performance.

7.6 Implementing Agency:

The performance of the staff at PMC, provincial, prefecture (municipal) and county PMOs, and township forestry stations was satisfactory during project implementation. They played constructive roles for project implementation and monitoring, and maintained good working relations with financial, planning and other related agencies. There were early problems affecting timely reimbursement due to lack of the coordination between the PMOs and financial departments, but this situation was improved in the second year of the project implementation. During implementation, the project agencies and entities complied satisfactorily with the legal covenants in Credit Agreements and the quality of physical implementation was consistently rated as satisfactory. PMC, provincial and county PMOs also assisted adequately the World Bank supervision mission and provided reports and necessary information on a timely basis.

7.7 Overall Borrower performance:

In view of the above, the overall Borrower's performance is rated satisfactory.

8. Lessons Learned

Lessons learned from the project design and implementation are summarized as follows:

(a) Close correlation with the borrower's priorities is the foundation of the project. This project was initiated by the government and is thus highly consistent with the government development priorities. Therefore, it is continued to enjoy strong support from the government throughout implementation, which has enabled the Bank's goals of environment improvement, technology transfer and institutional capacity building to be reached.

(b) The Strong linkage of research and extension with planting activities was critical to technology transfer. Project R&E has been closely linked with plantation activities and provided innovative and scientific basis for plantation establishment and management which has accelerated the dissemination of new technologies and created broad impacts throughout China. However, the project did not address the broader requirements of future research. The project could have leveraged the component impact more effectively by promoting the integration of sustainable breeding and selection programs in the research agendas of partner forestry institutions.

(c) Centralized procurement of fertilizers and pesticides is not appropriate for multi-province forestry projects, where the project participants are widely dispersed. As the project areas located in about 300 counties, 17 provinces and municipalities, contract packaging and centralized procurement approach led to prolonged delay in fertilizer delivery to planting entities and farmers, which meant that fertilizers were not available for the planting season and caused huge logistical problems. In such circumstances, greater autonomy in procurement must to be given to individual local project agencies.

(d) Further study will be necessary to assess market condition and new policies such as logging ban related issues. Despite China's rapid liberalization, decision-making and planning in the forestry sector still do not fully reflect the market principles. China's entry into the World Trade Organization will also greatly affect forest product markets. In particular, new policies, such as logging ban, have broad impacts on plantation management and planter's benefits. Therefore, the policy studies for

tackling the related issues are needed.

(e) Watershed management will be more effectively carried out as integrated land management approach with treatments not only for forest zones, but also for agriculture lands and necessary conservation engineering work in the watersheds areas. This project has achieved its development target for establishment of multiple-use protection forests which will create substantial environmental and economic benefits for watershed management. However, the overall functions of minimizing soil erosion and water runoff for the catchments would be increased in sustainable way by also including appropriate treatments for agriculture lands and necessary conservation engineering work in the catchments.

(f) Bank projects have raised awareness of the potential of production forestry. Both NAP and FRDPP have retained a simple design and a strong focus on commercial forests. This has contributed to their successful implementation, and to greater awareness of the potential for production forestry and its impact on economic development, while at the same time acting as a social tool for poverty alleviation and environmental improvement. This message could certainly be replicated in a number of other sites, in China and abroad.

9. Partner Comments

(a) Borrower/implementing agency:

Comments From PMC, SFA

Thanks to the constructive cooperation between World Bank officials and the Chinese colleagues, the implementation of FRDPP achieved the expected targets and is thus satisfactory. We regard that the ICR of the World Bank objectively reflected the condition of the project. Since the final financial accounting of the project has not been made, the financial data contained in the report is only used for rough evaluations. The precise financial analysis of the project shall be made after the final accounting.

(b) Cofinanciers:

N/A

(c) Other partners (NGOs/private sector):

N/A

10. Additional Information

N/A

Annex 1. Key Performance Indicators/Log Frame Matrix

Outcome/Impact Indicators:

Indicators	Projected in SAR	Actual/Latest Estimate	Actual/SAR
A. Total Plantation Area (ha)	900,000	1,031,353	114.6%
Protection Forest Program	280,000	282,218	100.8%
Mourning Cypress	15,000	5,823	38.8%
Mixed Conifer/Broadleaf	16,800	21,601	128.6%
Masson Pine	32,000	28,557	89.2%
Chinese Fir	25,000	28,169	112.7%
Sawtooth Oak	22,000	16,237	73.8%
Chestnut	29,000	23,159	79.9%
Pear	4,500	21,690	482.0%
Eucommia 1/	8,700	9,958	114.5%
Chinese Sumac	7,000	932	13.3%
Hill Closure-Replanting	40,000	39,100	97.8%
Hill Closure-No Replanting	80,000	86,992	108.7%
Average Mortality Rate (%)		11%	
Average Acceptance Rate (%)		89%	
Plantation Program	620,000	749,135	120.8%
Chinese Fir	109,200	125,024	114.5%
Mason Pine	121,200	75,557	62.3%
Slash Pine	30,200	38,394	127.1%
Loblolly Pine	33,300	27,536	82.7%
Larch	140,500	169,112	120.4%
Poplar	47,800	62,837	131.5%
Populus Simonii	19,000	64,807	341.1%
Eucalyptus	38,500	25,755	66.9%
Black Locust	13,000	16,643	128.0%
Sichima Superba 2/	23,600	37,330	158.2%
Bamboo-New	11,000	26,229	238.4%
Bamboo-Rehabilitation	30,700	64,829	211.2%
Arundinaria	2,000	2,006	100.3%
Other Conifer Tree	--	13076	--
Average Mortality Rate (%)		5%	
Average Acceptance Rate (%)		95%	
B. Research and Extension Program			
Number of new clones adopted (No.)	Not specific	199	--
Number of new technologies adopted (No.)	41	56	136.6%
Pilot Plantation Establishment (ha)	140	350	250.0%
C. Capacity Building			
Overseas Study Tours (person.times)	105	156	148.6%
Overseas Training (person.month)	60	39	65.0%
Local Training (person.times)	41600	150366	361.5%
International Consultants (person.day)	225	60	26.7%
Local Consultants (person.day)	240	1412	588.3%

1/ Including plantation of 618 ha of Gingko and Mulberry trees.

2/ Actual plantation includes other broadleaf trees.

Output Indicators:

Indicators	Projected in SAR	Actual/Latest Estimate	Actual/SAR
A. Total Incremental Output ('000 m³) 1/	114,378	109,072	95.4%
Mourning Cypress	2,188	713	32.6%
Mixed Conifer/Broadleaf	2,847	1,654	58.1%
Masson Pine - MPF	6,191	4,909	79.3%
Chinese Fir - MPF	5,245	4,740	90.4%
Sawtooth Oak	3,311	2,191	66.2%
Eucommia Wood	48	66	137.5%
Chinese Sumac	591	112	19.0%
Hill Closure-Replanting	5,011	388	7.7%
Hill Closure-No Replanting	6,380	434	6.8%
Chinese Fir	21,221	19,680	92.7%
Mason Pine	18,008	12,293	68.3%
Slash Pine	5,193	7,640	147.1%
Loblolly Pine	6,593	3,105	47.1%
Larch	17,013	25,128	147.7%
Poplar	5,961	6,490	108.9%
Populus Simonii	1,780	9,941	558.5%
Eucalyptus	2,965	2,497	84.2%
Black Locust	884	1,865	211.0%
Other Broadleaf Tree 2/	2,948	3,501	118.8%
Other Conifer Tree	Not specific	1,725	--
B. Total Incremental Other Output ('000 ton)	18,530	31,481	169.9%
Chestnut	1,032	593	57.5%
Pear	512	2,004	391.4%
Eucommia 3/	31	77	248.4%
Bamboo	4,885	10,587	216.7%
Bamboo Shoots	605	1,471	243.1%
Arundinaria	438	491	112.1%
Arundinaria Shoots	13	12	92.3%
Resin	262	283	108.0%
Fuelwood	10,752	15,963	148.5%
C. Planting Material Program (million piece)			
Bare-Root Seedlings Production	1,701	2,189	128.7%
Seedlings Production - Clonal	84	135	160.7%
Seedlings Production - Root Trainers	60	34	56.7%
Seedlings Production - Poly-Bags	294	310	105.4%
Seedlings Production - Bare Root (%)	81	86	106.2%
Seedlings Production - Clonal (%)	5	8	160.0%
Seedlings Production - Root Trainers (%)	Not specific	1	--
Seedlings Production - Poly-Bags (%)	14	12	85.7%
D. Research and Technology Transfer			
Number of species studies for improved cultivation	Not specific	12	--
Number of superior provenances identified	17	35	205.9%
Number of families selected	535	630	117.8%
Number of clones/individuals selected	86	249	289.5%
Number of cross breeding combinations selected	160	444	277.5%
New/improved seed/cutting production areas (ha)	404	484	119.8%
Number of publications, papers and books	Not specific	201	--

1/ Including estimated live wood volume and value.

2/ Actual plantation includes other broadleaf trees.

3/ Including ginkgo and mulberry trees.

Annex 2. Project Costs and Financing

Project Cost by Component (in US\$ million equivalent)

Project Cost By Component	Appraisal Estimate US\$ million	Actual/Latest Estimate US\$ million	Percentage of Appraisal
Plantation	238.93	242.25	101.4
Protection Forests	44.68	41.32	92.5
Planting Material and Nursery Management	41.00	52.44	127.9
Research and Technology Transfer 1/	4.41	1.82	41.3
Capacity Building 2/	4.31	1.12	26
Total Baseline Cost	333.33	338.95	
Total Project Costs	333.33	338.95	
Total Financing Required	333.33	338.95	

1. Including the additional inputs provided by the provincial and county governments from outside of the project budget, total cost used for the Reserach and Technology Transfer activities was about US\$4.22 million, about 95.6% of the appraisal estimates.

2. Using the resources outside of the project, additional US\$2.4 million has been provided by the provincial and county governments for local training. As a result, about US\$3.62 million has been used for the Institutional Capacity Building Component, accounting for 84% of the appraisal estimates.

3. Total project costs do not include the cost for activities supported by GEF.

Project Costs by Procurement Arrangements

(US\$ million equivalent) ¹

Category	Appraisal Estimate				Total
	ICB	NCB	Other ²	NBF ³	
Aforestation Establishment			272.3		272.3
			(149.8)		(149.8)
Seeds			0.6		0.6
			(0.6)		(0.6)
Fertilizer	24.8	2.3		1.9	29.0
	(24.8)	(2.3)		0.0	(27.1)
Pesticides	1.7				1.7
	(1.7)				(1.7)
Vehicles and Other Equipment	9.7	1.2			10.9
	(9.7)	(1.2)			(10.9)
Office and Nursery Equipment	1.2	0.4	1.1		2.7
	(1.2)	(0.4)	(1.1)		(2.7)
Indirect Costs ⁴			8.5	3.4	11.9
			(4.7)	0.0	(4.7)
Research Services			0.5	1.0	1.5
			(0.5)	0.0	(0.5)
Training and tech. Assistance			2.0	0.7	2.7
			(2.0)	0.0	(2.0)
Total ⁵	37.4	3.9	285.1	7.0	333.3
	(37.4)	(3.9)	(158.7)	0.0	(200.0)

1. Figures in parentheses represent the amounts financed by the IDA credit, including contingencies.

2. Other procurement methods include direct recruitment of labor, force account, local and international shopping, and direct purchase.

3. NBF: Not Bank-financed.

4. Indirect costs include costs related to extension, supervision, and information management.

5. Procurement for GEF activities are not included.

Project Costs by Procurement Arrangements

(US\$ million equivalent) ¹

Category	Actual/Latest Estimate				
	ICB	NCB	Other ²	NBF ³	Total
Aforestation Establishment			298.0		298.0
			(179.2)		(179.2)
Seeds			0.2		0.2
			(0.2)		(0.2)
Fertilizer	3.3	1.1		4.7	9.0
	(3.3)	(1.1)			(4.3)
Pesticides				0.2	0.2
					0.0
Vehicles and Other Equipment	6.9	1.4			8.3
	(6.9)	(1.4)			(8.3)
Office and Nursery Equipment	0.5	0.0			0.5
	(0.5)	(0.0)			(0.5)
Indirect Costs ⁴				20.0	20.0
					0.0
Research Services			0.5	1.3	1.8
			(0.5)		(0.5)
Training and tech. Assistance			0.6	0.5	1.1
			(0.6)		(0.6)
Total ⁵	10.7	2.5	299.3	26.6	339.0
	(10.7)	(2.5)	(180.5)	0.0	(193.63)

1. Figures in parentheses represent the amounts financed by the IDA credit, including contingencies.

2. Other procurement methods include direct recruitment of labor, force account, local and international shopping, and direct purchase.

3. NBF: Not Bank-financed.

4. Indirect costs include costs related to extension, supervision, and information management.

5. Procurement for GEF activities are not included.

Project Financing by Components

(in US\$ million equivalent) ¹

Component	Appraisal Estimate ²			
	IDA	Government	Beneficiaries	Total
Intensively Managed Plantation				
Multiple-Use Protection Forest				
Planting Stock Dev. and Nursery Management				
Research and Technology Transfer				
Institutional Capacity Building				
TOTAL PROJECT COSTS	200.0	83.3	50.0	333.3

Component	Actual/Latest Estimate			
	IDA	Government	Beneficiaries	Total
Intensively Managed Plantation	159.0	56.7	26.6	242.3
Multiple-Use Protection Forest	33.5	6.6	1.3	41.3
Planting Stock Dev. and Nursery Management	0.03	5.9	46.5	52.4
Research and Technology Transfer	0.5	1.3	0.0	1.8
Institutional Capacity Building	0.6	0.5	0.0	1.1
TOTAL PROJECT COSTS	193.6	71.0	74.4	339.0

Component	Percentage of Appraisal ²			
	IDA	Government	Beneficiaries	Total
Intensively Managed Plantation				
Multiple-Use Protection Forest				
Planting Stock Dev. and Nursery Management				
Research and Technology Transfer				
Institutional Capacity Building				
TOTAL PROJECT COSTS	97%	85%	149%	102%

1. Total Project Costs do not include GEF activities.

2. No breakdown of financing by component was made at project appraisal.

Annex 3. Economic Costs and Benefits

Species Model		Economic Analysis				Financial Analysis			
		Appraisal		Latest Estimates		Appraisal		Latest Estimates	
		ERR %	NPV '000 yuan	ERR %	NPV '000 yuan	FRR %	NPV '000 yuan	FRR %	NPV '000 yuan
Multiple-Use Protection Forest		16.2	279,736.0	16.4	287,306.9	15.1	195,229.1	15.2	184,215.5
1	Cypress/Alder	9.7	-559.0	14.1	703.8	10.1	-449.6	13.3	391.3
2	Masson Pine/Broad-leaf Tree	10.7	-312.0	14.5	951.1	11.2	-204.0	13.7	540.1
3	Masson Pine	11.7	-92.0	16.3	1,712.1	12.1	34.0	16.1	1,502.7
4	Chinese Fir	13.0	386.0	16.3	2,080.0	13.4	529.2	16.1	1,829.0
5	Sawtooth Oak	9.4	-444.0	17.1	1,466.5	9.9	-354.6	16.1	1,053.3
6	Chestnut	25.6	10,900.0	17.4	3,170.9	22.6	7,461.2	13.9	899.1
7	Pear	23.2	8,304.0	22.5	7,516.2	20.8	5,884.4	19.7	4,813.0
8	Eucommia	18.4	4,045.0	16.6	2,206.8	18.1	3,782.0	16.2	1,884.6
9	Chinese Sumac/White Birch	27.8	7,041.0	15.3	1,006.9	25.9	5,774.9	13.9	528.8
10	Hills-Closure-1	10.9	-93.0	15.9	487.7	10.7	-110.2	15.1	328.4
11	Hills-Closure-2	12.2	10.0	11.6	-20.4	12.0	-0.7	11.5	-20.0
Intensively Managed Plantation		18.0	2,132,623.0	18.9	2,615,838.5	18.1	2,152,375.0	18.2	2,069,553.8
1	Chinese Fir (18)	18.0	7,007.0	16.0	2,119.9	18.2	7,077.0	15.8	1,856.0
2	Chinese Fir (16)	20.4	7,464.0	18.4	5,052.7	20.7	7,745.0	18.2	4,472.5
3	Chinese Fir (14)	18.0	4,947.0	17.0	3,539.9	18.2	5,240.0	16.7	3,100.9
4	Masson Pine (14)	17.2	2,918.0	17.0	3,088.8	17.5	3,070.0	16.8	2,684.0
5	Masson Pine (16)	18.3	4,191.0	17.6	3,497.4	18.5	4,306.0	17.4	3,058.1
6	Slash Pine (18)	14.5	1,859.0	19.3	4,054.4	14.7	1,907.0	19.3	3,728.3
7	Slash Pine (16)	18.7	4,712.0	19.5	5,135.5	18.9	4,770.0	19.4	4,670.0
8	Slash Pine (14)	18.3	3,931.0	18.5	4,353.0	18.5	4,039.0	18.4	3,952.9
9	Loblolly Pine (16)	19.5	5,558.0	15.0	1,496.6	19.7	5,677.0	14.9	1,350.9
10	Japanese Larch (16)	15.8	2,379.0			16.1	2,609.0		
11	Japanese Larch (14)	16.1	2,268.0			16.5	2,509.0		
12	Korean Larch (16)	15.4	2,040.0	16.8	3,036.2	15.8	2,264.0	16.6	2,661.6
13	Korean Larch (14)	15.4	1,834.0	15.1	1,861.9	15.9	2,066.0	15.0	1,604.1
14	Chinese White Poplar (II)	24.6	9,244.0	23.5	6,599.8	24.2	8,533.0	20.7	3,808.2
15	Populus Simonii (12)	26.8	4,690.0	33.5	10,225.8	26.9	4,684.0	31.3	7,484.7
16	Eucalyptus (II)	28.1	3,410.0	25.7	4,791.6	28.9	3,594.0	24.2	3,695.2
17	Black Locust (18)	18.6	2,803.0	21.2	4,611.3	18.7	2,851.0	19.8	3,366.6
18	Schima Superba (II)	15.8	1,881.0	14.8	1,140.9	16.3	2,091.0	14.0	741.0
19	Moso Bamboo - New (II)	25.6	14,543.0	22.9	9,881.2	23.7	11,844.0	21.2	7,401.5
20	Moso Bamboo - Rehab. (II)	21.7	6,756.0	20.6	5,296.9	21.1	5,758.0	19.6	3,982.3
21	Arundinaria (II)	23.3	6,184.0	17.9	2,964.0	22.0	5,309.0	14.8	1,233.7
22	Other Conifer Tree			19.4	2,767.9			19.2	3,342.3
Total Project		17.7	2,412,359.0	18.5	2,896,279.7	17.6	2,347,604.0	17.7	2,248,034.4

1/Projections were made based on before tax and debt service scenario;

2/ NPV for individual species models is in yuan;

3/ Projections for Japanese larch models are included in Korean Larch models.

Annex 4. Bank Inputs

(a) Missions:

Stage of Project Cycle	No. of Persons and Specialty (e.g. 2 Economists, 1 FMS, etc.)		Performance Rating		
	Month/Year	Count	Specialty	Implementation Progress	Development Objective
Identification/Preparation					
	03/92	9	1FS, 2EC, 1SNS, 1ECD, 1NFEC, 1MS, 1RS, 1IMS		
	11/92	6	2FS, 2EC, 1ECD, 1MS		
	5/93	5	1EC, 1FS, 1ECD, 1FA, 1SEC		
Appraisal/Negotiation					
	11/93	8	2EC, 1FS, 1ECO, 1FA, 1RS, 1SEC, 1BS		
	4/94	4	1ES, 1LW, 1DS, 1ECO		
Supervision					
	9/94	3	1EC, 1ECD, 1FS	S	S
	8/95	4	1EC, 1ECD, 1FS, 1IDS	S	S
	5/96	3	1EC, 1ECD, 1FS	S	S
	11/96	3	1EC, 1ECD, 1FS	S	S
	5/97	5	1EC, 1ECD, 1FS, 1ECO, 1IDS	S	S
	5/98	3	1FS, 1RS, 1SNS	S	S
	11/98	5	1FS, 1EC, 1DS, 1SNS, 1SC	S	S
	5/99	4	1FS, 1DS, 1SNS, 1SC	S	S
	11/99	4	1FS, 1DS, 1SNS, 1SC	S	S
	4/2000	4	1FS, 1DS, 1SNS, 1SC	S	S
	10/2000	5	1FS, 1DS, 1SNS, 1SC, 1EC	S	S
ICR					
	3/2002	5	1FS, 1EC, 1RS, 1SC, 1ECO	S	S

/a: DS: Disbursement Specialist; EC: Economist; ECO: Ecologist; FA: Financial Analyst; FS: Forestry Specialist; IDS: Institutional Development Specialist; LW: Lawyer; IMS: Information Management Specialist; MS: Marketing Specialist; RS: Research Specialist; SC: Silviculturist; SNS: Seed Nursery Specialist; NFEC: Natural Resource Economist; SEC: Socio-Economist; BS: Bamboo Specialist.

(b) Staff:

Stage of Project Cycle	Actual/Latest Estimate	
	No. Staff weeks	US\$ ('000)
Identification/Preparation	61.6	231.38
Appraisal/Negotiation	73.8	280.98
Supervision	137.8	324.74
ICR	20	50
Total	293.2	887.1

Annex 5. Ratings for Achievement of Objectives/Outputs of Components

(H=High, SU=Substantial, M=Modest, N=Negligible, NA=Not Applicable)

	<i>Rating</i>
<input checked="" type="checkbox"/> <i>Macro policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Sector Policies</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Physical</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Financial</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Institutional Development</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Environmental</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<i>Social</i>	
<input checked="" type="checkbox"/> <i>Poverty Reduction</i>	<input type="radio"/> H <input type="radio"/> SU <input checked="" type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input checked="" type="checkbox"/> <i>Gender</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input checked="" type="radio"/> N <input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Private sector development</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA
<input checked="" type="checkbox"/> <i>Public sector management</i>	<input type="radio"/> H <input checked="" type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input type="radio"/> NA
<input type="checkbox"/> <i>Other (Please specify)</i>	<input type="radio"/> H <input type="radio"/> SU <input type="radio"/> M <input type="radio"/> N <input checked="" type="radio"/> NA

Annex 6. Ratings of Bank and Borrower Performance

(HS=Highly Satisfactory, S=Satisfactory, U=Unsatisfactory, HU=Highly Unsatisfactory)

6.1 Bank performance

Rating

Lending

HS S U HU

Supervision

HS S U HU

Overall

HS S U HU

6.2 Borrower performance

Rating

Preparation

HS S U HU

Government implementation performance

HS S U HU

Implementation agency performance

HS S U HU

Overall

HS S U HU

Annex 7. List of Supporting Documents

1. China FRDPP ICR by PMC, SFA, March 2002 (Final Version);
2. China FRDPP Research and Extension Program Execution Summary by CAF, March 2002 (Final Version);
3. SAR for China FRDPP, May 9, 1994;
4. Aide-Memoir for FRDPP ICR Mission, March 25, 2002;
5. Chongqing Municipality FRDPP Completion Report, March, 2002;
6. Shandong Province FRDPP Completion Report, March, 2002 (Chinese) and it Brief (English);
7. Fujian Province FRDPP Completion Report Brief, March, 2002;
8. Details of project financial and economic analysis and inputs from the mission members.

Additional Annex 8. Implementation Agency ICR Brief

1. Introduction

1.1 Background

As the result of the lasting attention of Chinese Government, notable achievements were made in forest resource protection and development of the country. However, the condition of China as a forest-poverty country as a whole remained unchanged, which was especially obvious in the imbalance between timber supply and demand. Since the country is mainly relying on natural forest for the need of the timber in economic and social development, the area of natural forest tended to drop continuously and the biodiversity remained seriously threatened. The natural environment in a lot of areas was deteriorating. To reverse this tendency, Chinese Government approved in 1988 a vigorous development program aimed to establish 100 million mu of fast-growing and high-yielding (FGHY) timber plantation bases before year 2000, to develop timber plantations, add forest cover, reduce natural forest consumption, protect biodiversity and improve the ecological environment.

As a part of the above FGHY program and by the use of the World Bank loan, China implemented the National Afforestation Project (NAP) from 1990. The implementation of NAP was a huge success. It has greatly promoted the commercial afforestation process of the project areas and the country. To further accelerate the steps of development of forestry and FGHY plantation bases, alleviate the contradiction of timber supply and demand, the former Ministry of Forestry (MFO) made a proposal of the FRDPP (Phase II of NAP) to the World Bank in December 1991.

1.2 Objectives and Components

The project is designed to enhance the productivity of forest resources, the efficiency of forest resource use and the institutional capacity for sustainable management through investment in the timber plantations and shelter-belt protection forest of the project provinces.

The project consists of the following five components (the completion report of the affiliated GEF financed China Nature Reserve Management Project is prepared separately):

(1). Intensively Managed Plantation is aimed, with timber market demand as the orientation, at new afforestation technology supported plantations establishment of 620,000 hectare in 16 project provinces (autonomous region) for timber, pulpwood and pit props, to alleviate the imbalance between timber supply and demand, maintain and improve the ecological environment.

(2). Multi-Function Protection Forest is, by adopting improved land use planning and advanced technologies for mountain closure and plantation establishment, to establish 280,000 hectares of protection timber plantation and economic tree crops at gullies and watersheds of Hubei, Sichuan and Chongqing in the middle and upper reaches of Yangtze River to recover and enlarge vegetation, control soil and water loss for extended environmental benefits of shelter-belt forest, and improve the living and employment conditions of the localities through the harvest of timber, fruits and forest byproducts.

(3). Research and Technology Transfer is to strengthen the operational focus of research and extension through provision of technical assistance and operating support for 12 priority research programs, experimental plantations, and a field extension network.

(4). Planting Stock Development and Nursery Management is to raise the quality of planting materials through introduction of superior genetic materials and nursery management technologies, and support the production of seedlings needed in project afforestation.

(5). Institutional Capacity Building is to strengthen the capacity of public and private sector institutions in forestry through support for training and technical assistance, improvement of information management system, establishment of a new private sector investment promotion agency, improvement of natural forest management, and policy research.

1.3 Project area

The project is implemented in and by 104,000 afforestation entities of 313 counties (cities) in 17 province (municipality, or autonomous region) including Hebei, Shanxi, Liaoning, Heilongjiang, Zhejiang, Anhui, Fujian, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangxi, Sichuan, Chongqing, Guizhou and Yunnan.

1.4 Project Investment

The planned investment of USD 333 million including the World Bank credit of USD200 millions (140 million SDR at the signing of Development Credit Agreement).

1.5 Implementation period

FRDPP was launched in December 1994 and the implementation completion occurred in December 2001, for seven years in total.

2. Project Execution

(1) Intensively-Managed Plantations

Afforestation. The inspected and accepted afforestation area is 749,000 hectares or 120.8% of the acreage stipulated in The Development Credit Agreement. afforestation targets of all species were over-completed except Loblolly pine, Eucalyptus and Black locust.

Young plantation tending. According to the afforestation models set for project species, the young plantation tending completed reached 1,230,000 hectares tending time.

Main supplementary works under the project. The actual number of guard/storage sheds completed is 2,159 ones. The constructed forest road came to 2,214 kilometers.

(2) Multi-Function Protection Forest

Afforestation. The inspected and accepted afforestation area is 282,000 hectares or about 100% of the planned 280,000 hectares of the Development Credit Agreement. The afforestation acreage targets of all species were fulfilled except Eucommia, Chinese Sumac, Sawteeth oak and the mixed forests.

Young plantation tending. According to the project afforestation models, the young plantation tending completed reached 370,000 hectares tending time.

Construction of Guard /Storage Sheds. The actual number of sheds completed is 712 ones.

(3) The Planting Stock

Planting stock development. Production promotion measures were taken in the seed orchard (153.3 ha.) and seed stands (240.7 ha.) which were developed under the NAP Planting Stock Development Program. These measures have helped improve the quality and increase the quantity of the produced seeds and the annual supply of superior seeds came to 2,527,000 kg. 199 superior clones were screened for Chinese Fir, Poplar, Larch, Eucalyptus and Black locust. Besides, superior families were screened for Chinese Fir, Masson Pine, Larch, Exotic Pines, Eucalyptus and Alder with the family number reaching 630 ones in total. Based on these clones and families, 89-hectare clonal multiplication gardens (including the cutting orchards and the cutting planting gardens) were built for Chinese Fir, Larch, Eucalyptus, which has aided in the increased productivity of clonal stock by 26 million plants.

Improvement of Nursery Management Technology. The Nursery Technological Management Guidelines, and the Seedling Criteria for Major Species were prepared and carried out. For each county, one central nursery and several key nurseries for which the central nursery should provide technical guidance were selected as the main planting stock supply channels of the project. Accordingly, the stocks provided by these two kinds of nurseries were over 80% of the afforestation stocks under the project and the important technical measures of nursery management were appropriately carried out in the central nurseries, including reduced seed sowing rates for production of fine quality seedlings, implementation of improved culling regulations, extension of root undercutting of pine species, improvement of the potting media prescriptions of the root trainers.

Seedling Production. For the whole project, 2.1 billion Grade I stock should be produced. The actual production came to 2.53 billion plants, of which the Grade I seedlings is 2.39 billion plants or 113.8% of the planned target. Of the stock production, the containerized seedlings represented 13.6% of the total, the clonal stock 7.8%, in compliance with the targets determined at the project appraisal

(4) Implementation of Research and Extension Program

The Research. While continuing the observational studies of NAP, the afforestation technology of multi-function protection forest was added to the FRDPP research program. In the implementation of the project, 350 ha. research experimental plantations, 14076 ha. of demonstration forest were established. Consequently 49 research achievements were appraised and accepted, and 173 research papers were published.

Technological Extension. In the 17 project provinces, totally 59 technological accomplishments were disseminated and applied. These accomplishments and technologies have significantly improved the project afforestation quality.

(5) Environmental Management and Monitoring

On absorbing NAP experiences in environmental protection, improved environmental protection guidelines were prepared for FRDPP, which have strengthened the environmental management of the project. The major adopted measures are as follows:

Execution of Environmental Protection Guidelines. The FRDPP Environmental Protection Guidelines

was implemented vigorously, and the performance of execution of environmental protection guidelines was taken as a major project indicator and part of the standard project inspection acceptance.

Implementation of Environmental Protection Monitoring Plan. Shanxi and Heilongjiang as new provinces of FRDPP, in accordance with their actual conditions of the afforestation sites, set up 3 monitoring plots. For multi-function protection forest, 3 monitoring plots were established in Chongqing Municipality, Sichuan and Hubei Provinces. The monitoring results indicate that the ecological environment of the project afforestation site was basically improved and the soil and water better conserved.

(6) Goods Procurement

By the end of 1999 and by various means of procurement, 49,194 tons of chemical fertilizer, 2189 kg of superior seeds, 228 sets of forest fire control commanding vehicle, 56 pick-ups, 44 trucks, 75 field motorcycles, 64 caterpillar tractors, 236 sets of office equipment, 6 plastic shed greenhouses, 4 sets of sprinkling and spraying irrigation equipment were procured, with the total expenditure of 13.265 million US dollars or 100% of the planned procurement cost.

(7) Training and Technical Assistance

Domestic Training. 4,373 training courses in various types were conducted with 150,000 person times, 360% of the planned target. For the breakdown, the national level 41 courses with 3,860 person times, the province level 454 courses with 11,965 person times, the county level 3878 courses with 134,500 person times. In addition, 282,561 workers and farmers have been trained.

Overseas Study Tour and Training. In accordance with the actual needs of project implementation, from 1996 to 2000, PMC organized 24 study tours (15-20 days per tour team) for 156 person times to ten countries, including USA, German, Sweden, Turkey, Canada, Japan, Finland, France, New Zealand and Australia respectively. Besides, PMC organized 13 selected young project technical staff with better English proficiency level to Canada for project management training and improved English learning courses for 3 months. Compared with the targets by person times, the completed study tours represent 149% of the plan; and the completed training makes up about 65%.

International Consultancy. During the project implementation, project consultants of natural forest management, fertilization and feasibility studies (the International Consultancy Panel) of 60 person days or 42.8% of the plan were procured for the project.

(8) Natural Forest Management Pilot Program

The natural forest management pilot program implemented finally completed acreage of 834.53 ha. or 104.32% of the target of 800 ha.. The implementation happened in three counties of Jiangxi, including Xinfeng, Ninggang and Jing'an and the managed forest types are mid-term rotation young growth thinning forest and the middle-aged, density-based management timber forest. The 3 counties totally invested 1776,600 yuan taking up 120.9% of the planned target of 1,470,000 yuan. Of the actual investment, 872,700 yuan is the credit fund accounting for 49.1%, and 903900 yuan, the counterpart funding representing 50.9%.

The acceptance inspection of the program concludes that the area verification rate is 100%, the unwanted vegetation cutting compliance rate 95.8%, the tending/felling compliance rate 90.9%, the patch-up survival rate 96%, the density control compliance rate 100%. Meanwhile 50 km forest road was built with road density of 16.7 ha/km.

(9) Plan Adjustment

During the project implementation, six major adjustments were conducted including those of project province participation, afforestation plan, the category of credit fund, afforestation unit price and goods procurement.

Project Province. In 1996, Guangdong province withdrew from the project while Shandong took part in the project.

The Afforestation Plan. Following the adjustment, the acreage of the component of intensively managed plantations went up from 620,000 ha. to 702,000 ha (an increase of 102,000 ha); and the acreage of the multi-function protection forest rose from 280,000 ha. to 288,000 ha. (an increase of 8,000 hectares).

Credit Category. Responsive to the needs of project implementation, the adjustments of August 1997, January 1999 as well as June 2000 reduced the credit scale of goods procurement, consultancy and training by increasing the scale of afforestation.

The Adjustment of Unit Price. The afforestation unit price were increased after the adjustment.

(10) Fund disbursement

At the completion, the total investment came to 2.815 billion yuan (339 million US dollars equivalent) in total, or 101.6% of the budgeted 2.767 billion RMB yuan (333 million US dollars equivalent). The breakdown amounts include USD194 million of credit fund (1.611 billion RMB yuan equivalent) or 57.2% of the total actual investment and 99.3% of the credit budget, 1.204 billion RMB yuan of the domestic counterpart fund for 42.8% of the total actual investment. (Exact figures of this paragraph shall comply with the final accounting of the project). In addition, the project provincial and county governments have provided about US\$ 4.9 million funds from the budget outside of the project to support the local training and extension activities.

3. Project Achievements

3.1 Economic Benefits

After the project enter production, 106.31 million cubic meters of timber, 15.32 million tons of fuelwood, 200 million kg. of resin, 2 billion kg of various fruit products, 6.298 million tons of bamboo, and other miscellaneous forest products will be produced accumulatively with the total output value estimated at 49.06 billion yuan. After tax, the NPV would be 2435.42 million yuan and the internal rate of return 20%. Based on the project input-output analysis, the project output would exceed the project input beginning from the 6th year of implementation.

3.2 Ecological Benefits

(1) Increase Forest Area and Coverage

During the project implementation, a total of 1.03 million ha. of plantations was established by 313 project counties (cities), leading to an increase in the forest coverage by 1-2% in the project areas with a potential timber production of 106.31 million m³, which has guaranteed the smooth implementation of NFPP and promoted the sustainable development of forestry.

(2) Health of the Plantations

Compared with the plantations outside the project, the project plantations are growing more vigorously and generally healthier, with little occurrence of pest and diseases in the young plantations.

(3) Benefits of Soil and Water Conservation

The monitoring results of the multi-function protection forest indicate that benefits of soil and water conservation of all plantation types and site conditions were obvious, with the soil and water loss reduction rate at 44% - 60%.

(4) Benefits of water retention

Calculated by saturation of the forest land, the 1.03 million ha. project plantation has an added water storage of 560 million tons. At the price of 0.8 yuan per ton, the benefits of water retention of the project is 448 million Yuan.

(5) Carbon absorption

Based on the characteristics of different tree species on the absorption of CO₂, the established 1.03 million ha. plantations of FRDDP shall absorb and fix carbon up to 76,827,000 ton by the year of 2018 accumulatively, equivalent to the amount of carbon released from the burning of standard coal of 118 million ton.

3.3 Social Benefits

During the implementation period, the afforestation activities created 420,000 person year employment labor (calculated by 300 days per year), generating an poverty alleviation income of 1.98 billion Yuan for the project implementation area. Compared with NAP, FRDPP has a wider coverage in beneficiaries' participation. The participation of households, shareholding forest farms and collective forest farms accounts for 85.6% of the total, 10.6% higher than that of NAP. Moreover, of the 313 project counties, 88 were nationally-designated poverty counties. By means of project implementation, the significant social benefits were generated in that the short-term incomes of these beneficiaries have been improved, which is conducive to the local poverty reduction in the future.

3.4 Technical Improvement

Technical improvement include:

- (1) Adoption of density control and innovative afforestation models for major project tree species, which have resulted in favorable impacts on the general growth and quality of the project young plantations.
- (2) Extension of Updated Seedling Production Technologies. To ensure the application of fine quality and qualified seedlings in project afforestation, the effective measures adopted under the former project NAP were continuously employed in FRDPP including establishment of central project nurseries; supply of seeds, and cultivation and provision of seedlings in set locations as well as issuance of three certificates like "Superior Seeds Certificate", "Seedlings Quality Certificate" and "Stock Inspection

Certificate". Besides, based on the actual needs of the project provinces, the innovative seedling-raising technologies have been popularized under FRDPP including "root-cutting technology for pine tree seedling raising in the field", "containerized seedling raising technology for pine trees and eucalypt", "application of mycorrhiza inoculation for pine trees and eucalyptus seedling raising" and "root retaining technology for poplar seedling raising". The promoted area has been up to 26,800 hm², resulting in a greater improvement in seedling quality for project afforestation with provision of over 95% of the Class I seedlings by the project nurseries. For instance the wider application in seedling raising and project afforestation of the cycorbial innoculum composed mainly of fungus *Pt* the exomycorrhiza, the promotion of the technology has led to improved quality of seedling and afforestation. Specifically, after implementation of the technology in pine tree seedling raising, both the survival rate and the preserving rate have been increased by over 5% on the average, the height growth increased by 13~56% and DBH of the young plantations by 25~60%.

(3) Dissemination of Practical Afforestation Technologies. To ensure the project afforestation quality, a series of practical and efficient afforestation technologies were widely adopted and disseminated in accordance with the actual needs, which include: "Fertilization Regime for Major High-Yielding Tree Species", "Technologies of Small Hole Site Preparation and Partial Tending", "Classification and Assessment Methods for Timber Forest Land Type", "Technologies of Planting Density Control and Thinning for Major Tree Species", "Improvement Technologies for Inferior Bamboo Forests" and "Biological Control Methods of *Aeolesthes sarta*". By adopting the new technologies, there have been a remarkable improvement in afforestation quality and young plantation growth.

(4) Technical Extension for Establishment of Multi-Function Protection Plantations In establishment of multi-function protection plantations, a variety of effective measures have been taken in light of the planting site conditions in the project areas, which has generated obvious impacts on ecological environment. From the 7-year implementation practice, several optimized management models for multiple-function protection forests have been developed.

4. Participation of the World Bank

During the 7-year project implementation period, the World Bank conducted regular reviews of the various project documents submitted by PMC as required such as project annual plans, project progress reports, the financial statements and the relevant auditing reports, the progress report on the technical research and extension program as well as a variety of project procurement documents. Besides, from 1995-2001, the World Bank sent 12 supervision teams in total to implement official field review. Based upon the supervision findings, the supervision aide-memoire was developed for each field tour. In each aide-memoire, the supervision group confirmed the achievements made in the project implementation and pointed out the problems and proposed recommendations, which has played very important role in providing guidance for smooth implementation following the set objectives. In the period of the project preparation and implementation, the Bank officials and consultants adhered to the project management principles and regulations and they listened to the views from the Chinese side and adopted the practical and effective ways to solve the problems emerged. This has contributed to the adaptation of the local situation and continuous improvement of the project implementation.

5. The Post-completion Management Plan

5.1 Objectives and Responsibilities

Classified management would be conducted to the established plantations according to tree species, site

conditions, plantation growth, etc. by means of appropriate organizational and technical measures for promotion of the stand increment, stocking volume and timber production value to achieve or approach the described targets, to ensure the FIRR at no less than 12%, to ensure that the afforestation entities shall be able to repay timely the Bank loan and to improve the economic and environmental conditions in the project areas.

5.2 Methodologies and Measures

(1) Stabilization of the institutions

The project management institutions at different levels will be maintained or adjusted based on projects needs and characteristics.

(2) New project operation system

It needs to be established to integrate the future project plantation management and "three prevention" (including prevention of fire, pest and diseases and illegal harvesting and cattle damages) be implemented into the routine forest management of forestry units at various levels. The afforestation entities will take full responsibilities of the plantation management with the technical management work carried out by corresponding managerial functions at county and township levels. Specifically, the project forest fire prevention will constitute a part of the responsibility of the county fire prevention office; the project forest pest and disease control and monitoring will be the responsibilities of the county forest pest and disease control and monitoring stations; the thinning and management of project young plantations will be guided by county forestry stations; and the county forestry legislation management section will be responsible for harvesting approval and monitoring, the township forestry stations will carry out the unified management of the afforestation entities and the county forestry bureau will be in charge of the state forest farms.

(3). Efforts will be taken in tending/thinning management of project young plantations to promote their rapid growth

The afforestation entities are required to prepare and implement the management work in response to the different Categories of stands, following the management principles that Category I plantations should be maintained, Category II plantations be promoted into Category I and rescuing measures should be taken for Category III plantations earnestly.

In accordance with the findings of the thinning studies carried out by the project technical research and extension group, the afforestation entities should prepare the improved regime for thinning time and strength and the operational guidelines of major tree species.

The PMOs at all levels are required to prepare and implement a training plan for future project plantation management, with thinning and pruning as its main components to ensure that the afforestation entities are fully familiar with the key technologies for their future management work.

(4) Mobilization of funding for future operation and sustainability of the project.

The funds for normal stand management will be borne by each afforestation entity, the project beneficiaries, while the funds for sectoral responsibilities will be from the corresponding functionaries of the project county. Specifically, the forestry stations will be responsible for technical services; the forest pest and disease control station responsible for monitoring pest and disease occurrence; the forestry legal and administration office and forest fire prevention and control office for the their

respective tasks, and the state forest farms will be administered by the original authorities.

In regard to the project economic tree crops designated now inside NFPP area, income would be generated in the later project implementation stage and the future management, with which the sustainable project management would be conducted. Meanwhile, the timber plantations and multi-function protection forests now located in the NFPP implementation areas, the relevant forest maintenance cost will be covered by the forest maintenance fees, forest ecological subsidy fund allocated by the Government, together with the funds from NFPP. For some protection forests which planted in very steep mountains, logging will not be allowed and the local government will likely undertake the repayment also. In addition, an improved taxation and fee levying system will be implemented, which means more resources can be mobilized for the sustainable management of FRDPP plantations. A pilot on sustainable logging and replanting for the timber plantation has been carried out in Sichuan Province and the central and provincial government have confirmed that the pilot is successful and will be much likely to be extended to other regions.

The funding for future operation of the project may also be from the revenues generated through cooperative operation in plantation management with the large-scaled papermaking enterprises or from marketing of their thinned timber.

PMC, provincial and county PMOs will strengthen its information services by which data on ongoing basis of the timber markets including its development tendencies as well as the best option for cultivation targets of tree species would be provided to the afforestation entities, in an attempt to maximize the economic benefits of the afforestation entities by orienting their cultivation activities to the needs of the market.

The government will provide financial support for development of fast-growing and high-yielding plantations, for which the preferential loan with subsidized interest will be implemented. The concessive loan is also funding source for the future project operations.

IMAGING

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